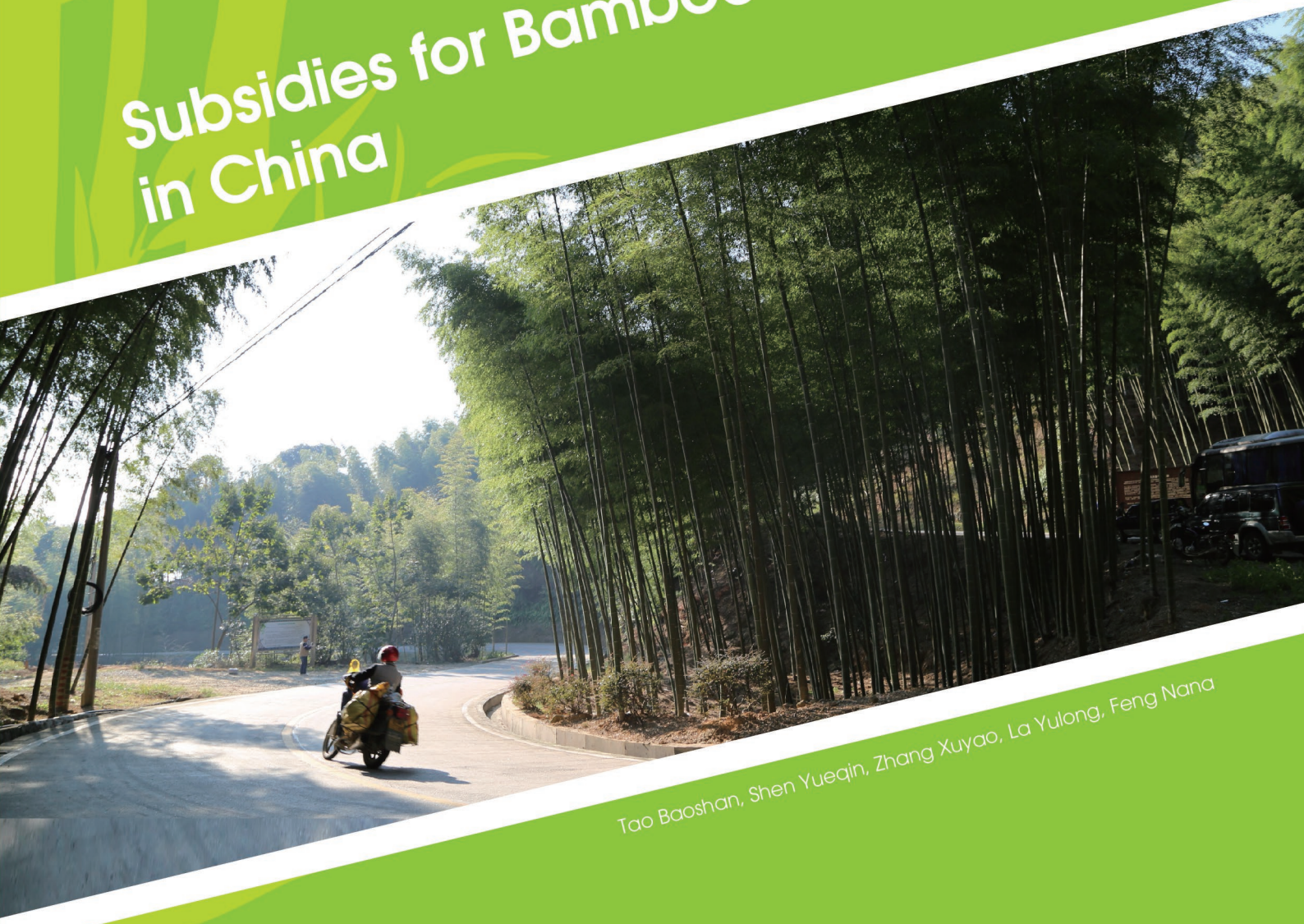
INBAR Working Paper

Subsidies for Bamboo Afforestation in China



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International Bamboo and Rattan Organisation

INBAR, the International Network for Bamboo and Rattan, is an intergovernmental organisation bringing together some 43 countries for the promotion of the ecosystem benefits and values of bamboo and rattan.

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1 An Overview of Chinese Bamboo Afforestation Subsidy Policies

China is one of many countries which has used afforestation subsidies[1] to encourage development of their bamboo industry. The main purpose of these subsidy policies is to establish a favourable environment for the development of the bamboo industry and improving the incomes of people working in bamboo forestry management by decreasing participation costs and, thus, encouraging greater rural household engagement.

This report considers three main types of bamboo afforestation subsidies; incentives, service subsidies and compensation subsidies, though there are overlaps between these categories. The report outlines the policy context, presents the findings from three case studies conducted in 2014, and concludes with policy recommendations based on those findings.

1.1 Incentive Subsidies

Incentive subsidies take the form of i) direct subsidies, ii) preferential credit policies and iii) tax incentives.

1.1.1 Direct Subsidy

Direct subsidies are most often given as cash, but also as seedlings and grain, to reduce forestry managers' costs. China has a number of related subsidy policies, three of which are described here:

* Grain to Green Program[2]: Begun in 1999 with a central government capital grant of 430 billion yuan, it is considered China's strongest subsidy program, having the largest value and geographical coverage. Based on the measured grain-to-green coverage, the government offers three subsidies to land managers.

1) Grain Subsidies: for participating households in the Yangtze River Basin and southern areas at 150 kg/mu[3]. The subsidy for the Yellow River Basin and northern areas is 100 kg/mu. The subsidy has usually been paid in cash since 2004 at 1.4 yuan/kg of unprocessed grain.

2) Afforestation Seedling Subsidy: of 50 yuan/mu (750 yuan/ha) for afforested land.

3) Living Subsidy: Households get 300 yuan/ha per year.

Afforestation for commercial forest uses[4] is subsidised for five years, while ecological forests[5] can receive subsidies for eight years. Zunyi City of Guizhou Province provides a good example. Having explored the bamboo opportunities, at the end of 1999, a grain-to-green program covering 1 million mu was started and, so far, ecological, economic and social benefits have accrued. Farmers' income has increased and ecotourism is flourishing. Chishui City, under Zunyi City, contributes more than one-third of total provincial taxes. All farming households achieve an income of ~500 yuan/yr from bamboo-related activities, whilst bamboo farmers earn nearly 900 yuan/yr, accounting for more than

1 the term 'subsidy' refers to all direct and indirect government financial support, including road construction subsidies, technology training and bamboo afforestation loans

2 area of cropland converted to forests, computed in monetary value

3 1 mu = Chinese unit of area=1 / 15 of a hectare

4 For timber production

5 NTFP production

half of their total income.

* Ecological Forest Benefits Compensation: This central government fund subsidises and compensates for expenditure incurred for construction, cultivation, protection and management of non-commercial forests. The fund pays subsidies at 5 yuan/mu/yr of which 4.75 yuan is for management/protection expenditure of state-owned forestry units, while 0.25 yuan is for provincial financial units (e.g. Financial Bureau of Xinjiang Production & Construction Group) and is to be used for activities organised by provincial forestry-related departments (e.g. Forestry Bureau of Xinjiang Production & Construction Group). These activities include management inspections and protection of key non-commercial forests, forest fire prevention measures and maintenance of forest roads.

Additionally, provincial governments have also begun ecological forest compensation funds. For example, since establishing an ecological non-commercial forest compensation scheme in 2004, Zhejiang Province has gradually increased its subsidy/compensation from 8 yuan/mu to 25 yuan/mu, a compensation fund totalling, so far, 5.45 billion for non-commercial forests (including a central government grant). Furthermore, the central government subsidises forestry cultivation by state-owned forestry industry enterprises, state-owned forest farms, specialised farmers' cooperatives and forestry staff and farmers at 100 yuan/mu.

* Bamboo Afforestation Subsidy: In order to encourage afforestation, the Financial Ministry together with the State Forestry Bureau started a pilot afforestation subsidy in 2010, conducted in 20 southwestern, north-western provinces and autonomous regions[6] where basic reform of collective forest rights was complete and there is massive local government support.

The subsidy targets forest farmers, forestry cooperatives and contractual workers of state-owned forests engaged in afforestation of suitable land with superior seedlings. The minimal coverage requirement is 1 mu and the cash subsidy is 200 yuan/mu for timber forest, 120 yuan/mu for shrub forest, and 100 yuan/mu for newly afforested bamboo. Based on 2010 data collected from the 20 pilot areas, 3,298,600 mu of subsidised afforestation had been completed, of which 87 per cent mu was on previously barren and deserted land and 2.4 per cent was new bamboo forest.

Some local governments also issued additional subsidy policies to promote bamboo development. From 2007 to 2010, Naxi District of Luzhou City in Sichuan Province provided 30 million in subsidies. The annual plan was to afforest 20,000 mu with bamboo and transform 40,000 mu of low-yielding bamboo forest. The Naxi District government would provide superior seedlings free of charge and a subsidy of 50 yuan/mu for a minimum coverage of 3 mu, subject to passing an acceptance inspection. For low-yielding bamboo forest transformation, a fertiliser subsidy of 50 yuan/mu was offered.

Similarly, in 2013, the local government of Taihu County, Anhui Province, started an afforestation fund with an annual investment of at least 5 million yuan to reward moso bamboo clustering development and barren land (burned) reforestation demonstration sites. Compliance inspections of newly afforested clustering bamboo forests with minimum coverage of 50 mu are conducted in May and December every year. Compliant forests receive 200 yuan/mu. For compliant smaller forests, the annual subsidy is 100 yuan/mu for three consecutive years including the inspection year. The county forestry department enters contracts with seedling cultivators and grants a subsidy of 500 yuan/mu reducing to 200 yuan/mu in the second and third years.

