Village Governance Framework and Natural Resources Management in Rural China[1]

SHI Xiaoping, QU Futian & GU Xiang

College of Land Management, Nanjing Agricultural University, China

Introduction

The exploration of nature resources is still a main source of income for farm households in rural China, especially in underdeveloped areas, so it is very important to keep utilization of natural resources in a sustainable way. More than 600 million people living in rural China earn their livelihood partly through explorations of natural resources. In this sense, the sustainability of natural resources utilization is very important for supporting their livelihood. On the other hand, the un-rational use of natural resources gives rise to frequent natural calamities and serious resource degradation in recent years. Recent empirical studies show that problems of desertification, water erosion, rural industrial pollution of water, soil and air, salinization, and declining soil nitrogen and organic matter contents have generally increased (e.g. Ho, 2001; Lindert, 1999). For instance, destruction of vegetation cover and soil degradation at upper reach of river cause floods at the middle and low reach of the river. At the national level, the frequently and severity of natural calamities, such as droughts, floods, and sandstorms, has increased in recent years. In 1998, the flooding in central China lasted for over 1 month causing huge damage to a number of provinces along the Yangtze River. In 2001, a severe sandstorm hit north China, especially Beijing suffered from it for more than 2 weeks (Yao, 2002). Due to its strong externality, it thus has attracted much attention from researchers and policy makers in recent years.

Natural resources in rural China are used under a specific framework of property rights--Collective ownership. For instance, agricultural land is used and developed under the village collective ownership. Since the implementation of Household Responsibility Systems (HRS), natural resources such as cultivated land, orchards land and forestland that used to be in the charge of the collective (Kung, 1995; Kung and Liu, 1997; Dong, 1996), have been contracted to the individual farm households. Because cultivated land is the most important resource for households' subsistence, in most areas it was distributed according to population or number of labors in each family while orchards land and forestland were distributed in different ways to promote economy of scale. Orchards land

[1] Financial support by the Netherlands Ministry of Development Cooperation (DGIS-SAIL program) and the European Union (EU-INCO program) and the National Natural Science Foundation of China (70403007) is gratefully acknowledged.

and forestland might be contracted to one household or several households jointly. In some areas, the village collective retains certain amount of land managed at village level. At household level, redistribution of cultivated land occurs for several times due to demographic change or other reasons, and different ways of contract have been innovated, "two-farmland system (TFS)[2]", "three-farmland system (THFS)", "management in economics of size", "share-holding management" and etc. to overcome the shortcomings of HRS (Chen and Brown, 2001; Zhang, 1998; Zhang, 2002). Orchards land and forestland were also contracted in diverse models: auctioning use rights for managing uncultivated hills for tree planting, share-holding management of forestland under collective ownership (Song et al., 2004).

To advance the reform in utilization of rural natural resources, not only roles of households are very important, the village collective also play a key role since they has the power to redistribute land to sign contracts and make rules related to natural resource utilization (Xiong, 2001). Laws and policies issued by different levels of government also have some influence on natural resources development and use such as agricultural structure change (*Nongye Jiegou Tiaozheng*), project of transferring cultivated land to forestland, plan of closure mountains and tree planting (*Fengshan Yulin*), quota for felling and transfer license. So natural resources use is regulated by the village governance framework, government policies and law, and its ultimate efficiency will affect natural resources use. Moreover, role of governance framework at village level is outstanding in regulating natural resources use. It plays the role for explaining the government policies, and affects the power of law implementations (Zhang, 2003). So, effective governance at village level is a prerequisite for sustainable use of natural resources in rural China. Therefore, understanding governance at village level, especially the role the village collective might play would improve the policy efficiency in government's regulating natural resource use, and hence ensure its sustainability.

This paper begins with an overview on the governance framework of natural resources in rural China, the changes it has undergone in these twenty years' reform and opening-up. Based on analysis of data collected in villages in Jiangxi Province, the paper points out the defects of current governance framework of rural natural resources in the less-developed areas and difficulties it has to overcome. In the last part of the paper, some countermeasures are proposed. It focused on the utilization and management of land resources as the authors believe that it can represent very well the general situation of natural resources utilization.

The paper includes several parts as follows: Background to institution context, land use and its environmental impact will be given in section two, and institutions and environment will be presented in section three. The fourth section provides case studies

[2] The explanation about "two-farmland system" can be found in Chen and Brown (2001).

from Jiangxi province, and the last section ends with conclusions and policy recommendations.

