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# Impact of socio-economic status on the implementation of China's collective forest tenure reform in Zhang Guying Township, Hunan: potential for increasing disparity

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## Summary

China's collective forest tenure reform will have a profound impact on the livelihoods of rural people. For the equitable implementation of reform, rural smallholders need sufficient knowledge and understanding of the opportunities and limitations offered by reform. Here, we examine rural smallholder's awareness and attitude towards the reform, across the socio-economic range, in three villages of Zhang Guying Township, Hunan province. Income level and educational background played a consistent role in knowledge and understanding of the reform, as people with low income and no formal education were more likely to be unaware and have no clear understanding of the reform. Additionally, low-income rural smallholders were more likely to convert forest to cash crops, undercutting the central government's stated objectives for the forest reform to improve forest condition. Given our results, the government needs to ensure equitable distribution of information, specifically targeting low-income villagers without formal education. The strong disparity in knowledge and understanding between wealthy and poor creates a situation where the wealthy effectively benefit from the reform, while the poor miss its opportunity. This inequality has great potential for generating future unrest and conflict and for damaging forest condition due to unsustainable or uninformed practices.

## Introduction

The Chinese government is currently implementing a major change in its national policy on forest tenure and management rights that will have a profound effect on many aspects of forest quality and use, including rural livelihoods and development (Zhang *et al.*, 2000; Wang *et al.*, 2008). These effects will have global impact, as China possesses the world's fifth largest forest area (State Forestry Administration, 2004) with 159 million ha. Chinese forests cover diverse physical environments, from tropical to boreal regions and from wetlands along the eastern coast to grassland/desert in the far west (Dai *et al.*, 2009). The current forest tenure reform in China will affect only 'collective' forests, accounting for 58 per cent of China's forest land (Food and Agriculture

Organization, 2009) and home to more than 400 million people (Liu *et al.*, 2008). 'State' forests, including nature reserves, national parks, state plantations and some ecological welfare forests, will remain under the control of provincial governments and industry-related ministries. Previously, collective forests were managed by a community organization that distributed benefits from forests among local households and paid infrastructure or communal expenses.

The history of collective forest land ownership in China is rife with discontinuity (Wang *et al.*, 2008). With the formation of the People's Republic of China, the Chinese Communist Party confiscated private property from landlords using military force and redistributed it equally to rural populations (Miao and West, 2004). Between 1953 and 1958, the Central Government initiated the 'agricultural

cooperative movement' to redistribute land according to rural family size. Eventually, private-owned forests were replaced by collective-owned forests, resulting in community control of all property rights. Rural smallholders lost their rights to use and manage forests and severe deforestation occurred in some areas (Chokkalingam *et al.*, 2006).

In 1976, a new round of sweeping reforms occurred, often called the 'Three Fixes': (1) to fix forest land ownership; (2) fix private ownership of use right to mountains and (3) fix responsibility for forest management (Liu, 2001; Grinspoon, 2002), in which private ownership was strengthened so that rural households had usage and management rights over forest lands and resources. From 1981 to 1983, collective forest land was partially reallocated to village households to manage and use for roughly 50–70 years under the Contract Household Responsibility System (Chokkalingam *et al.*, 2006). It was not until 1998 that the revised Forest Law guaranteed transfer rights of the resources to the household as well (Miao and West, 2004). This system contracted mostly non-timber forests and fuel wood forests to households, but the village collective often retained control of cutting and product sales and used a variety of schemes to share benefits with the households (Liu, 2001).

These fluctuating forest policy and mandatory programmes over the last 60 years have resulted in a sector characterized by tenure insecurity and inefficiency. Meanwhile, low productivity has been a longstanding problem for the forestry administrators and China's central government, especially when compared with developed countries. Unregulated forest exploitation and conversion to monoculture in China has had disastrous consequences, including degradation of forest and associated landscapes and the loss of biodiversity (Zhang *et al.*, 2000). The need for comprehensive reform was evident (Wang, 2007). In 2003, pilot studies to devolve land use rights and forest ownership in collective forest areas to individual households were initiated in Fujian, Jiangxi, Liaoning and Zhejiang provinces after the release of the Decision of the CPC Central Committee and the State Council on Accelerating the Development of Forestry. Because of the satisfactory results obtained from these studies, a formal decree was released in 2008 and to the reform was implemented at a national level, in all provinces and autonomous districts (FAO, 2009). The reform was widely promoted as a step towards private property rights, part of the broader social and political trend aiming for the de-collectivization of China's rural landscape and the establishment of free markets (Xu *et al.*, 2010).