6 Hebei, Shanxi, Inner Mongolia, Liaoning, Heilongjiang, Zhejiang, Fujian, Jiangxi, Henan, Hubei, Hunan, Guangdong, Guangxi, Sichuan, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang.

The government has also established other policies to encourage professional farmer cooperatives to get involved in bamboo afforestation. Organisations of a minimum size can access capital support for the introduction of new cultivars, promotion of new technologies and standardised production of bamboo products. Zhejiang Government issued identification and supervision regulations of forestry cooperatives and those registered with the government can benefit from project support, rewards, forestry project loan subsidies, project financing guarantees, etc. Anji County of Zhejiang Province has issued reward and subsidy policies to support the establishment of professional forestry farmer cooperatives. Professional cooperatives with a minimum of 500 mu that are registered with the county for forestland clustering development projects are granted a one-time reward of 50,000 yuan. There is an additional reward of 5000 yuan per additional 100 mu.

1.1.2 Preferential Credit Policies

Preferential credit policies are another tool to promote the development of the bamboo industry. The government provides interest-free, low-interest and long loan period credit under direct financial loan projects or subsidised loan projects.

* World Bank (WB) Loan Afforestation Projects: Since 1985, with WB support, the Chinese Government has successively run six forestry projects; Forestry Development Project, Daxing'anling Forestry Fire Disaster Restoration Project, the National Afforestation Project, Forestry Resources Development and Protection Project, Forestry Development Project for Poverty Stricken Areas and Forestry Sustainable Development Project.

Project activities include afforestation, infrastructure construction, forestry fire prevention and science, and technology promotion. Up until 2010, the WB Loan Afforestation Projects have provided loans to the value of 910 million yuan and a total investment of 10 billion including other domestic investment.

In 1992, the WB loan Forestry Resources Development and Prevention Project (FRDPP) was initiated in Fujian Province. Conducted in 13 counties, the project's total investment was 143 million, of which 86 million was a WB loan and 57 million counterpart funding from the Fujian Government. The loan for Gutian County was used to develop a 3000 ha intensively managed forest and a 300 ha moso afforestation project. After four years, 591.8 ha of moso forest had been afforested in 13 towns and townships, a completion rate of 197 per cent.

* Forestry Soft Loan: Since 1986, China has introduced forestry loan/interest subsidy policies every five years in accordance with the national economic and social development plans. Soft loans are only intended for forestry units and only available from the Agricultural Bank of China. Since 2000, new developments include new bank loan products, subsidy targets, subsidy range, increase in load interest subsidy rate and extension of loan periods. In 2009, the interest-subsidy rate was increased from 2 per cent to 3 per cent (the highest allowed by the Financial Ministry so far) after the Central Financial Ministry issued the 'Forestry Loan Interest Subsidy Capital Management Regulations'.

The central government requires local governments to include corresponding interest subsidy policies in their local financial plans. As well as loan interest subsidies for afforestation projects, the subsidy period for forestry resources processing enterprises, cultivation projects, forestry nurseries and forestry industrial enterprises has been extended to three years from the original two years. The subsidy period has been extended to five years for afforestation activities by forestry farmers to encourage them to take advantage of the loan interest subsidies. Between 2005 and 2011, the accumulated interest

subsidy capital of the central government was CNY 3.4 billion, along with total commercial bank loans of CNY 74.5 billion and social[7] investment of CNY 30 billion (other forestry development activities) resulting in a 30-fold effect.

Zhejiang Province issued 'Forestry Resources Asset Mortgage Credit Interest Subsidy Capital Management Regulations' creating a special fund to provide interest subsidies to third-level Forest Rights Mortgage Loan Projects, using forestry resources as the collateral. Activities included economic development projects in rural areas (e.g. cultivation and protection of forestry resources, production and processing of grain, oil, fruit, nuts, seedlings, flowers, timber, bamboo, tea and wild plants as well as the captive breeding of wild animals), production facilities construction projects and forestry-based agritourism leisure projects. The interest subsidy is available to those applying for bank loans using their forestry resources as the mortgage for specified use. For those qualifying, and not in receipt of other forest right mortgage loan interest subsidies, the provincial financial department provides a loan interest rate of 3 per cent.

1.1.3 Tax Incentives

Forestry taxes and dues are applied on collected timber and other derivatives. Bamboo forest management taxes[8], as well as various forestry charges, including tolls and farmer contributions to project funds, e.g. Forestry Cultivating Fund, Maintenance Fund, and Forestry Protection and Construction Fund. In 2001, the Financial Ministry together with the State Administration of Taxation issued a 'Notice on Forestry Taxation Issues' which clarified that all those engaged in tree planting, seedling and crop cultivation and initial processing of timber products are exempted from income tax. Since 2004, the government cancelled all the taxes (which had been as high as 8 per cent) on special agricultural products except tobacco, which greatly alleviated the costs borne by small farmers.

1.2 Service Subsidy

This refers to services provided to bamboo forest managers, thus decreasing their production costs. Such services mainly manifest as forestry infrastructure construction, science and technology investment, bamboo disease and pest control and prevention as well as developing a functional subsidy services system.

1.2.1 Bamboo Roads Construction Subsidy

Since forest roads are a significant part of infrastructure facilities, faster and better construction is an effective way to improve the production and management of forests and increase the income of people living in mountainous areas. In 2008, the Zhejiang Financial Department established a 25 million fund for 1600 km of bamboo forest roads restoration demonstration projects in 12 major underdeveloped cities (counties/districts) of Lishui and Quzhou with a planned total of 2500 km within two years. At the same time, local financial departments were required to release counterpart funds of at least 50 per cent given by the Zhejiang Government as subsidies. By the end of 2009, 4761.9 km of forest road had been completed in the whole province with a total investment of 267 million yuan, averaging at 56,100 yuan/km. In 2010, Zhejiang launched a 100,000 km Forest Roads Construction Project for commercial bamboo and oil-tea camellia forests, leading to forestry demonstration areas,

7 Including private business investment, govt social projects etc.

8 Includes special agricultural products tax, value added taxes, income tax, urban maintenance and construction tax

high-quality forestry parks and the provincial forested areas of the agricultural zone. The fund was raised jointly by the government, the community and individual farmers. A subsidy of 50,000 yuan/km was provided for arterial roads of underdeveloped areas included in the plan and 30,000 yuan/km for developed areas.

Encouraged by provincial government subsidy policies, the local government of Longquan County, Jiangshan City, Longyou County, Qujiang District and Anji County issued policies to facilitate bamboo forest road construction. Anji County's forest road construction project completed 1080 roads, totalling 2160.5 km, offering subsidies of 4500 to 5500 yuan/km. In 2010, further projects were launched to upgrade 150 km of forest roads providing subsidies at a higher rate of 50,000 yuan/km. By the end of 2011, a total subsidy capital of 16 million had been invested in the construction of forestry roads in the whole county.

1.2.2 Science and Technology (S&T) Investment in the Bamboo Industry

The central government has provided forestry funds to promote Science and Technology (S&T) development by forestry technical advice stations/centres, scientific research institutions, colleges, forestry professional cooperatives, state-owned forestry industrial enterprises, state-owned forest farmland and state-owned seedling nurseries. In 2013, for the Fujian Forestry Vocational and Technical College's 'Cultivation & High Yield Technology Promotion and Demonstration Project of Coastal Sandy Land Protection Bamboo Forest', the central government provided 1 million yuan, and 100,000 was provided by the institutions.

Encouraged by central government activities, most bamboo growing provinces and regions have invested in bamboo S&T development. From 2004 to 2007, to promote efficient and high-yield moso bamboo- forests, Zhejiang Province established a fund to subsidise low-yield moso forest transformation projects. The subsidies covered costs of buying fertiliser, technology improvement and technology promotion but mainly focused on technology transformation and upgrading infrastructure to increase yields and efficiency. A grant of 200,000 yuan was available per project. In 2007, the provincial Party committee and the provincial government recognised bamboo and wood as one of the top ten leading agricultural industries and conducted the 'Ten Million Mu Bamboo Forest Upgrading Project' which focused on speeding-up construction of infrastructure, such as forestland roads, tackling S&T challenges and transforming low-yield bamboo forests.

In 2012, bamboo yield improvement projects were conducted in 10 counties across the whole province with a total coverage of 1 million mu. Further efforts have been made in the integration, maturation and promotion of new bamboo varieties, improving ecological and efficient production of bamboo forest and processing of bamboo-shoot products. The results include the establishment of five superior seedling production bases, promotion of 10 superior and new commercial bamboo varieties, 20 per cent increased bamboo growth rate and bamboo-shoot processing technology, bamboo production demonstration bases covering a total of 1.6 million mu of bamboo forest, successful development of five high-quality bamboo-shoot products and establishment of five bamboo-shoot product processing enterprises. Collectively, the 14 key cities (counties/districts) realised income of 2.8 billion and income increases for rural residents. The total project budget of 187 million yuan was made up of: a provincial government fund of 16 million, provincial government financial agriculture fund of 16 million, a local government counterpart fund of 16 million and self-raised investment of 140 million by the participating enterprises and individual farmers.

1.2.3 Construction of Modern Bamboo Demonstration Areas

Bamboo demonstration areas are those with proper infrastructure facilities, applying modern technology, intensive and standardised production for improved management and income potential. From 2001 to 2006, about 30 provincial forest bases larger than 100,000 mu were constructed, focusing on cultivation and production of superior fruits (fresh and processed) and efficient, high-yield production of bamboo and bamboo-shoot forest. Capital for base construction is mainly raised by the public with some government support. Every year, the government grants 6 to 6.5 million yuan to support construction of provincial forest bases with counterpart funds from local governments.