1. Background to institution context, land use and its environmental impact

Recently, some new changes have taken place in rural natural resources which are closely related to efficiency improvement and sustainability of resource use and thus deserve more attention from both micro and macro aspects. China has 123 million ha of cultivated land, 0.093 ha per capita. From 1996 to 2003, 8.27 million ha of cultivated land has been converted to non-cultivation purposes with an annual decrease of 1.18 million ha, and 16.1% of total decrease of cultivated land or 1.333 million ha is used for urban construction. There are 0.867 million ha cultivated land in total decreased cultivated land used to be fertile with good irrigation conditions (Communique by Ministry of Land Resources, 2003). In arid and semi-arid areas, about 40% of cultivated land has experienced more or less degradation (Qu, 2002).

The sustainable use of cultivated land raises more concerns; because even increasing losses have been created by natural calamities, land erosion, industrial pollution, excessive use of fertilizer and pesticides. Statistics show that the area of land eroded and land desertification has come up to 3.60 million km^2 and 1.74 million km^2, accounting for 37.5% and 18.2% of the total area of the country respectively. At the same time, increasingly severe land erosion and desertification have led to rapid degradation of eco-environment. On the one hand, more than 2 billion tons of bedload has been brought into Yangtze and Yellow River, the deposition of which in the bed makes water level rise and cause floods in the lower reaches. On the other hand, the northern part of the country suffers from problems of sand storm and droughts (see Wang, 2003). Soil salinization caused by improper farming process, especially by inappropriate water use, is also a big problem. The total salinized area has reached more than 80 ha, of which 37 million is newly added. Problems such as un-rational location of town and village enterprises also give rise to farmland pollution (Qu, 2002).

With the acceleration of industrialization and urbanization, a large amount of rural cultivated land in urban fringe has been used for urban construction. According to Li's (2000) analysis of data from 1988 to 1995 provided by the former Bureau of Land Management, 62% of the lost cultivated land was transferred to orchards land, fishing lakes, forestland and grassland due to agricultural structure change. The other 20% was used for construction, and the rest was destroyed by natural calamities (wind and water erosion, sand storm, floods). During these 8 years, 76% of the newly cultivated land came from cultivating wasteland, while 13% and 11% from agricultural structure change and land reclamation.

Cultivated land area decreases more strikingly in rapidly developing provinces where land is much more fertile than that in western and southwestern provinces. The central government issued the strategy of maintaining a dynamic balance of cultivated land within every administrative area to ensure that the total area of cultivated land remains the same. Yang and Li (2002) analyzed the change of cultivated land in different provinces and found the short-term stability of cultivated land area might lead to failure of stability in the long term and do harm to eco-environment. They found that after the strategy was enforced, there was indeed an increase in cultivated land area in western provinces where eco-system is quite fragile, but this increase is achieved developing land resources in reserve, that is, grassland and forestland, which are very important to maintain eco-environment in those regions. The impact on environment and sustainable resource use is often overlooked in order to achieve the goal designed in the strategy.

Since the reform and opening-up, especially with the implementation of HRS, cultivated land[3] that used to be owned and managed by the village collective now was contracted to households. In 1979, only 1.02% production brigades adopted HRS, in 1980, the percentage rise to 14.4% while in 1984, it was more than 99% (Lin, 1991). Since then, the growth in agriculture was quite amazing, especially in grain production. After that, new adjustments and innovation on contracts such as TFS, THFS, "land share-holding system", "inverse rent and contract" (*Fanzu Daobao*), have been practiced to suit the changing situation in population and economic conditions, which brought forth agricultural growth. But at the same time, frequent land redistribution leads to insecurity of land right that has been a concern of many policy-makers and researchers, which might discourage households to invest in land, especially to make long-term investment (Zhu, et al., 1997).

Since more and more rural people work and migrate to urban areas, the pressures on rural natural resources have been to some extent alleviated. For instance, households' needs for firewood have decreased since a lot of rural laborers move out for jobs, and more and more households begin to use coal instead of firewood (Chen, 2000), which help reduce depredation of forests and promote their rehabilitation. Since households choose to use modern inputs instead of traditional materials in agricultural production, sustainable use of rural resources are threatened. The application of pesticides and fertilizer instead of green manure leads to soil degradation, river and ground water pollution and rural eco-environment deterioration. Land erosion could become more severe due to lack of long-term investment, such as maintenance of terraced land in agricultural production. The decrease planting of green manure and use of organic manure leads to land hardening and degradation of land quality (Shi, 2001).