Previous studies on the current forest tenure reform primarily address issues concerning macro-economic effects on timber market or forest management, including income improvement, logging quota systems, subsidy policies and timber prices (Mao and Chen, 2009; Zhu *et al.*, 2010). Most of these authors reach the conclusion that the collective forest property rights reform will broaden villagers' income, thus fulfilling the central government's goal (Jia, 2006; Zhang and Wen, 2008). The reform represents a major decentralization in forest management and will greatly enhance the effect of market forces on the forest

economy, as studied by scholars in Fujian and Yunnan provinces demonstrated the value of property rights on forest appreciated with soaring price of timber which spurred new types of management styles for forest such as rural smallholder-united management, and at the same time, capitals, technologies and working forces were attracted into forestry, which advanced the industrialization of forest management (Li, 2005; Zhu and He, 2007; Liu, 2009).

Yet, little is known about whether local villagers understand the current reform or its effects on their property and management rights. Given the chaotic history of forest tenure and the limited experience of rural households with a market economy, sufficient effort to educate and inform villagers about the implications and opportunities emerging from the reform is required to avoid confusion, conflicts and inequities. Here, we assessed the impact of socio-economic status, educational background and gender on individual knowledge, understanding and perception of the current forest tenure reform in three villages in the Zhang Guying Township, Hunan province. Additionally, we investigated the effectiveness of various activities of the local government in assisting individuals to understand and benefit from the reform. We also examined how the reform affected villagers' attitudes toward their livelihoods and forest management to determine the reform was likely to produce the stated objectives of the reform. We chose our study area because Zhang Guying Township participated in the early pilot projects in Hunan Province was initiated in 2008, providing insight into the longer term effects of the reform. Our results can potentially improve the implementation of the reform at the national scale, which has just started in several regions of China, e.g. Tibet Autonomous Region and Qinghai Province.

## Study area and methods

### Study area

Our study was located in Zhang Guying Township (113° 27' E, 29° 01' N), in northeast Hunan province (Figure 1). The township has a total population of 28 045 in 6585 family units of 31 villages and total area of 14 000 ha with forests covering 10 885.2 ha. The forest cover rate is 81.37 per cent, and the majority (70 per cent) of these forests is dominated by bamboo (Yueyang County Resources, 2008; Zhang Guying Town Administrative Resources, 2009). Bamboo forests play a vital role in the economic growth of the town and two major processing firms rely upon their natural resources.

We chose Zhang Guying Township as our study site for the following reasons: (1) forest reform was initiated in 2008 in Hunan Province during the pilot study phase of the policy implementation; (2) the township has extensive (>60 per cent) forest cover, largely bamboo, and has been directly affected by the many different phases of historical forest reform; (3) the township belongs to the Jiangnan Hills in geomorphology and is representative of the general landscape in Hunan province and (4) sufficient differences in socio-economic status and accessibility existed among