In 2007, the Zhejiang Government began construction of large scale bamboo forest demonstration parks with modern facilities, standardised production and industrialised management to increase ecological friendliness and optimise efficiency. The target was to establish bamboo demonstration areas of at least 1 million mu with an output of at least 1000 yuan/mu over three years. The construction of demonstration parks has enabled the transformation of 4 million mu of low-yield bamboo forest and the construction of forest roads totalling 5000 km. As a result, modern demonstration parks provide the backbone for modern bamboo industry development founded on improved efficiency. The provincial government has granted funds to support demonstration park construction in bamboo-rich counties as well as underdeveloped counties. This reward-as-subsidy policy pay rewards each year according to local government efforts and park construction efficiency. The central government's 'Afforestation and Forestry Cultivation Grant-in-aid Pilot Project' focuses on bamboo demonstration parks for forest S&T promotion.

As a result, many local governments issued complementary policies. Anji County Government issued construction regulations granting subsidies to completed demonstration parks which pass third-party acceptance inspections. The standard subsidy is 30 per cent of the total construction investment.

1.3 Compensation

1.3.1 Subsidy for Forestry-Related Natural Disasters

This subsidy covers losses due to natural disasters such as floods, fires and storms. In January 2008, areas of southern China were hit by snowstorms and the central government allocated a disaster relief subsidy fund of 30 million yuan to six provinces and regions: Hunan, Hubei, Anhui, Jiangxi, Guangxi and Guizhou. The Zhejiang Government provided an emergency forest restoration subsidy fund of 3.02 million yuan for replanting, reforestation, bamboo forest restoration, seedling purchase and cultivation, clearing dead trees, treatment of injured wild animals, safe disposal of dead animals and loans to timber-bamboo processing enterprises to purchase disaster-damaged timber and bamboo. The main recipients were households working large areas of forest, professional cooperatives, leading forestry enterprises and the local branches of state-owned forestry management units.

1.3.2 Subsidy for Forestry Assurance

China began forest insurance pilots in 1984. By 1994, forest insurance had been introduced to more than 20 provinces and regions, but things have stagnated or even regressed since the 1990s. In 2009, the central government initiated the 'Forestry Insurance Subsidy Pilot Project' in Fujian, Jiangxi and Hunan. Provincial government subsidises at least 25 per cent, supplemented by 30 per cent from the central government. In 2010, Zhejiang, Liaoning and Yunnan were included as pilot areas and the central government's subsidy contribution increased to 50 per cent and at least 40 per cent from local

governments (25 per cent from the provincial government). In 2012, the pilot area was extended to cover 17 provinces (cities and districts), insuring a total of 1.289 billion mu of forest. Altogether, the central government has subsidised 680 million of forestry insurance, about 40 per cent of the total insurance premium value, while local governments (provincial, city and county levels) provided 700 million (44 per cent) with the remaining 16 per cent paid by forestry management units and individual farmers. As of the end of December 2013, the total insured forest of Zhejiang Province (excluding Ningbo City) had reached 60 million mu, 70 per cent of the total forest coverage; with a total insurance value of 25.5 billion yuan and the total insurance subsidy had reached 40 million yuan (88 per cent of the total premium).

2 Policy Recommendations for INBAR Member Countries for Bamboo Afforestation Subsidies

2.1 Establishing Incentive Subsidy Systems

2.1.1 Establish Flexible Bamboo Afforestation Subsidy Policies

The direct subsidy for bamboo afforestation aims to ensure relatively stable incomes for bamboo farmers so as to enable them to try other initiatives, further contributing to bamboo forest resource development. Direct subsidies are supposed to be granted on principles of justice and equity, taking into account the requirements of the bamboo forestry management regulations on the profit made by farmers. Forest management costs arise from forestland cleaning, soil preparation, purchase of seedlings and fertilisers, forestland rent, tree planting and replanting, cultivation and nursing as well as disease and pest prevention and control. Most of these activities require labour and there is a big difference in labour costs depending on the economic environments in different areas, which greatly affects the level of afforestation costs. Therefore, the government needs to set subsidy rates in accordance with the economic situation of each area.

Bamboo forest cultivation improves soil nutrient absorption, light conditions and reduces the outbreak of diseases and pests, which further promotes the growth of bamboo forests and increases yield. Therefore, it is recommended that governments make efforts to strengthen the dissemination of information to ensure rural households recognise the importance and opportunities of bamboo forestry cultivation. Subsidising the cultivation of bamboo forestry is a direct way to encourage their interest in bamboo forest cultivation.

2.1.2 Broaden the Channels for Access to Capital for Bamboo Industry Development

Accessing finance is a major challenge to bamboo afforestation, therefore, it is recommended that governments establish and improve policies and measures that encourage social, private and overseas investment so as to broaden the capital channels and diversify the kinds of capital which flow into bamboo forest management. Establishing clear subsidy policies will ensure consistent approaches by all levels of government and counterpart investment by other financing institutions to support bamboo afforestation. In this way, loan projects suffer less risk and loaning institutions' interest burdens can be alleviated.

Financing institutions should explore different kinds of financial products which meet the various needs of the bamboo industry and establish more user-friendly loan support systems for bamboo farmers as well as small or medium-sized bamboo enterprises, e.g. lower loan interest rates, simplified loan procedures, and forestry resources asset mortgage credit, which would increase their own turnover as credit financing businesses.

2.1.3 Standardise the Forestry Taxation System

As an important government macroeconomic regulation and control tool, taxation has a critical role in regulating the allocation of resources. Appropriate adjustments to tax policies can decrease forestry managers' marginal costs and increase their income, further encouraging bamboo afforestation initiatives. Though still a weak industry, forestry is recognised as having high eco-efficiency, therefore, governments are encouraged to adopt policies which exclude forest products from tax and decrease

the tax rate to alleviate the financial burden on forest farmers.

In addition, holistic taxation systems should include forestry charges, while other non-tax charges should be included in management budgets. Efforts should be made to reduce charges as much as possible and review the purpose and level of charges. Central and provincial governments should establish laws and regulations for the administration, standards and management of these charges as well as clarify that other levels of governments have no right to collect further administrative charges.

2.2 Developing a Functional Subsidy Service System

2.2.1 Increase Bamboo Industry S&T Investment

As already mentioned, science and technology play a critical role in the further development of the bamboo industry, therefore, governments should make efforts to establish diverse bamboo industry S&T investments focused on addressing development and cultivation of superior bamboo seedlings, sustainable management of bamboo forests, deep processing of bamboo-shoot products, exploitation and utilisation of commercial bamboo varieties and research into efficient cultivation of bamboo forestry resources.

Additionally, investment from enterprises, special funds and individuals should be encouraged, guided and attracted into bamboo S&T development. This includes active efforts to attract overseas investment in the form of capital or technological aid. Furthermore, governments can allocate special funds and cultivate forest technology talent by offering various types of free training for forestry farmers, administrative staff and technicians.

2.2.2 Improve Bamboo Forestry Infrastructure Construction

Well-constructed bamboo forest infrastructure facilities provide a solid foundation for the development of bamboo-related activities. Improvement of such facilities can not only change the production methods and output of bamboo farmers but also positively influences their investment decisions. Specifically, governments should support construction of bamboo forest roads, forest fire prevention and irrigation facilities. Of these three, construction of roads, which directly supports production and management of bamboo forests, helps to maximise existing bamboo forest potential, decreases production and management costs, increases resource utilisation rates and, thus, increases bamboo farmer incomes. Well-constructed roads facilitate intensive forest management further increasing output.

Mechanisms to mobilise more diverse sources of funding are urgently needed to facilitate forest road construction. This means a combination of different levels of government subsidies, bank loans, village leadership loans as well as private investment from the participating farming households and forestry enterprises.

2.2.3 Establish Bamboo Forestry Disease/Pest Prevention and Control Mechanisms

The government should establish standard bamboo disease/pest prevention and control mechanisms, offering free services to bamboo farmers. As well as better bamboo diseases and pest preventative measures, disaster response procedures are needed. Governments are encouraged to offer guidance on different bamboo management activities, e.g. seedling plantation, land selection, afforestation and cultivation of cutting so as to prevent and fight against diseases and pests.

Additionally, governments should address the issue of bamboo quarantine and provide forest farmers free bamboo product inspection and quarantine services. Bamboo product inspection and quarantine systems need to be established with clearly defined quarantine standards and funds made available to the relevant inspection and quarantine institutions.

2.2.4 Promote the Construction of Bamboo Industrial Parks

Accumulated practice shows that the establishment of bamboo demonstration parks plays an important role in improving high quality production, demonstration and stimulation, optimising resource allocation such as land, capital, technology and labour as well as providing tourism activities. The close proximity of different actors and enterprises strengthens integration of bamboo-related activities, facilitates bamboo production technology development and ultimately increases bamboo farmers' income. Therefore, the government should encourage, through provision of subsidies or grants, professional farmer cooperatives and bamboo contractors to establish industrial bamboo economic parks with necessary facilities, advanced technologies, well-organised production and strong radiation and stimulation capacity in bamboo growing areas.

2.3 Improve Insurance and Compensation Subsidy Systems Based on Local Conditions

Due to the nature of forests, forestry insurance is generally complex to assess, even by professionals. Guided by the government and oriented by the market, forest insurance is supposed to be conducted with financial and policy support from the government. The central government can support areas where there is high forest coverage, providing counterpart subsidies together with local governments and contributions from the forest farmer to pay for insurance. The subsidy can take the form of a premium subsidy or managerial cost subsidies for insurance companies, together with tax deductions or exemptions. In addition, efforts should be made to widen the natural disaster subsidy system to compensate for income or other production losses resulting from disasters. This could be in the form of a disaster relief subsidy, social assistance for forest regions as well as post-disaster restoration subsidies.