[3] Some cultivated land was state-owned, including land cultivated by state-owned farms. But most cultivated land are owned by the collectives.

In order to improve farm households' living standards, agricultural structure change has gradually been implemented since 1998. Instead of only growing grain, households began to follow the needs of market and supply all kinds of agricultural products to the markets. The diversification of agricultural production may have a complex impact on land quality, which is not quite clear yet. In recent years, idle lands appeared in many rural areas because of the decline of grain price and households' migration to cities. More than 17% of cultivated land had been abandoned, and even 36% of cultivated land in certain towns in Hubei Province (Chu, 2001)[4]. The decrease of cultivated land area, the increase of idle land, and other un-rational behaviors of households in farming have great effects on sustainability of cultivated land use.

So far, as forestland is concerned, there was 158.9 million ha in 1998, and man-made forest had increased by 25.2 million ha compared to that in 1994 (Ministry of Forestry, 1994; State Forestry Administration, 2000), 52.6% of which was owned by collectives (owned by production brigades and teams or planted by collective members barring woodland near houses) (Xiao, et al., 2002). After HRS was implemented, collective-owned forestland was gradually contracted to individual households also in some areas. A new innovation has been introduced in wasteland management, auctioning 'five wastelands' (uncultivated barren hills, valleys, riverbanks, wilderness and etc.) to the private sector for afforestation. Since being adopted, auctions have been implemented in 16 provinces. Up to 1996, rural households purchased 3.7 million ha of wasteland. In total, auctions have resulted in the development of 1.9 million ha, which is 50.4% of the auctioned land (c.f. Li and Yang, 2000). In some areas like Sanming prefectures in Fujian Province, forestland is managed under share-holding systems. Those innovations not only bring great profits to them, but also improve use efficiency of forestland (Song et al., 2004).

The macro policies related to cultivated land and forestland have undergone great changes. In the past, in order to promote grain production, cultivated land area had been enlarged without considerations of eco-environment impact. At present, the basic target is to increase farm households' income and meet the demand of consumers, thus agricultural structure change is necessary. Because the priority is given to grain production, when its production fluctuation occurs, the government tends to change its policies, thus exerting a negative impact on agricultural production and cultivated land use. So far, as forestland is concerned, development and use of economic woods was encouraged in the past while now protective development is more in favor. For instance, the Natural Forest Protection Project encourages households to convert farmland to forestland and pasture. In order to protect land and prevent land erosion, cultivated land with a slope of more than 25 degree should be converted to forestland or grassland according to local conditions (Xiao et al., 2002). At the state level, the central

[4] Idle land might have a favorable impact on rehabilitation of land quality.

government has attached more importance to natural resource conservation and invested 322 million US dollars in projects to protect natural forest (Xiao et al., pp8, 2002).

2. Institutions and Land Resources Use

The degradation and un-rational use of rural natural resources are caused by many natural and social factors combined, and one of which is inappropriate institutions and policies. For a long time, the rural land tenure reform in China has received much attention for its great contribution to agricultural production growth. It plays quite important role in giving incentives to farm households and regulating them on land use. However, the impact of incomplete land property rights on agricultural eco-environment has received little attention, and that could be shown in the following aspects.

First of all, the use rights entitled to the households are implicit in the present framework of land property rights since the land tenure reform was incomplete. Based on 119 interviews with 240 households in 7 provinces in China, Prosterman found that the "quasi-ownership" given to households is quite ambiguous since the term of validity of use rights is not longer sufficient and uncertain, households might be deprived of land use rights due to land redistribution or land requisition (Zhang, 2003). Another effects of the vagueness of land property rights are that households cannot decide on the type of crops they'd like to grow because of the grain quota system (Qu et al., 1997). In the process of agricultural structure change, some local government officers and village leaders out of their own interest, may order households to grow economic crops they recommend and cause loss to farm households.

Secondly, households cannot obtain loans by taking land as collateral due to its incomplete claim to land property rights. Farm households often have no access to credit to invest in agricultural production because of poverty and lack of collateral. Thus land becomes important for them to gain credit. Since now they cannot do so, agricultural production might be affected and they are unable to make sufficient investment in land protection.