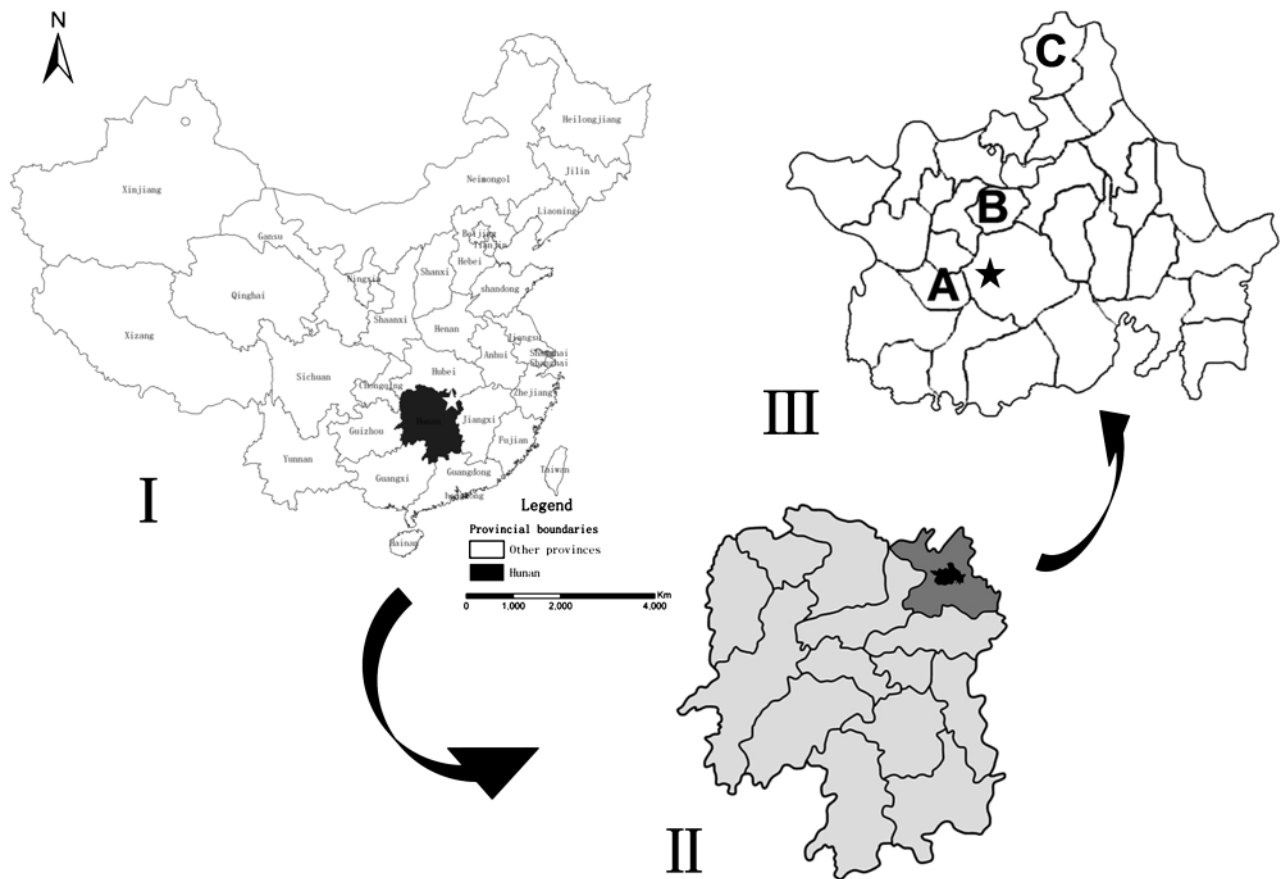


Figure 1. The map of study area: Zhang Guying town. I = map of China, showing Hunan province in dark colour; II = map of Hunan Province, showing the position of Zhang Guying town in black; III = map of Zhang Guying Town, showing the three study villages: A—Liujia village, B—Bajiao village, C—Shitang village. The black star indicates the position of Zhang Guying town.

the villages to provide comprehensive insight into the effects on individual understanding of the reform.

To choose a representative sample of villages within the township, we divided all 31 villages into three groups according to mean per capita income with data backed up by Zhang Guying Administration, with ‘high income’ ranging from 7 to 8.5K RMB, ‘middle income’ ranging from 5 to 7K RMB and ‘low income’ ranging from 3.5 to 5K RMB (ZGYAR, 2009). We then chose one village from each group randomly: Bajiao village (BJ), Liujia village (LJ) and Shitang village (ST), respective to the income classes described above. Bajiao village has the largest population of 770 people in 198 families but has the least forest area (only 74.5 ha). Liujia Village has a population of 500 in 104 families, with 143 ha of forests. Liujia and Bajiao villages each have a bamboo processing plant. Shitang village enjoys the greatest forest cover with 376.7 ha with a population of 729 villagers in 190 families (ZGYAR, 2009).

#### Data collection and survey

Research methods include document analysis, participant interviews, site visits and forest inventories. Background

information was obtained from official decrees of the central government; documents were released by the provincial government and published reports by the local government. These documents include Decisions of the CPC Central Committee and the State Council on Accelerating the Development of Forestry (25 June 2003), Opinions of the CPC Central Committee and State Council on Collective Forest Tenure Reform (8 June 2008), Decisions of CPC Hunan Provincial Committee and Hunan Provincial People’s Government of Intensify Collective Forest Tenure Reform (14 June 2007), Decisions of People’s Government of Yue Yang City on Wholly Implement Collective Forest Tenure Reform (1 December 2008) and Decisions of Yue Yang County On Fully Implement Decrees on Collective Forest Tenure Reform from Regional Governments and Central Governments (20 January 2009).

Personal interviews with local administrative officials, forestry department staff, local educators and villagers were performed in the preliminary stages of the project. ‘Memory protocol’ was used to complete the notes that could not be taken during the interview. These notes were taken immediately after the interview to prevent overlooking any relevant details and thus to increase the accuracy

of the information (Ibarra and Hiarakuri, 2007). Site visits and forest inventories were made with the help of the local forestry department to verify information gathered from villagers and officials. The information gathered during this process was used to design the questionnaire and to develop the most effective approach for our survey.