2.4 Strengthen Supervision to Guarantee Subsidy Policy Efficiency

The possibility of some parties abusing these policies cannot be completely eliminated, be it applicants bribing relevant administrative departments to gain more resources or administrative staff abusing their power for personal gain. Therefore, it is very important for governments to strengthen the supervision of bamboo support procedures and ensure open and transparent capital distribution. Furthermore, joint efforts should be made by the finance, audit and inspection departments to strengthen audit of subsidy flows and prevent corruption. Similarly, appropriate management of projects, establishment of restraint systems and monitoring of construction projects using relevant price index system are all suitable measures to ensure efficient implementation of bamboo afforestation activities. Harsher penalties are necessary to prevent regulation violation.

2.5 Improve Dissemination of Bamboo Support Policies to Improve Understanding by Households

As the households involved in bamboo forest management mainly live in the countryside with low levels of education, isolated lifestyles and limited access to information, they have low awareness and uptake of bamboo afforestation support initiatives. This could lead to two unfavourable outcomes:

limited bamboo afforestation activities due to lack of information or negative perceptions of bamboo-related policies due to insufficient or misunderstood information. To prevent this from happening the government is advised to maximise its use of different media, including newspapers, radio, TV, picture displays, videos and brochures to disseminate bamboo afforestation information to rural households. Promoting rural households' understanding and acceptance of the subsidy policies will facilitate their participation and support.

3 Bamboo Afforestation Subsidy Case Studies

3.1 Background

3.1.1 Introduction

Forestry not only provides the materials necessary for economic activities but also plays a role in protecting the ecological environment, such as wind damage prevention, sand fixation, soil erosion prevention and carbon dioxide absorption. Bamboo, an important component of China's forests, is characterised with wide distribution, fast growth, high yields, strong regeneration capacity, diverse uses and high economic value. Economically, ecologically and socially, it has been recognised as an important global forest resource. As one of the major bamboo yielding countries, China has implemented a series of policies intended to promote the bamboo industry.

The Zhejiang Province, with bamboo as its main economic forest, accounts for one-sixth of China's national bamboo coverage, accounting for 40 per cent of China's output value and export volume. Its critical role is well recognised in the saying 'speaking of bamboo, the world depends on China while China depends on Zhejiang"'. In 2007, the Zhejiang Government published 'Several Proposals on the Promotion of Modern Agricultural Construction Propelled by the Dominant Industry of Agriculture by Zhejiang People's Government', which included the bamboo industry as one of the 10 leading agricultural industries and arranged special funds to support infrastructure construction such as bamboo forest road building. Most local governments issued corresponding policies to support the bamboo industry.

3.1.2 Objective

These three case studies explored the situation of bamboo forest management by rural households inside and outside of provincial bamboo science parks in Anji County, Qingyuan County and Longyou County. It focused on the perception, evaluation and demand for bamboo afforestation subsidies and identified existing problems.

The policy proposals presented in the previous section are based on the problems identified from these case studies. Hopefully, they will provide a reference for the responsible government agencies, while providing useful insights for other bamboo producing countries.

3.1.3 Research Methodology

Households were selected at random from targeted villages and townships, based on their participation in bamboo afforestation activities. For comparison, villages inside and outside of bamboo parks were chosen within the same province.

Printed questionnaires were distributed to the households covering five aspects: 1) household demographics; 2) their involvement in the management of bamboo forest subsidies; 3) experience of bamboo afforestation subsidy and policy implementation; 4) attitudes towards bamboo afforestation subsidies; and 5) their suggestions or advice regarding bamboo afforestation subsidy policies.

Interviews were conducted with the relevant forestry offices to establish the history and current situation of bamboo afforestation subsidies, implementation issues, major difficulties encountered during management of subsidy schemes as well as their perception and suggestions.

Apart from primary data collected from face-to-face interviews, efforts were made to collect secondary data about social and economic status as well as the implementation of bamboo afforestation subsidies in each county and the sample villages in particular. Data was collected on three main issues: 1) the management of bamboo forestry and current implementation of subsidies in the sample villages; 2) socioeconomic and forestry resources data, forest development, and bamboo industry development in particular; and 3) social, economic and natural resource status.

3.1.4 Analysis Methodology

(1) Horizontal comparative and contrastive analysis was conducted to assess the income of households receiving subsidies compared to those who do not.

(2) Qualitative statistical analysis was conducted regarding subsidy-related activities and decisions of households together with their perceptions and suggestions.

3.2 Anji County of Zhejiang Province

Anji County has achieved a level of prosperity and development as well as fame due to bamboo and is widely recognised as 'The Bamboo Town of China' or the 'Chinese Cradle of Bamboo Floor', with half of farmers' income coming from bamboo-related activities.

3.2.1 Data Sources

3.2.1.1 Households

The study chose three sample villages as shown in Table 1.

Table 1 Sample Village Locations in Anji County

Name of Science Park	Shangshugan Village Provincial Moso Bamboo Boutique Park in Jishan Township	Fushi Village Provincial Moso Bamboo Industry Demonstration Park in Xiaofeng Town	——
Region	Shangshugan Village of Jishan Township	Fushi Village in Xiaofeng Town	Liujiatang Village of Shangshu Township
Scale of Construction	Provincial Modern Forest Boutique Park	Provincial Modern Forest Demonstration Park	——

Source of Data: Survey Data

Ten households were chosen from each location totalling 30 households and 30 questionnaires were distributed and collected (survey response rate of 100 per cent).

3.2.1.2 Other Information Sources

Interviews were also conducted with the Anji Forestry Bureau.

3.2.2 Case Study Site Features

3.2.2.1 Introduction to Anji County

Located in the northern mountainous area of Zhejiang Province, the hinterland of the Yangtze River Delta Economic Zone, Anji County, has a total land coverage of 1886 km^2 and a total population of

457,100. With mountains, water and arable land taking up 70 per cent, 20 per cent and 10 per cent respectively, Anji County has a total forest coverage of 2.07 million mu (71 per cent), one of the top 10 forest counties of Zhejiang Province. In 2012, Anji County had a gross output of 24.52 billion yuan, which led to a fiscal revenue of 2.91 billion yuan. The average disposable income of the residents was 32,200 yuan with that of the rural residents as high as 158,000 yuan.

Known nationally as 'The Bamboo Town of China' and 'Chinese Cradle of Bamboo Floor', Anji County, with a bamboo forest coverage of 1.08 million mu, possesses 62 bamboo species categorised into 15 genera. With 86,000 mu of moso bamboo and a total growing stock of 170 million, an annual volume of 28 million of commercial bamboo and 100,000 tons of small diameter bamboo is produced. In 2012, the whole county had a gross output of 15.8 billion yuan (primary activities[9] contributing 170 million, secondary industries[10] contributing 11.93 billion and the third branch contributing 3.06 billion). From this, we can see that the bamboo industry made a 35 per cent contribution to GDP, equivalent to a rural income increase of 7700 yuan, accounting for 50 per cent of their total income.

3.2.2.2 Introduction to the Case Sites

3.2.2.2.1 The Two Science Parks

（1）Shangshugan Village Provincial Moso Bamboo Boutique Park in Jishan Township

Located in Shangshugan Village in the north-western area of Jishan Township, Provincial Moso Bamboo Boutique was established in November 2008. The village founded Shanglin Moso Shareholding Cooperative, China's first moso shareholding cooperative, which later was involved in the successful proposal and establishment of the Provincial Moso Boutique Science Park in 2010. The science park covers 8715 mu with a vegetation coverage at 96 per cent and forestry coverage of 90 per cent. With a total bamboo forest coverage of 6563 mu, the science park has now built a moso boutique area of 1000 mu of which 680 is the demonstration site.

Geographically, Shangshugan Village is located in the mid-western area of Zhejiang and is considered a very important bamboo producing base with the village's bamboo forest accounting for 50 per cent of Jishan Township's total bamboo coverage. As a key bamboo centre in the township, the village has been honoured titles such as 'National Ecological Cultural Village', 'Provincial Forestry Sightseeing Garden', 'Provincial Tourism Village' and 'Provincial hygienic Village'. The total population of 1099 people is distributed among 312 households who are mainly economically reliant on mountain forestry, other industries and odd jobs.

（2）Fushi Village Provincial Moso Bamboo Industry Demonstration Park in Xiaofeng Town

Located in Fushi Village of Xiaofeng Town, founded in November of 2010, this moso bamboo industry demonstration park was one of the second wave of provincial modern forestry demonstration parks with a planned coverage of 10,000 mu. Sitting on the lower reaches of the Fushi Reservoir, Fushi Village is blessed with abundant moso resources and is called the 'Most Beautiful Chinese Village' Boutique Village and the 'Zhejiang Landscaping Demonstration Village'. With a total mountain and forest coverage of 17,346 mu, the village has a moso forest coverage of 10,269 mu. The population of 2115 people is split into 14 village groups. Moso harvesting and processing is the main economic activity of the residents.

9 Bamboo forestry activities

10 Processing and production

Making use of the abundant and exceptional natural resources and tourism opportunities of the Fushi Reservoir, the Fushi Provincial Moso Bamboo Industry Demonstration Park has successfully integrated its bamboo resources with new technological advances to establish the park and, thus, promote large-scale industrialised and professional management of bamboo resources. This has not only increased the efficiency of their bamboo industry but also increased farmers' net income, providing a role model for the development of the bamboo industry in Anji.

3.2.2.2.2 Liujiatang Village

Included in the first wave of the 'Most Beautiful Chinese Village' Boutique Villages of Anji County and Huzhou City, Liujiatang Village of Shangshu Township is considered the northern gate of the township. With the southern gate of Lingfeng Tourist Resort located within the village boundary, the Hangxiao Road passes through it, making transport convenient. Covering 7.7 km^2, it has a mountain and forest coverage of 10,149 mu of which 3340 mu is moso forest. The population of 2010 people is split into 561 households, residing in one central village[11] and six natural villages[12], represented by 14 village groups[13]. In 2012, the rural residents earned an average net income of 20,053 yuan and the collective income of the village was half a million or so. The bamboo forest of the village is mainly managed through contracts and the household incomes come from wages and self-employment.