Thirdly, the insecurity of land tenure might have some negative impact on households' investment behavior. Originally, land was given to households for 15 years, but then it was redistributed in many areas due to change in population and social economic conditions. In the second stage of implementation of HRS, land tenure could last for 30 years as designed in the policy stipulated but in practice it is not the case in many villages (Xiong, 2001). A number of researchers have studied on how property rights entitled to the households influence land use efficiency and cause eco-environmental problems (Xiang and Huang, 2000, Wang, 1999; Hu, 1997; Zhu et al., 1997; Luo and Wen, 1996). According to Hu (1997), because the term of land contract is too short and land tenure is

not well defined, households are reluctant to make their long-term investment and pay adequate attention to maintain of irrigation equipments etc., which may result in land degradation and other environmental degradations. Zhu et al. (1997) found that frequent land redistribution would discourage households to use green manure and other inputs to improve land quality, which shows land redistribution has a negative impact on land quality improvement. Besides, insecure land tenure of forestland also tends to cause more deforestation and excessive exploitation of forest (Luo and Wen, 1996).

Some case studies reveal that with enhanced land tenure security households would consider more about their long-term interests, which would lead to sustainable land use and improvement of eco-environment. For instance, by auctioning “five-wastelands”, land rights are well defined and the term of contracts is prolonged, which greatly encourage households to put in more capital and labor. As a result, the uncultivated barren hills, valleys, riverbanks and wilderness are covered with green plants again, which do benefit to the improvement of environment also (Zhang, 2002).

Because of small size of contracted land and scarcity capital availability, it will be difficulties for individual farm households to invest in farmland irrigation infrastructures, irrigation works and terraces building. However, use of organic and planting green manure in field, which may improve the sustainable land use, may be less affected by household land size and capital availability.

As mentioned above, because utilization of rural natural resources is regulated under the collective property rights system in China, its using pattern and its impact on eco-environment is determined not only by household behaviors, but also on village collective-owner of these resources and by government policies and regulations. The status of resources use will be determined by farm household behaviors and interactions among households, village collectives and different levels of governments. A number of researchers have paid much attention to the manner in which the use rights of farm household obtained from village collective was formulated, and the consequences of those rights on land use (Li et al., 2000; Liu et al., 1998; Rozelle et al., 2001). They focus on investigation land use efficiency, and less emphasis has been given to its impact on eco-environment. Policy distortions occur frequently at village and household level (Zhang, 2003). For instance, in order to prevent eco-environment degradation, the central government has made a series of policies on natural resource conservation such as Natural Forest Conservation Project, Plan on Transferring Farmland to Forestland. Those policies are effective in some areas while in others they just fail to achieve their goal since household behavior and local conditions are overlooked in the process of making and implementing policies (Wang, 2003).

Effective governance of rural natural resources may have great impact on sustainable use

of rural land because it is collective owned. Study on village governance and institution formulation may provide a new perspective for analyzing resource use and management (Zhang, 2003). In the framework of village governance, roles of the village collective, village committee and village group [5] deserve more attention. Figure 1 provides a structure model that illustrates how the village collective interferes with land use. Village collectives play significant roles in natural resources use. The village collective not only is directly engaged in land management, more importantly, it also can exert an influence on land reallocation, decision on term of contracts, definition of contracted rights, and etc. In recent years, the village collectives play an important role in land requisitions in that it makes a big profit and acts as the government to accelerate land requisitions (Qu, 2001).