In our three chosen villages, we distributed 280 questionnaires in proportion to their population (100 copies to Shitang and Bajiao villages, 80 to Liujia village). Rural smallholders in each village were chosen randomly, using the village census data, and one questionnaire was given to the head of each household. In addition, a local guide from each village verified the basic information provided by each study subject, including educational background and income range.

Each questionnaire contained three sections: (1) introduction explaining the purpose of the survey, thanking each villager for their participation and assuring them that no personal information would be released; (2) background information about each individual, including gender, age, income and education level; (3) knowledge and understanding of forest policy reform, including information on the local governments' actions and individual reaction to tenure reform (see Table 1).

#### Data analysis

Responses for all questionnaires were compiled, scoring the answers to each question categorically (Table 1). Multiple answers were allowed for questions for which the answers are not mutually exclusive. We examined the response of the villagers in relation to four independent factors: (1) village, (2) gender, (3) educational background and (4) income level. Income level was simplified into three

levels: 'low', 3–5K RMB, 'mid', 5–10K RMB and 'high', >10K RMB. Statistical analysis was performed using permutation or resampling tests (Pitman, 1937), where the dependent values are shuffled 100 times in relation to the independent variables to generate a null distribution for the expected values. The rank of the observed value (ties were resolved by taking the mean of the ranks sharing the same value) in the expected distribution provides the significance test. If the observed value ranked in the lower 5 per cent of the distribution, the observed value was interpreted to be significantly less than expected, given the overall distribution. If the observed value ranked in the upper 95 per cent, the observed values were interpreted to be significantly greater than expected. Tests for all possible combinations of independent and questions were written in Mathematica 7 (Wolfram Research Inc, 2008) and only the significant results are discussed below.

#### Results

Our response rate was quite high and evenly distributed across the villages, with 210 completed questionnaires including 80 from Shitang, 70 from Bajiao and 60 from Liujia. Of the respondents, 173 (82 per cent) were males and 37 were females. For all three villages combined, most people reported an intermediate annual income level: 59 individuals (28 per cent) of low income (3000–5000 RMB), 143 (68 per cent) of middle income (5000–10 000 RMB) and 8 of high income (>10 000 RMB). As for education level, 36 villagers (17 per cent) received no formal education, 122 villagers (58 per cent) received only a primary education, while one-quarter (52 villagers) graduated from high school.

Table 1. Details of questions we asked in survey

Questions we asked	Response
What's your forest type?	Six types*
Are you familiar with forest policy itself?	Complete/Somewhat/Not sure/Not at all
Are you familiar with the context of policy?	Complete/Somewhat/Not sure/Never heard
Are you satisfied with forest reform?	Yes/Not sure/No
Did the reform improve income of your family?	Yes/No
Were you satisfied with local government's implementation of reform?	Yes/Not sure/No
What's local government done in the forest reform?	Eight procedures <sup>†</sup>
What's your attitude towards forest before forest reform?	See Figure 3
What's your attitude towards forest after forest reform?	See Figure 3
Where do you get the knowledge about forest reform?	Six responses <sup>‡</sup>
What do you think the government's purpose?	Four purposes <sup>§</sup>
Is there any conflicts happened in the process of forest reform?	A lot/Somewhat/No

\* Six types of forests includes barren forests, bamboo forests, needle leaf forests, pine forests, mixed bamboo forests and mixed broadleaf and pine forests.

<sup>†</sup> The eight procedures stated by local official government included publicize policy, investigate property rights, hold votes, demarcate boundaries, solve conflicts, sign contracts, release results and certification.

<sup>‡</sup> Six responses included local village administrators, friends, billboards, brochures, unknown and others.

<sup>§</sup> There are three purposes stated by Central government in official decree, which included enhance income, improve environmental quality and improve forest quality. The fourth one was a misleading one added by author to investigate the respondent's knowledge.