3.2.2.3 The Sample Households

3.2.2.3.1 Sample Household Demographics

From the survey data collected, the household respondents had an average age of 52.3. Of the 30 household survey respondents, 27 were male (90 per cent) and 3 were female with 27 respondents being the heads of their household. Figure 1 presents the educational level of the survey respondent from each household. The majority had primary (40 per cent) or junior high (36.7 per cent) education. On average, each household had 4.1 members of whom 2.8 were full-time labourers and 1 migrated to urban areas for better job opportunities.

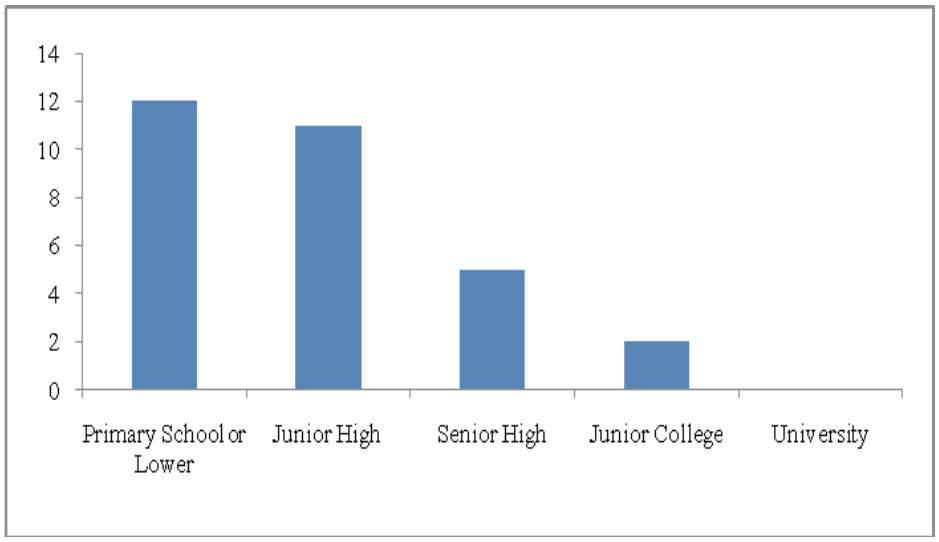

Figure 1 Educational Level of Anji Sample Household Respondents

11 A rural community with a certain population size and a more complete public facility.

12 A village that is spontaneously formed by a family or a clan and then peoples congregate together.

13 Autonomous rural grass-roots organisations

3.2.2.3.2 Household Income Status of Anji Sample Households

Table 2 provides the source and value of income for households in the science parks. Initially the two main income components were from wages (45.83 per cent) and forest activities (28.9per cent). Over time, there has been a steady increase in the proportion of income from bamboo forests, from 15.04 per cent at the establishment of the park to 16.42 per cent in 2013. We also see that the bamboo afforestation subsidy only contributes 2 to 3 per cent of their total income.

Table 2 Income Data for 20 Park Households

Income Type	Upon the Park's Establishment		2012		2013	
	Average Income per Household (Yuan)	Proportion in the Total (%)	Average Income per Household (Yuan)	Proportion in the Total (%)	Average Income per Household (Yuan)	Proportion in the Total (%)
Agricultural Income	7650	8.20%	8050	7.16%	8350	7.09%
Forest Induced Income	26,969	28.91%	35,942	31.97%	33,299	28.26%
Of which: bamboo management income	*14,029*	*15.04%*	*18,027*	*16.03%*	*19,349*	*16.42%*
Of which: bamboo afforestation subsidy	*288*	*0.31%*	*315*	*0.28%*	*521*	*0.44%*
Wage Income	42,750	45.83%	45,310	40.30%	49,560	42.05%
Self-employment Income	10,500	11.26%	13,000	11.56%	15,000	12.73%
Property Income	3000	3.22%	7000	6.23%	8500	7.21%
Transfer Income	2412	2.59%	3137	2.79%	3137	2.66%
Total	93,281	100.00%	112,439	100.00%	117,846	100.00%

Table 3 provides the survey data for the non-park village which included one household farming a relatively large area of bamboo forest. For this household, 98 per cent of their total income came from their forest activities, while other households derived their income from other wages and self-employment.

Comparison of Table 2 and 3 shows that the non-park households' income (including the one with the large contract) is slightly lower than households from the bamboo science park.

Table 3 Income Data for Non-Park Households

Income Type	2012		2013	
	Average Income per Household（Yuan）	Proportion in the Total（%）	Average Income per Household（Yuan）	Proportion in the Total（%）
Agricultural Income	400	0.40%	550	0.48%
Forest Induced Income	3025	3.00%	6360	5.52%
Of which: bamboo management income	525	0.52%	2360	2.05%
Of which: bamboo afforestation subsidy	10	0.01%	10	0.01%
Wage Income	48,960	48.48%	55,460	48.13%
Self-employment Income	41,500	41.09%	41,500	36.02%
Property Income	6750	6.68%	8750	7.59%
Transfer Income	358	0.35%	2608	2.26%
Total	100,993	100.00%	115,228	100.00%

3.2.2.3.3 Land Resources of Sample Households

The survey found that, on average, the park households have management rights of 40.1 mu forestland. Table 4 shows that the majority (75 per cent) of park households have worked 1.33 to 6.67 ha of forestland. Most of the non-park households have transferred their forestland allocation to the contracted households in their village, and now only have forestland of 0.33 to 0.67 ha. In comparison to the park peasant households, the non-park peasant households have an average forestland coverage of 7.3 mu.

Table 4 Land Resources of 20 Park Households

Coverage（hectare）	Forestland		Bamboo Forestland	
	Number of Households	Ratio (%)	Number of Households	Ratio (%)
≦0.07	0	0%	0	0%
0.07-0.33	0	0%	1	5%
0.33-0.67	0	0%	2	10%
0.67-1.33	2	10%	2	10%
1.33-6.67	15	75%	13	65%
≧6.67	3	15%	2	10%
Total	20	100%	20	100%

3.2.3 Analysis of the Bamboo Afforestation Subsidy Situation

3.2.3.1 General Situation

Efforts made to promote the bamboo industry in Anji County have concentrated on the establishment of moso science demonstration parks and improvement of forestry infrastructure facilities.

(1) Establishing moso science demonstration parks: In order to establish a modern forest demonstration park so as to promote the intensive management of the bamboo forest of Anji County, various investments have been made since 2005: forestland road building, construction of reservoirs and irrigation systems, establishing professional cooperatives in moso bamboo abundant areas where proper planning, efficient cultivation and centralised demonstrations are conducted. By the end of 2013, 26 moso science parks had been established in 11 towns including Shanchuan, Dipu and Hanggai covering 137,400 mu. Taking advantage of the various preferential policies issued by the Zhejiang Government and Central Government, demonstration and promotion projects have been conducted within these parks. For example, a moso bamboo-shoot efficient ecological management demonstration and promotion project from 2010 to 2012, a bamboo-shoot efficient ecologically sustainable management technology demonstration and promotion project from 2012 to 2015, and a bamboo industry promotion technology integrated innovation and popularisation project from 2010 to 2012. All these projects have greatly facilitated the cultivation of bamboo resources within parks.

(2) Construction of forestry infrastructure facilities: Forest roads play a key role in facilitating production and decreasing costs. Forest road construction projects have been prioritised since 2004 and Anji County issued forest road construction policies in 2005 to encourage forest road construction across the whole county. Village leadership coordinates rural households to raise funds for construction which can be partially refunded through subsidies on passing acceptance inspections. By the end of 2013, Anji County had conducted forest road construction projects for nine years, completing 1080 roads for a total length of 2160.5 km and repayment/subsidy rates of 4500 to 5500 yuan/km.

Since 2010, in order to increase and maintain the quality of existing forest roads, forest road upgrading projects began with subsidy rates of 50,000 yuan/km with a plan to complete 1000 km within five years. By 2013, 53 forest roads had been successfully upgraded, a total length of 124.4 km. According to data from the Anji Forestry Bureau, by the end of 2011, the total value of subsidies invested had reached 16,000,250 yuan. This is by far the longest and highest value subsidy project in the whole province.

3.2.3.2 Access and Use of Bamboo Afforestation Subsidy by Sample Households

3.2.3.2.1 Bamboo Forest Management in the Science Parks

As noted above, as of 2013, 26 moso parks had been established in 11 towns covering 137,400 mu. According to the Anji Forestry Bureau data (Table 5), the moso parks have achieved steady increases in production.

As of 2013, annual production of bamboo shoots was 1580 kg/mu and 690 kg/mu with an average gross output of 3525 yuan/mu (with a max of 5630 yuan/mu). For the bamboo-shoot forest, there was an annual bamboo production of 2021 kg/mu and 430 kg/mu of bamboo shoots with an average gross output of 2919 yuan/mu.

Table 5 Bamboo Forest Management by the Peasant Households of the Science Parks

	Upon Park Establishment	2012	2013
Average Bamboo Forest Coverage (hectare)	2.80	2.91	2.94
Density of Bamboo Plantation (tree/hectare)	2531.25	2711.25	3322.50
Bamboo Production (kilogram/hectare)	19,125.45	21,393.60	22,222.80
Bamboo Shoot Production (kilogram/hectare)	229.05	412.05	592.35

3.2.3.2.2 Science Park Households Access to Bamboo Afforestation Subsidies

Since the foundation of the science parks, there has been increased subsidy support from both the county government and provincial government mainly in the form of subsidised infrastructure facilities.