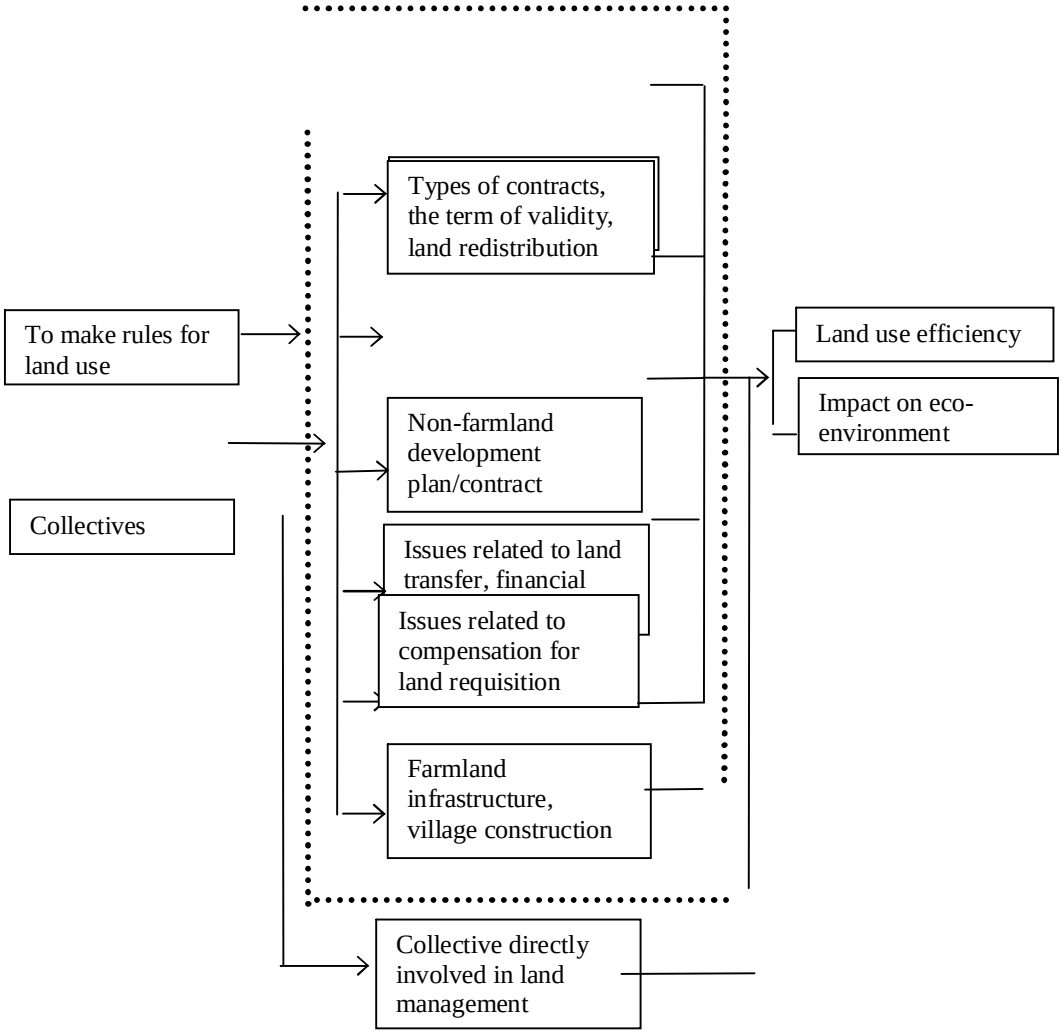

Figure 1. Illustration of Village Collective's Interference with Land Management

Since land property rights are collectively owned, and farm households dominate in land

[5] Diversified representatives of ownership of natural resources exist in villages in rural China, and in practice it can be

utilization, and use of rural natural resources is under a complicated framework of governance. So, efficient governance at village level will be very important for rural natural resources use, especially when farm household behaviors have strong externality during agricultural production. Decisions of farm household on land use will not only affect the environment locally, but may also the interests of other people from other places. For instance, we found during the field visit in Jiangxi province that some farmers cut all trees on the banks of river and planted fruit trees. However, the floods in 1998 not only destroyed all his orchards land, but also these of other households (Shi, 2001).

Through a comparative study of land resources management in several villages, we may find how the governance framework at village level affects local land resources management. Geographic factors and market access maybe very important in formulating the governance framework at village level, and its efficiency in turn will have great effects on the resources utilization efficiency.

3. Case studies in villages of Jiangxi province

This paper uses data collected in Jiangxi Province (covering the year 2000)[6]. Detailed data collection description can be found in Shi et al. (2006) and Kuiper et al. (2001). The three villages selected are Banqiao in Yujiang County, Shangzhu in Guixi City and Gangyan in Yanshan County. They belong to three townships, three counties and two prefectures (Yingtan and Shangrao).

3.1 Land resources management in the three villages

Cultivated land is contracted to all households in the three villages in the early 1980s, and each village keeps a certain amount of land reserved for small-scale redistribution when the size of some households changed. In the three villages, there are no other types of cultivated land contracts. Land requisition happens sometime in some village groups, but in small scale. In each village, farm households also obtained amount of forestland by contracted from village collective or villager group in terms of the size of each household. Farm households do not need to pay the rent for the contracted cultivated land and forestland. Orchard lands in Gangyan are contracted to the two households through auctioning the use rights for certain years. Those two households have to pay the rent to the village collective, and in principle, the rent will be used for village public affairs only.