While our initial attempt to classify the villages by average annual income (Liujia = 'high', Bajiao = 'mid' and Shitang = 'low') was generally correct, the observed results were slightly more complicated. Liujia, the high-income village and closest to Zhang Guying city (Figure 1), did have significantly fewer low-income and significantly more mid-income respondents (low: 6 observed *vs* 14 expected,  $P < 0.01$ ; mid: 43 observed *vs* 34 expected,  $P < 0.01$ ), while Shitang, the low-income village and most remote, had significantly fewer mid-income people and significantly more low- and high-income people (low: 32 observed *vs* 22 expected,  $P < 0.01$ ; mid: 42 observed *vs* 55 expected,  $P < 0.01$ ; high: 6 observed *vs* 3 expected,  $P < 0.05$ ). Income levels in Bajiao, the mid-income village, were not significantly different than expectations. Shitang village was unusual in having such dramatic economic disparity, having over-representation of both the poor and wealthy groups and a missing 'middle' class. The villages did not differ in educational background. Across all villages, women were more likely to have low-income levels, with more poor women respondents (16 observed *vs* 10 expected,  $P < 0.01$ ) and fewer middle class women (20 observed *vs* 26 expected,  $P < 0.05$ ) than men.

As found in the preliminary forest inventories and official documents, most of the villagers reported that they possessed bamboo forests (22 per cent) but an almost equivalent fraction reported that their land was barren (21 per cent), while broadleaf, pine and mixed broadleaf/pine forests were all present in roughly equal but lower proportions (~12 per cent). Observed distribution of forest type was not significantly different than expectations, in relation to the independent variables: village, gender, income class or educational background.

#### *Knowledge of and satisfaction with reform*

A surprisingly large percentage (39 per cent) of villagers in Zhang Guying Township reported that they were not aware of the forest reform policy, while only a small fraction (7 per cent) said the policy itself was very familiar to them. Larger fractions of the villagers said they had poor (44 per cent) to very poor (22 per cent) familiarity with the context of reform. Villagers in Liujia were more aware of the reform (35 observed *vs* 30 expected,  $P < 0.05$ ), while more villagers in Shitang reported a vague familiarity of the policy and its context than expected (29 observed *vs* 21 expected,  $P < 0.01$ ; 39 observed *vs* 31 expected,  $P < 0.01$ , respectively). Low-income individuals were much less likely to have any knowledge of the reform policy (only 27 poor respondents were aware of the reform compared with an expected number of 36,  $P < 0.01$ ) or a clear understanding of its implications (18 respondents did not understand compared with an expected number of 13,  $P < 0.05$ ). Additionally, individuals without any formal education were less likely to be aware of the reform (17 observed *vs* 22 expected,  $P < 0.05$ ) and to not have a clear understanding of the reform (11 observed *vs* 8,  $P < 0.05$ ).

Most villagers obtained their knowledge from local village administrators (22 per cent), while roughly equal

number of villagers indicated that their information came from more casual and opportunistic sources, like friends (18 per cent), billboards (18 per cent) and brochures (17 per cent). Low-income respondents were more likely to have no source of information (10 observed *vs* 6 expected,  $P < 0.05$ ), while government publications were cited more frequently by mid-income respondents (26 *vs* 20,  $P < 0.05$ ). Similarly, respondents without formal education had no source for information (9 *vs* 4,  $P < 0.01$ ), while high-school graduates frequently reported government publications as an information source (12 *vs* 7,  $P < 0.05$ ). Women received their information more frequently through friends (12 *vs* 6,  $P < 0.01$ ) than men (24 *vs* 31,  $P < 0.01$ ).

Only 27 per cent of all villagers were very satisfied with the reform policy, while 18 per cent were not satisfied. In terms of how the reform had been implemented, villagers in Shitang (the most remote) were very satisfied (31 *vs* 21,  $P < 0.01$ ) and villagers in Bajiao were not satisfied (37 *vs* 26,  $P < 0.01$ ). High-income respondents were more satisfied (5 *vs* 2,  $P < 0.05$ ), while mid-income respondents were not satisfied (29 *vs* 37,  $P < 0.01$ ) with the policy implementation. High-income respondents reported that the reform had improved their income (6 *vs* 3,  $P < 0.01$ ), although in general, more villagers indicated that the reform had not improved their income (63 per cent). In relation to gender and educational level, the reform did not significantly change income level.

#### *Local government implementations and effect on forest management*

According to official decree from Hunan Province, local governments have eight possible activities to implement the reform policy: (1) publicize policy, (2) investigate property rights, (3) hold village votes, (4) demarcate boundaries, (5) resolve conflicts, (6) sign contracts with rural smallholders, (7) publicly release the results of the reform and (8) certification of forest property rights. Property demarcation was the most frequent government activity (Figure 2), as reported by the villagers, while conflict resolution, certification of property rights and village votes were also quite frequent. In Shitang, the most remote village with the largest proportion of poor and uneducated people, the local government focused more on publicizing the reform (17 *vs* 7,  $P < 0.01$ ) than in other villages while fewer certificates of property rights were issued in Shitang (4 *vs* 11,  $P < 0.01$ ). In Liujia, the local government focused on resolving conflicts over property rights (13 *vs* 7,  $P < 0.05$ ). Among villagers with no formal education, the local government focused on resolving conflicts (10 *vs* 5,  $P < 0.01$ ), while among poor villagers, the focus was on publicizing the reform (10 *vs* 6,  $P < 0.01$ ). No differences were reported by men and women about the actions of the local government.