(1) Infrastructure Facilities Construction Subsidy: Using Shangshugan Provincial Moso Bamboo Boutique as an example, from 2010 to 2011, 773,800 yuan was allocated as subsidies. As of August 2011, secured infrastructure construction subsidies were valued at 715,500 yuan, of which 200,000 yuan came from the provincial government and 150,000 yuan from the county government. The breakdown of subsidy allocation is shown in Figure 2 with 461,000 yuan of this capital used for infrastructure construction and 254,500 on the introduction and promotion of new technologies.

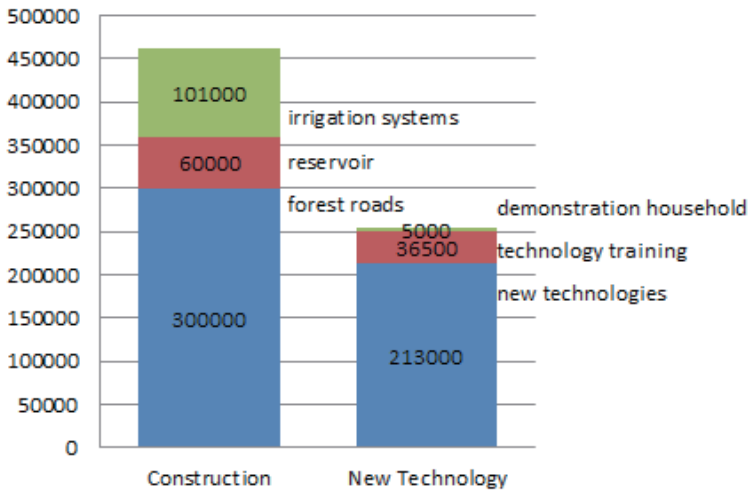

Figure 2 Shangshugan Provincial Moso Bamboo Boutique Construction and Technology Subsidy (yuan)

In Fushi Provincial Moso Industry Demonstration Park, the total subsidy value was 1,713,600 yuan from 2010 to 2011, mainly assigned to infrastructure facilities construction, reservoirs, reclamation and fertilization of bamboo forestland, mountain digging, tree planting, the installation of electronic mosquito killers, the establishment of a large-scale advertising board and the maintenance of Poganwu Reservoir.

(2) Cash Subsidy The cash subsidy granted to the Shangshugan Park households is usually paid based on their production volume. Since its foundation in 2009, the contracted park households received 5 yuan/kg. They also get a labour subsidy of 50to 100 yuan per person for mountain digging and cultivation, plus other subsidies in the form of insurance and gifts. Following the 2012 typhoon, affected

households of Fushi Provincial Moso Demonstration Boutique Park received a disaster subsidy of 0.8 to 1 yuan/tree and 80 yuan/mu of bamboo forest.

For the non-park households, the survey data found that the bamboo subsidy only benefitted those with forestry contracts. For example, in 2008, the contract households received 10,000 yuan while the other households whose forestland had been transferred or those not participating in bamboo forest management did not get any subsidies at all.

3.2.4 Satisfaction with Bamboo Afforestation Subsidies among Sample Households

3.2.4.1 Levels of Satisfaction

Figure 3 presents the responses of the 30 sampled households regarding their level of knowledge of bamboo afforestation subsidies. Eight of the nine (80 per cent) who did not know about the subsidies are non-park households. Since most of the non-park households have transferred their forestland to the contracted households, they no longer engage in forestry management and are not eligible for subsidies which explains their low awareness levels compared to park households.

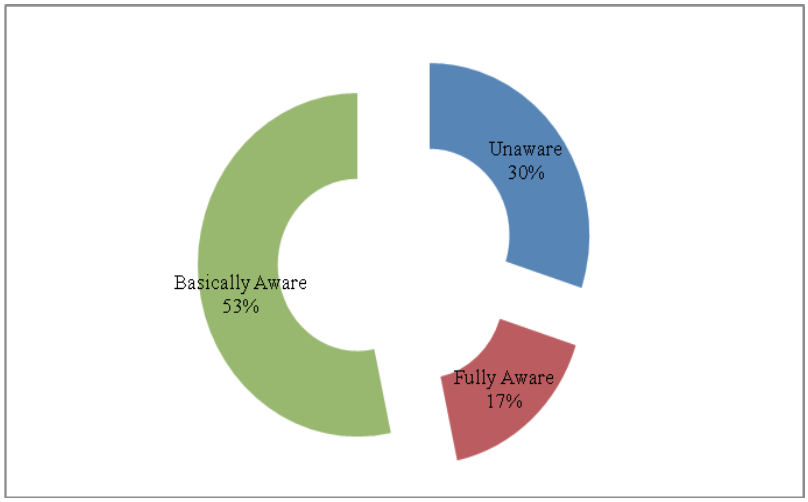

Figure 3 Awareness Levels of Bamboo Afforestation Subsidy by Sample Households

Figure 4 presents the survey data for the different communication channels by which bamboo subsidy information was received by the 30 sample households.

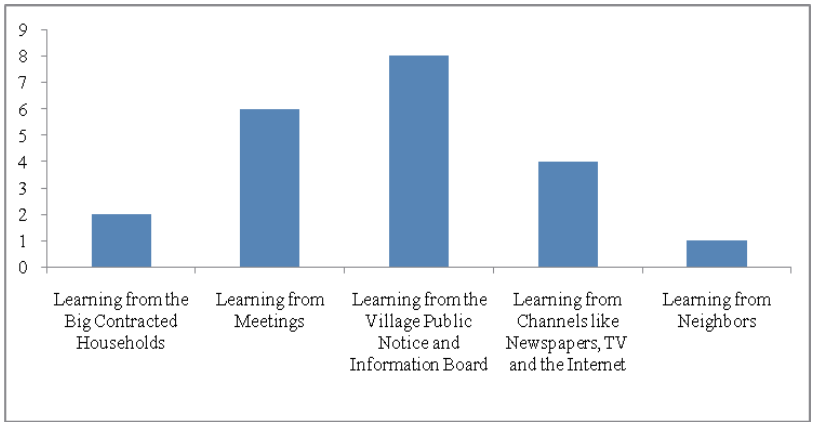

Figure 4 Subsidy Communication and Information Channels for Sample Households

Of the households who didn't know about bamboo subsidies, five households (31.3 per cent) attribute this to their 'indifference' or 'limited number of information channels and information quantity'. Of these five 'indifferent' households, four (80 per cent) were non-park households. When asked whether village leadership was active in information sharing and advertising, 16 households agreed, while 11 disagreed, of which five (45.5 per cent) were non-park households. The remaining non-park households said they had no idea whether there were any such notifications. We see that the park households clearly have better awareness of the bamboo afforestation subsidy policies and paid more attention to subsidy information channels.

Of the 30 sampled households, 13 (43.3 per cent) had a positive impression while three (10 per cent) had a negative impression of subsidy policies. Figure 5 presents the satisfaction levels of the 20 park households. Generally speaking, the park households have a higher degree of satisfaction towards the subsidy policies than the non-park households.

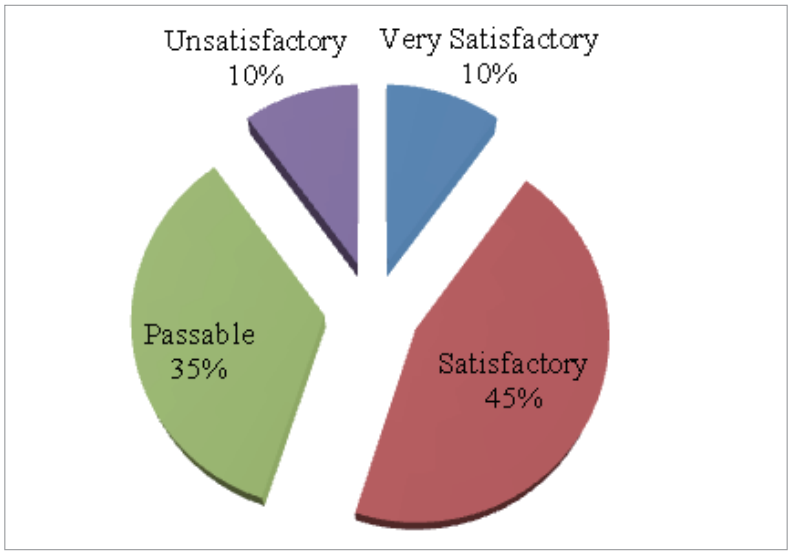

Figure 5 Bamboo Afforestation Subsidy Satisfaction Levels among Sample Park Households

The 30 sample households note different benefits of the park on the village with 16 (80 per cent) park households believe that the village environment has improved since the foundation of the bamboo science park, including better environment, better air, water and soil quality, more wild animals and higher vegetation coverage.

Since the opening of the science park, 11 park households (55 per cent) think that, though there was an increase demand for labour, many villagers have still left for urban areas or are engaged in agricultural or other business. 18 park households (90 per cent) think that there is an increase in the quality and quantity of the bamboo products and bamboo management technical training since the science park opened.

3.2.4.1.1 Satisfaction with Bamboo Afforestation Subsidy Levels

Figure 6 presents the views of the 20 park households towards the bamboo afforestation subsidy level.