Three types of forestland management

There are three types of forestland management in the three villages. Forestland is

village collective, villager group, villager committee or even village leaders.

contracted to individual households according to each household size. The duration for such type of forestland use rights are not clear for households, and until 2000 no adjustments have been implemented for the contracted forestland while cultivated land have been adjusted for several times. But farmers did not know how long they could keep the use rights of their forestlands. Some forestlands in Shangzhu are contracted both to several households together or households associations (both by auction). The use rights obtained by auction can last for 20 years, and it has been clarified in their contracts with the village collective.

In Banqiao and Gangyan, the village collective manages part of forestland. In Banqiao, the village collective managed forestland is planted with ecological forest, while in Gangyan, economic forest is planted. Two village leaders give two different answers when asked the reasons why they retain management of forestlands. The village leader of Banqiao explains that the forestland could be managed very well only in village level because individual households may cut trees if forestland were contracted to them and then the forestland might lose the function of preventing land from degradation. The reason given by the village leader of Gangyan is that they need money to meet the big deficit of village finance, which incurred by the cost of a very modern office building for the village collective. At the time, the village collective hired a farmer to take care of that forestland and paid the farmer from the village budget. The income from the forestland the village collective managed will be used to pay up the debt.

In general, forestland contracted to households is managed extensively in three villages. Almost no farmers from the three villages reported that they applied fertilizer or other inputs in the forestlands. Only a few farmers in Shangzhu said that they put back the leaves of bamboo into forestlands (bamboo field) when they harvest the bamboo, for they know it is good for bamboo production. Collecting firewood is free to go to any fields, so the forestlands close to the hamlets are less densely covered with vegetation. No people would like to contract these forestlands. Some farmers in Gangyan even reported that they did not know where are their forestlands. Especially in recent years, firewood consumption keeps dropping, and fewer people tend to take care of their forestland in Gangyan. One reason is that forestland contracted to households lie quite far from households' house in Gangyan. In Banqiao, it is the village collective that controls most forestlands as ecological forest production. However, villagers are difficult to benefit directly from them. When we visited that forestlands, the guide (a local farmer) said it looks good because the trees line up tidily, but they could not be eaten, so they did not know how they could benefit from them.

[6] The research is a joint project of Nanjing Agricultural University, Wageningen University and the Institute of Social Studies, The Hague, financed by the Netherlands Ministry of Development Cooperation (SAIL program) and the EU (INCO program).

Timber production and firewood collection are major sources of income for people in Banqiao and Gangyan. Farmers in those two villages could collect firewood freely in forestland contracted by themselves and other people. In Shangzhu, there are large share of forestland planted with bamboo. Farmers could harvest bamboo shoots (twice a year, in spring and winter), bamboo and younger leaves of bamboo for making handcrafts.

Quota and license for cutting tree and bamboo

Felling-trees in the three villages need felling quota from Forest Administration Station at township level (FAST) (*Xiang Linguanzhan*), either from the forestland managed by households themselves or households association. It is usually very difficult to obtain the cutting quota, and only these with good social connections (*Guanxi*) can make it. Village leaders can also manage to get the felling quota. Farmers always complain that they cannot cut the tree freely from their 'own' forestland for selling timber, and they said this results in low inputs in forestland management.

Serious conflicts in village Shangzhu happened several times for applying cutting license from the village collective by individual households who contracted the forestland by auction. All auctioned forestland are planted with pine trees. Their claim to felling license is based on two reasons. One is that they paid money (rent) to village collective for obtaining the use rights, and another is that they have invested a lot in the forestland, for protecting forest from pesticide and being stolen, things like that. The village collective argued that farm households should apply to the FAST for felling quota. But farmers stated that they already had the rights for harvest because above reasons. Because of those conflicts, from contracted forestland by auction, households did not obtain any income from their forestlands management since 1996.

Farmer does not need to have license for cutting bamboo in Shangzhu. However, no farmer said they would cut all the bamboo overnight. To have a good harvest on bamboo in the next year, farmers have to harvest bamboo shoots very carefully. Otherwise they will have bad harvest of bamboo for the next year. Experience on bamboo production is very important at that time.