Before the reform, over a third of the villagers (37 per cent) reported they did not care about their forests, while another third (34 per cent) said they actively managed their forests (Figure 3). No differences among villages, genders, income classes or educational backgrounds were observed in terms of forest management before the

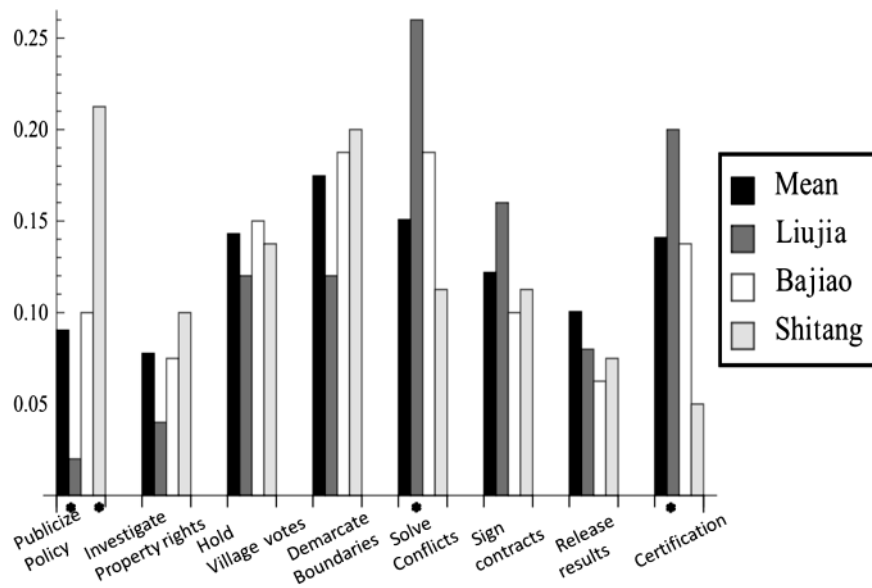


Figure 2. Reported actions by the local government during forest reform implementation. Observed values significantly different than expected values, as determined by permutation tests, are indicated by an asterisk at the bottom of the bar. The eight actions are regulated by the Administration of Hunan Province for advancing the reform.

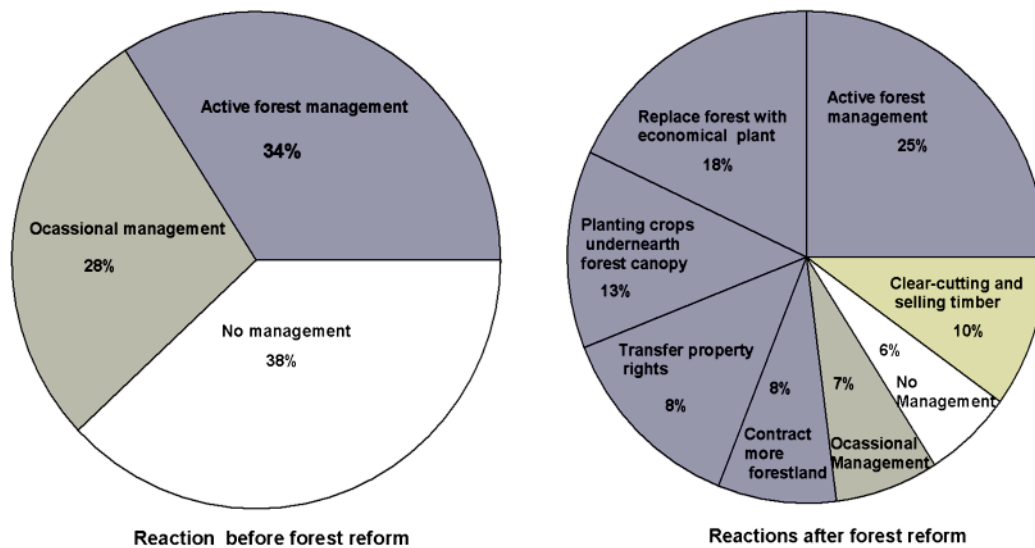


Figure 3. Forest management activities by rural smallholders in Zhang Guying Township before and after the implementation of the reform policy. Before reform, only three management options were possible; however, several more options were allowed after the reform, including transferring of property rights, planting crops underneath forest canopy and contracting more forest land. Because of misunderstanding of the policy, several actions not allowed by the reform were taken, such as clear-cutting and replacing forests with economical plants.