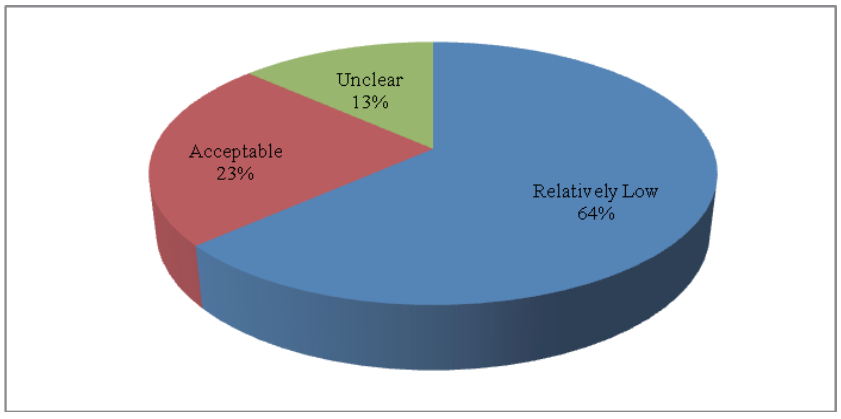

Figure 6 Households' Evaluation of the Bamboo Afforestation Subsidy levels

3.2.4.1.2 Satisfaction with Bamboo Roads

When asked their views of the bamboo roads in the village, 19 of 30 sampled households (63.3 per cent) think that they are in very good condition, 20 believe that they are in urgent need of maintenance and all households believe that the bamboo road construction should be continued. Figure 7 presents the 30 sample households' perceived benefits of forest roads.

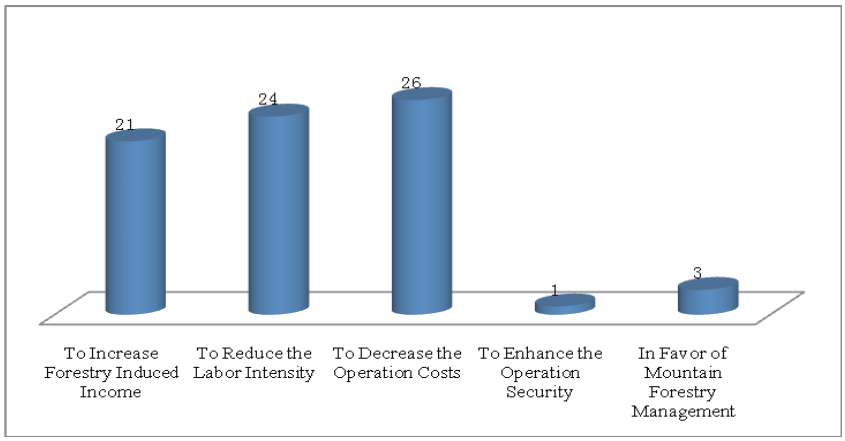

Figure 7 Sample Households' Perceived Benefits of Forest Roads

3.2.4.1.3 Demand for Bamboo Subsidies

The surveyed households reported that they are in most urgent need of bamboo construction subsidies, agricultural capital subsidies and forestry insurance. The non-park households noted that, since most have no legally binding forestland transfer documents, there have been many land occupation issues and disputes, and the government should clearly define the rights and obligations of both sides and regulate land transfer procedures.

3.2.5 Bamboo Afforestation Subsidy Implementation Challenges

3.2.5.1 The Policy Itself

3.2.5.1.1 Low Subsidy Values

The effects of the low subsidy values are manifested in the construction of infrastructure facilities and the cash received by households. Since most of the Anji County forestland is in very remote areas,

some of which are steep, rocky mountains, this leads to difficulties during construction and high costs from blasting, excavating and bridge building. From 2004 to 2009, the bamboo forest road construction subsidy was 5000 yuan/km for new construction which made little contribution to the construction costs of nearly 100,000 yuan/km.

Since 2010, the subsidy has increased to 50,000 yuan/km but accompanied by an increase in road construction standards, so there is still a big gap between the low value of the subsidy and construction costs.

The park households mainly received a subsidy in the form of a production subsidy and a disaster subsidy. When they are engaged in bamboo cutting and cultivating, they receive a labour subsidy of 180 to 200 yuan per labour. From this, we can see that the subsidy is still way far from covering the cost of bamboo forest management.

3.2.5.1.2 Limited Disaster Resilience

The low variety of tree species and decreased fauna diversity has weakened the forests' capacity to respond to pest outbreaks which are becoming more frequent. On the other hand, it seems bamboo forestland has low resistance to withstand natural disasters as was demonstrated by the huge losses following Typhoon Haikui. Given the level of investment by households, lack of forest insurance and low awareness of risks arising from forest homogeneity, households are vulnerable in the face of natural disasters.

3.2.5.1.3 Forestland Property Rights Disputes

The past couple of years have seen increasingly frequent forestland transfer especially among the non-park households. As part of the bamboo forest management promotion activities, most forestland has been transferred to a few households who are then awarded bamboo contracts. However, in order to save time and costs, it is common for the contracts signed between the parties to avoid legal procedures, instead relying on verbal or informal written agreements. This has led to property rights disputes regarding forestland management terms/durations, the occupation of bamboo roads or the occupation of other infrastructure facilities.

3.2.5.2 Implementation Challenges

3.2.5.2.1 New Bamboo Forest Road Construction Prioritised Over Maintenance

The construction of forest roads has greatly supported forest-agriculture income in Anji facilitating increased production and reducing costs as well as encouraging villages and townships to expand the road network. However, many construction units value the construction of new roads over construction quality and future maintenance.

3.2.5.2.2 Limited Communication and Information Channels

As presented above (Figure 4), currently the main way that households learn about bamboo afforestation subsidies is from the village public information board as well as village meetings, TV and internet. The government reliance on meetings is too narrow a channel for households to access information.

3.2.5.3 Stakeholder Specific Issues

3.2.5.3.1 Low Transparency in the Use of Funds by Local Government

Based on the survey and interviews, it seems that the use of funds has not been adequately shared

with the public. 16.7 per cent of 30 surveyed households hope that the village leadership will disclose capital expenditure of village projects.

3.2.5.3.2 Labour Shortages

Currently, there is severe shortage of labour with few young people willing to stay in the villages and participate in forest activities. Recruiting labour is difficult and the rates are relatively high (200 yuan/ labour).

The household demographic data showed that each household has, on average, only 2.8 full-time labourers of which one has left for better job opportunities in urban areas. Most of the labourers left behind are older men and women which is affecting the industry as they are not able to contribute much due to the laborious nature of the work.

3.2.6 Bamboo Afforestation Subsidy Suggestions

3.2.6.1 The Policy Itself

3.2.6.1.1 Diversification and Flexibility of Bamboo Subsidy Systems

The Anji Government should gradually increase the bamboo road construction subsidy rates and reduce levies and charges with appropriate capital funds. Efforts should be made to explore other fundraising models for forest road building. For example, village leadership can allot sums from the collective fund, households can contribute in either labour or cash, and forestry enterprises can be invited to participate, so as to address the problem of capital for forest road construction.

Labour migration and labour cost increases will result in further increases in bamboo forest management costs which requires flexible and diverse bamboo subsidy systems to meet the challenges.

3.2.6.1.2 Strengthen Disaster Subsidies and Insurance System

Anji Government activities have contributed to increases in household income. Yet, at the same time, a conflict between economic efficiency and ecological efficiency arises, which leads to frequent outbreak of disasters such as fires and pests.

It is very important that households are educated in disaster prevention activities as well as strengthening disaster subsidy and insurance systems so as to increase households' ability to recover from such events.

3.2.6.1.3 Address Forestland Ownership and Property Rights Disputes

The lack of standard practices in the management and transfer of bamboo forest has led to unclear ownership and rights status of households. Additionally, reduction in forestland coverage due to the occupation of forest roads has led to disputes. Therefore, the government needs to address the issue of ownership policy, simplify land transfer procedures and strengthen awareness of standard procedures, so as to encourage households to transfer land for large-scale management. At the same time, the government must take the initiative to settle current forest rights disputes.

3.2.6.2 Implementation Suggestions

3.2.6.2.1 Encourage Maintenance of Bamboo Roads

The current policies have led to local government valuing new construction over maintenance and management of bamboo forest roads. The government must explore innovative management systems

of the bamboo forest road network, including funding support so as to guarantee sustained benefits.

3.2.6.2.2 To Broaden Information Sharing and Communication Channels

At present, the bamboo forest subsidy information sharing and communication channels are narrow and only limited information is available. The government should diversify the channels and advertise through TV, distribution of brochures and doorstep notifications to increase households' perception and understanding of the policies and increase participation.

3.2.6.3 Stakeholder Group Suggestions

3.2.6.3.1 Strengthen Policy Supervision and Fund Transparency

The survey found that households only have very limited knowledge of the distribution and management of subsidy funds and even less about the value of capital invested in construction and maintenance of infrastructure. The central government should strengthen supervision and management of finance flows while increasing its capital support, and local government should make capital expenditure information available and transparent to households.

3.2.6.3.2 Address Labour Shortages through Labour Pooling and Increased Technology Use

Quite a few households expressed their willingness to participate in bamboo forest management but said the shortage of family labour prevents them from doing so. Local governments could, based on the labour price and professional technology, build rural mutual-aid teams and professional project teams to conduct professional technology training and learning so as to solve the local labour shortage problem.

3.3 Qingyuan County of Zhejiang Province

Qingyuan County, an economically rising county with bamboo industry induced development, has witnessed increasing policy support for bamboo afforestation and bamboo industry development in recent years. Through preferential policies, exploring their abundant bamboo resources, Qingyuan County has led to unprecedented development of the bamboo industry, which is becoming the leading industry in the county.

3.3.1 Data Sources

3.3.1.1 Households

Based on relevant factors, such as geographical location, natural resources endowment, etc, the study chose five townships (towns). From each town, two villages were selected as presented in Table 6.

Table 6 Sample Towns and Villages in Qingyuan County

Township（Town）	Annan Township		Pingdu Town		Zhukou Town		Huangtian Town		Longgong Township	
Sample Village	Huangzhu Village	Anxi Village	Jushui Village	Yangbei Village	Zhushang Village	Zhuzhong Village	Yanglong Village	Zhongji Village	Lianhu Village	Longgong Village

In this county, 25 households were chosen from each sample village, altogether 258 respondents, yielding 254 valid questionnaires resulted from the face-to face interviews (survey response rate of

99.14 per cent).

3.3.1.2 Other information sources

Interviews were also conducted with the Qingyuan Forestry Bureau.