Banqiao and Gangyan both have very good access to outside markets by roads. It is convenient to sell their timber to outside markets at a low cost. However, it is very difficult for Shangzhu because the road to village is very bad. There are traders in Shangzhu to collect bamboo to sell to outside villages. These traders have the permission from village collective to collect bamboo in the village.

3.2 Major challenges in cultivated land and forestland management in the three villages

Banqiao and Gangyan have better access to the markets, and it provides opportunities to farm households for expanding their forest production. However, farmers are not interested in having more inputs in forestland production, because they almost gain nothing from forestland management. Although ecological forest in Banqiao may benefit the local farmers in the long run, there still lack some complementary policies from government to compensate the farmer losses. Forestland management (including bamboo production) in Shangzhu is relatively better than that of other two villages, probably high transportation costs prevent bamboo from the over harvest and other by-products from bamboo production give incentives to farm households to maintain the bamboo production.

Felling quota may restrict over cutting of trees. However, it gives also negative incentives to farmers to invest in their contracted forestland because obtaining cutting quota is too difficult or too expensive. Transparency in the quota distribution or selling is needed, and it will give the farmers the expectations for future revenue from forestland management. For them, use rights obtained from auction for forestland use rights seem more valid than that contracted from village collective with payment, although the definitions of the two types of use rights are the same. However, quota system still prohibits them benefit from forestland management, and it may cause more serious conflicts if the situation cannot be solved properly.

4. Conclusion and policy recommendations

Rural natural resources degradation and its environmental impact have been identified by researchers and policy makers. Rural natural resources use is closely related to the institutional framework, which give incentives to the user of nature resources for overuse or in a sustainable way. Natural resources use in rural China is regulated by a collective property rights framework, which indicates that the village collective may play a very important role in shaping natural resources use. However, the role of the village collective and function of the village governance in natural resources management are often neglected, and more attention have been given to HRS at household level to examine its role and function.

This paper addresses the role of village collective in cultivated land and forestland management in villages in Jiangxi province. However, our case studies show that roles and functions of village collective are quite ambiguous. Sometime, it acts as division of local government office. Unclear defined ownership of natural resources and use rights of individual households in rural China create high incentives for the representatives of owner at village level for controlling use of nature resources and low incentives for individual households for rational use of it. The village collectives affect both

management of cultivated land and forestland.

At least two issues should be solved from policy perspectives. The use rights and the ownership of cultivated land and forestland at household and village level should be clearly defined, which will give more incentives to the rural households to manage their contracted land. To promote the sustainable natural resources use, the village collective may play very important role on that if the village governance framework could perform well and they have more incentives to do so. The advantage of the village collectives is that they know more about the local situation.

References

Chen, K., Brown, C. (2001). "Addressing Shortcomings in the Household Responsibility System Empirical Analysis of the Two-Farmland System in Shandong Province." *China Economic Review*. No., 12: pp 280–292.

Chen, L. (2001). "Energy Consumption in Rural Jiangxi Province: A Household Model for Fuel-wood Consumption." MSc Thesis, Department of Social Science, Wageningen University.

Chu, Y. (2001). "Lack of Entrepreneurship and Farmland Transfer." *China Rural Economy*, No., 12 (*in Chinese*).

Communique by Ministry of Land Resources of China, 2003

Dong, X. 1996. "Two-Tier land System and Sustained Economic Growth in Post-1978 Rural China." *World Development*, Vol., 24 (5): pp 915-928.

Kuiper, M., N., Heerink, S., Tan, Q., Ren, and X., Shi, (2001). Report of Village Selection for the Three Village Survey. Department of Development Economics, Wageningen University.

Kung, J., K. (1995). "Equal Entitlement versus Tenure Security under a Regime of Collective Property Rights: Peasants' Preference for Institutions in Post-reform Chinese Agriculture." *Journal of Comparative Economics*, No., 21: pp 82-111.

Kung, J., K., and Liu., S. (1997). "Farmers' Preferences Regarding Ownership and Land Tenure in Post-Mao China: Unexpected Evidence from Eight Counties." *The China Journal*, No., 38: pp 33-63.

Li, C. J., Yang, J. P., 2000. Forestry Development in China from 1949 to 1999, China Forestry Publishing House, Beijing.

Li, G., Rozelle, S., and Huang, J. (2000). "Land Rights, Farmer Investment Incentives and Agricultural Production in China." Working Paper No. 00-024, Department of Agricultural and Resource Economics, University of California.

Li, X. (2000). “Recent 20 years Cultivated Land Change and Policy Recommendations.” Discussion Paper of China Academy of Science.