reform. After the reform, rural smallholders have a wider range of management choices, including contract forest lands, transfer property rights and plant crop underneath forest canopy. One-quarter (25 per cent) of the respondents said they would continue active management, while 18 per cent were planning on replacing forest with economic plants and another 13 per cent were planning on planting crops underneath the forest canopy (Figure 3). More

villagers were planning on contracting more land to manage compared with those planning to transfer their rights to others (13 vs 8 per cent). Finally, almost 10 per cent were planning on clear-cutting the forest and selling the timber. More villagers in Liujia (7 vs 4,  $P < 0.05$ ) were planning on transferring rights to others, while the opposite was true in Shitang (3 vs 7,  $P < 0.05$ ). More people in Shitang were planning on actively managing their forest (26 vs 20,

$P < 0.05$ ). More people with high income were planning on active management of their forest (5 vs 2,  $P < 0.01$ ), as were people with no formal education (14 vs 9,  $P < 0.05$ ). People with a primary education were much more likely to plan on developing cash crops beneath the forest canopy (25 vs 16,  $P < 0.01$ ) but less likely to plan on clear-cutting the forest (7 vs 12,  $P < 0.05$ ).

Most villagers (72 per cent) indicated that some level of conflict had resulted from the forest tenure reform and 17 per cent reported many cases of conflict. While no differences were found among the villages, educational background or gender, low-income people were more likely to be involved in property right conflicts (14 vs 10,  $P < 0.05$ ).

### *Objectives of the reform*

When asked about the government's purpose for the reform, most villagers agreed with the stated objectives of the central government but their perspective was focused on the economic aspects: 26 per cent and 14 per cent said the purpose of reform was to either enhance villager's income or spur economic growth, while 21 per cent and 18 per cent said that the purpose was to protect the environment and improve forest quality, respectively. No difference among the villages or gender existed in relation to the perception of the reform objectives. Strangely, high-income people were less likely to think that the purpose was to enhance income (0 vs 2,  $P < 0.05$ ) although they were more likely to think the objective was to spur economic growth (3 vs 1,  $P < 0.05$ ), despite the fact that they were more likely to report that their income had improved, as stated above. Villagers with low income were more focused on the objective of income enhancement (21 vs 15,  $P < 0.05$ ), while mid-income villagers were more likely to think that protecting the environment was important (37 vs 29,  $P < 0.05$ ). Villagers with a high school education were more likely to agree that the objectives of the reform were to protect the environment (17 vs 11,  $P < 0.01$ ). In general, few respondents thought that the objective of the reform was to build a harmonious society. When asked what they thought the reform could actually achieve, most agreed with the stated objectives.

### **Discussion**

In a broad sense, the collective forest tenure reform has accomplished one of the stated objectives by the central government: to clarify property rights among rural smallholders, thus settling tenure issues and providing a strong framework for further forestry development. At a provincial level, the reform has proceeded with strong policy and economic support from the Central Government. Despite the conflicts and issues arising from reform implementation, unstable forest policy history and tangled historical property rights, most rural smallholders in our study recognize the improvement in forest quality and benefits. Our results suggest that, to fully achieve the stated objectives of the forest reform, greater attention should be given to the

equitable distribution of information, particularly the substantial fraction of the population with a weak educational background and low income. Currently, socio-economic status and educational background strongly influence whether a rural smallholder is aware of and understands the reform policy. This disparity in awareness could lead to greater economic disparity between high- and low-income rural households. Additionally, without some regulation, forest condition and quality could decline, as rural smallholders explore a wider range of management options, including conversion, clear-cutting and planting cash crops which are actually prohibited management options in the reform policy.

### *Poor awareness of forest tenure reform*

More than a third of the villagers reported that they were unaware of the forest tenure reform, with little knowledge of the policy. Families with low income or a poor educational background were the most likely to be unfamiliar with the reform, while wealthy villagers with formal education were most familiar with the policy. Satisfaction towards policy was a little better than familiarity, though the results were far from refreshing, with 27 per cent satisfied vs 18 per cent unsatisfied (the rest indifferent). Like many things in modern China, the forest reform policy is moving forward rapidly and the implementation of policy is often swift and forceful. In these circumstances, with high population densities on a landscape dense with historical disputes and local political relationships, a major change in forest tenure has large potential for social unrest and undesired impacts. In this study of one township in Hunan province, where a pilot version of the reform was implemented, the people with lower socio-economic status were unfamiliar with the existence and implications of the policy change. This socio-economic disparity could potentially lead to increasing disparity in the distribution of wealth and opportunity to the rural smallholders. The local government should identify those rural smallholders that require a directed effort in order to make them aware of the forest policy.

After careful investigation, three factors might attribute to such a disparity among familiarity and satisfaction:

- 1 Diverse economical strength and education background. Clearly, these two factors have a direct impact on the villagers' awareness and perception of the reform.
- 2 Different local driving forces for change in forest management. Villagers in Shitang shifted their focus to forest management gradually as timber prices increased. Villagers around factories in Liujia and Bajiao were backed by subsidies for forestry from local government with easy access to markets. These villagers were more willing to actively participate with policy reform compared with those who simply earned a salary working in the bamboo factories.
- 3 Ineffective information channel. A 'top-down' strategy (information on policy is transferred from Central

Government to Provincial Government, local Government, village heads and finally to local rural smallholders) constrains the dissemination of information to more official channels, while a diversified effort at publicizing the reform, like billboards and brochures, has greater potential for reaching a wide audience. We encourage the central government to explore creative ways through modern media and telecommunications to reach all rural smallholders affected by the reform.

### *Flexible implementation*

The demarcation of land boundaries was recognized by villagers as the main action taken by the local government, with a greater number of disputes in Liujia, the village closest to Zhang Guying. On the other hand, very few people in this village reported that the local government had publicized the forest reform policy (Figure 2). Each village will have its own socio-economic situation and local political history. The demarcation of forest boundary will obviously have a large impact on rural smallholders' livelihoods. The emphasis placed by the local government on solving this fundamental issue is appropriate.

Just as the political history varies from village to village, publicizing the policy could adapt as well. Local administrators should be familiar with their village to appropriately manage the implementation of the policy. This reliance on the local administrator's knowledge implies that the implementation of the policy will have to be flexible according to local culture and socio-economic conditions. This 'grass-roots' approach also has great potential for corruption and opacity of implementation. To implement this 'top-down' national reform and achieve the stated goals of the reform, the central government must work cooperatively with the local governments to adopt effective strategies and to ensure transparency and equitable opportunity.

### *Effects of the reform on forest management*

The stated objectives of the policy reform may lead to conflicting results. To achieve one stated objective—to improve the economic circumstances of rural smallholders—over a quarter of the rural smallholders was planning on converting the forest into intensive agriculture or clear-cutting the trees. A strong economic incentive exists for villagers, particularly the poor, to quickly liquidate the monetary value of their forests. This incentive could be quite strong and lead to conversion of the forested areas—in contradiction to another stated objective of the reform—to improve forest condition. While complete conversion generates cash quickly, forest loss greatly enhances soil erosion, degrades soil/water quality, decreases natural flood control, releases substantial amounts of carbon, endangers local biological diversity and limits future options (Zhang, 2007; Fan, 2010).

Another potential effect is increasing concentration of forest ownership by fewer individuals, as a larger proportion (13 per cent) of villagers said they were hoping to contract more forest land than those looking to transfer their rights to others (8 per cent). This result implies that a 'seller's

market' for forest land will increase property values and create greater disparity in ownership, with wealthier individuals expanding their ownership. The ability to transfer property rights creates a situation where villagers in an unfavourable trading position could lose their property rights to firms and businesses (e.g. Zhang, 2007). In a broad way, villagers with little formal education and little experience with the market economy could lose their land rights while gaining little benefit.

The local government needs to be aware of these possible trends. Their effects are unclear. Fewer forest owners make policy implementation and development more straightforward and the poor were more likely to convert forests but the poor also need appropriate livelihoods once they have transferred their land rights. Obviously, some forests are more valuable than others, simply because of their environmental condition, landscape position, accessibility to water, markets, etc., so the distribution of property to the rural smallholders and their knowledge and understanding of the reform policy must be carefully managed. Alternatively, more conflicts and underlying issues could arise if the local government did not employ appropriate out-reach programmes to villagers with lower socio-economic status and are vulnerable to being exploited during the rapid shift in policy and market dynamics.

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### *Conflict of Interest Statement*

None declared.

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