Lin, Y., (1992). Institution, Technology and Agricultural Development in China, Sanlian Publishing House, Shanghai.

Lindert, P.H. (1999) The bad earth? China's soils and agricultural development since the 1930s. *Economic Development and Cultural Change* 47: 701-736.

Liu, S., Carter, M., and Yao, Y. (1998). “Dimensions and diversity of property rights in rural China: dilemmas on the road to further reform.” *World Development*, Vol., 26 (10), pp 1789-1806.

Luo, B., and Wen, S. (1996). “Study on Mountain Land Resources and Environment Protection from Property Rights Point of View.” *China Rural Survey*, No., 3 (*in Chinese*).

Ho, P. (2001) Rangeland Degradation In North China: A Preliminary Statistical Analysis to Validate Non-equilibrium Range Ecology. *Journal of Development Studies* 37: 99-132.

Hu, W. (1997) Household Land Tenure Reform in China: Its Impact On Farming Land Use and Agro-environment. *Land Use Policy* 14: 175-186.

Minstry of Forestry, (1994). China Forest Resources Inventory from 1988 to 1993, China Forestry Publishing House, Beijing (*in Chinese*).

Qu, F., Chen, J., Feng, S. (2001). Economic Development and Sustainable Land Use, Renmin Publishing House, Beijing (*in Chinese*).

Qu, F., Huang, X., Wang, T., Wu, Q. (1997). Study on China Land Institutions, China Kuangye University Publishing House, Xuzhou (*in Chinese*).

Qu, G. (2002). “Factors Influence Ecological Safety of China.” *Environmental Protection*, No., 9 (*in Chinese*).

Rozelle, S., Brandt, L., Li, G., and Huang, J., (2001). “Land Rights In China: Facts, Fictions, and Issues.” Working Paper of Department of Agricultural and Resource Economics, University of California.

Shi, X., (2001). “Jiangxi Interview Report.” Working Paper of SERENA project, Nanjing Agricultural University (*in Chinese*).

Smil, V. (1999). “China’s Agricultural Land.” *The China Quarterly*, No., 158, pp 414-429.

State Forestry Administration, 2000. China Forest Resources Inventory from 1994 to 1998. China Forestry Publishing House, Beijing.

Song, Y., Wang, G., Jr., Burch, R., W., & Rechlin, A., M. (2004). "From Innovation to Adaptation: Lessons from 20 Years of the SHIFT Forest Management System in Sanming, China." *Forest Ecology and Management*, No., 191, pp 225–238.

Wang, X. (2003). "Cultivated Land Converted to Forestland: Private Contract and Government Regulations." Discussion Paper of Center of Economic Research of Beijing University. No.C2003014

Wang, Y. (1999). "Household Responsibility System, Farm Household Behavior and Eco-environmental problems." *Journal of Beijing University* (Social Science), No., 3 (in Chinese).

Xiang, Q., and Huang, J. (2000). "Empirical Studies on Property Rights of Irrigation System of Underground Water Evolution and Planting Structure Change-Case Studies in Hebei Province." *Management World*, No., 5 (*in Chinese*).

Xiao, F., Ouyang, H., Fang, Z., and Cheng, S. (2002). "China's Forestry ad Its Forestry Policies." *Forest Policy and Economics*, No., 11.

Xiong, J. (2001). "Decision Making Procedure and Rules of Rural Land Policies." *Rural Study of China*, No., 6 (*in Chinese*).

Yang, Hong, Li, X., (2000). "Cultivated Land and Food Supply in China." *Land Use Policy*, Vol.17, pp 73-88.

Yao, S. (2002). "China's Rural Economy in the First Decade of the 21st Century: Problems and Growth Constraints." *China Economic Review*, No., 13, pp 354-360.

Yao, Y. (2000). "The Development of the Land Lease Market in Rural China." *Land Economics*, Vol. 76 (2): pp 252-266.

Zhang, H. (1998). "Rural Land Property Rights Policy in China: Continuance Innovations." *Management World*, No., 6. (*in Chinese*)

Zhang, H. (2002). "Farmland Adjustment in Rural China: Comments." *Management World*, No., 5 (*in Chinese*).

Zhu, M., Wei, A., Liu, S. (1997). "Land Institutions and Land Investment under Household Responsibility Systems." *Economic Research*, No., 10 (*in Chinese*).