3.3.2 Case Study Site Features

3.3.2.1 Introduction to Qingyuan County

Located on the southwestern border of Zhejiang Province, Qingyuan County is blessed with abundant natural resources and is known as the 'Shiitake Mushroom Town of China' and the 'Best Ecological Friendly County of China'. With a total coverage of 2.87 million mu, the county has seven towns, 13 townships of 345 villages. In addition, there is a state-level forest farm, which is also registered as a natural reserve. The county has a total population of 206,000 of which 173,000 (84 per cent) are farmers with more than 50,000 involved in the bamboo industry (~30 per cent). In 2012, the average disposable income for the whole county was 22,669 yuan, while rural residents had an average income of 8079 yuan.

Blessed with a subtropical monsoon climate, Qingyuan County is generally warm and humid with abundant rainfall and four distinct seasons. In spring and summer, it is hot and rainy, while in spring and winter, it is cool. The mountainous topography has rich water resources and a permeable soil abundant with nutrients, favouring natural and artificial cultivation of bamboo. Of 62 bamboo species, 15 genera are found in Qingyuan County, which produced a gross output of 3.06 billion RMB in 2012. According to the statistical data from 2007, Qingyuan County had 392,000 mu of bamboo coverage. Compared to the previous data of 1997, this was an increase of 107,000 mu which indicates active development of bamboo resource cultivation. In recent years, intensified processing facilitated by technological advances has led to an upsurge in the bamboo industry in Qingyuan, which has gradually evolved into the leading industry in the whole county.

3.3.2.2 Introduction to the Case Sites

3.3.2.2.1 Annan Township

Considered as the southern gate of Qingyuan County, Annan Township is composed of 14 executive villages and 39 natural villages with a total population of 7700. Covering 84.8 km^2 of which 681.8 ha is arable land, Annan Township has a forest coverage of 8266.13 ha of which 159.53 ha is bamboo forest with a total 3.47 million bamboos. It is one of the key bamboo-shoot forest bases of Qingyuan County. At the end of 2012, there were 26 wood-bamboo processing enterprises with a gross output of 38.2 million, contributing to a total forest output of 42.26 million, 5.41 million from primary industry and 36.84 million from secondary industries. In 2012, the average net income of the rural residents was 5050.35 yuan of which 4445.35 was from forest-related activities and 190 from bamboo activities. In order to promote development of the bamboo industry, Annan Township has so far completed 307.43 km of bamboo forest roads.

Anxi Village has been a historic collection site for bamboo shoots, bamboo, mushroom and tobacco, and is an important border trading centre for neighbouring areas.

3.3.2.2.2 Pingdu Town

Located in the western area of Qingyuan County, Pingdu Town covers 163.47 km^2 composed of 16 executive villages with a population of 12,000. It has total forest coverage of 6477 ha of which 718 ha

is key public welfare forest and 5759 ha is commercial forest. In 2012, the average net income of the residents was 9580 yuan of which 5397 yuan was forest-related, and 3219.2 yuan was from bamboo. Pingdu Town has a wide variety of forest species which is managed as an economic forest covering 408 ha, 8.04 per cent of the total coverage of Pingdu Town. Bamboo forest covers 1073 ha accounting for 4.11 per cent of the total bamboo coverage of the whole county, of which 1063 ha is moso bamboo forest.

3.3.2.2.3 Zhukou Town

Located in the north-western mountainous area of Qingyuan County in the southwestern part of Zhejiang Province, Zhukou Town covers 171.9 km^2 composed of 16 executive villages and 65 natural villages, with a population of 9900 distributed among 2833 households. Forest coverage is 15,333 ha (90.4 per cent). and has a total forest stand volume of 539,000 m^3. There are about 600 ha of moso bamboo forest. The town has a rural population of 1367 people and an urban population of 1367 people. The rural residents' income mainly comes from the production of edible mushrooms, the bamboo-shoot industry and the production of tobacco.

3.3.2.2.4 Huangtian Town

Located in the north-western area of Qingyuan County, covering 126.37 km^2, Huangtian Town has 27 executive villages and 89 natural villages, distributed into 175 villager groups with a population of 15,200. It has 973.47 ha of arable land and forest coverage of 10,548.9 ha. In 2012, the average net income of the rural residents was 8783 yuan, of which 6148 yuan came from forest activities, with 4303 being bamboo-related. Huangtian Town is reliant on the bamboo industry as its main source of income. In 2012, the town collectively owned 10,548.9 ha of forest of which 1812.8 ha were part of a key public welfare forest. The town's forestland also includes 5813.4 ha of bamboo forest of which 5780 ha is moso bamboo forest and the remaining 3.4 ha is other species.

3.3.2.2.5 Longgong Township

In the southwest of Qingyuan County, Longgong Township is composed of 12 executive villages and 22 natural villages which are distributed into 65 villager groups with a total population of 7800. Covering an area of 68.7 km^2, it has 424.4 ha of arable land and forest coverage of 5276.7 ha. In 2012, the rural residents' average net income was 8504 yuan, of which 6142 yuan was forest-related and 2292 yuan bamboo-related. Longgong Town is one of the major moso bamboo producing bases of Qingyuan County as well as the whole of Lishui City. The local forest is mainly bamboo with a small volume of cedar wood forest and fir-bamboo mixed forest with a total bamboo coverage of 2913.5 ha (0.4 ha/person) with an annual yield of 600,000 bamboo and an annual demand of 3 million bamboo for processing. Currently, there are 5000 labourers mainly engaged in the exploration, processing and manufacturing of bamboo products. There are also more than 2000 migrant labourers making the bamboo-shoot industry the main source of economic income. In order to maximise the land available for moso bamboo forests, many processing enterprises have moved to neighbouring counties in Fujian Province such as Jian'ou and Zhenghe. This also promotes local development of technological training and employment.

3.3.2.3 The Sample Households

Of the households surveyed, 73 (29.8 per cent) had received bamboo afforestation subsidies as shown in Table 7.

Table 7 Households Receiving Bamboo Afforestation Subsidies

Sample Township(Town)	Number of Subsidized Peasant Households	Number of Peasant Households Not Subsidized	Total Samples
Annan Township	3	44	47
Pingdu Town	8	40	48
Zhukou Town	9	40	49
Longgong Township	17	33	50
Huangtian Town	36	15	51
Total	73	172	245

Data Source: Survey Data

3.3.2.3.1 Sample Household Demographics

From the survey data, the household respondents had an average age of 50.7. Among the 245 household survey respondents, 203 were male (83 per cent) and 42 were female. As for respondents' social status, 42 of them were village cadres[14], while the remaining 203 (82.9 per cent) were ordinary villagers. On average, each household has 4.4 members of whom 2.5 are full-time laborers and 0.7 had migrated for urban areas. Figure 8 presents the educational level of the household respondents with 48 per cent having a junior high education, and 38 per cent having a primary education. Only 1.2 per cent had a college education.

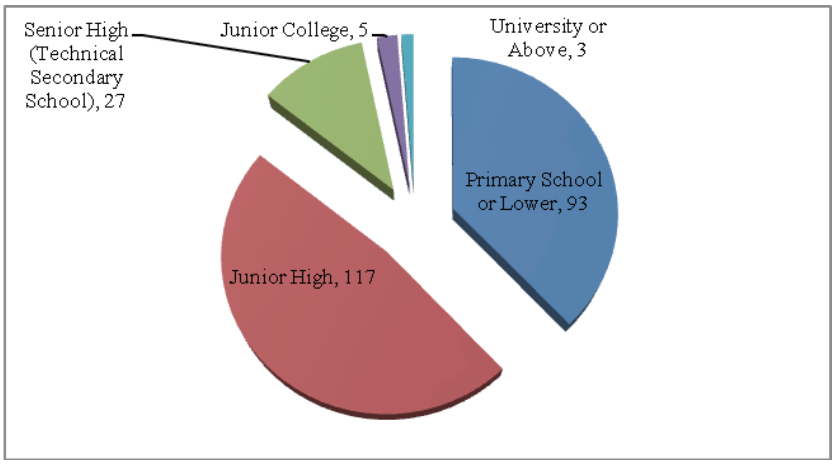

Figure 8 Educational Level of the Qingyuan Sample Household Respondents

3.3.2.3.2 Household Income Status of Qingyuan sample Households

Table 8 presents the income data for the 245 households. From 2009 to 2012, there was a 31.4 per cent increase in average income. The biggest contribution to the increase is from forest-related activities (36.5 per cent), of which 42.1 per cent is from bamboo activities. There is also a very small increase in the absolute value as well as the proportion of income coming from bamboo afforestation subsidies.

14 Party officials

Table 8 Income Data for Sample Households

Income Type	2009		2012	
	Average Income per Household (Yuan)	Proportion in the Total (%)	Average Income per Household (Yuan)	Proportion in the Total (%)
Agricultural Income	4363	13.25%	5602	12.94%
Forest Induced Income	12,047	36.59%	16,443	37.99%
Of which: bamboo management income	*10,521*	*31.95%*	*14,946*	*34.53%*
Of which: bamboo afforestation subsidy	*140*	*0.42%*	*222*	*0.51%*
Wage Income	9443	28.68%	12,826	29.63%
Self-employment Income	6841	20.78%	7992	18.46%
Property Income	69	0.21%	163	0.38%
Transfer Income	165	0.50%	255	0.59%
Total	32,928	100.00%	43,281	100.00%

3.3.2.3.3 Land Resources of Sample Households

The survey found that sample households have an average of 2.2 plots of forestland. Table 9 shows that most (82.45 per cent) households had more than 0.33 ha of forest land, while 72.65 per cent had bamboo forest coverage of more than 0.33 ha.

During the 'Three Defines[15]', mountain and forest lands were distributed to households, which resulted in small, scattered plots of hilly and forest land and low production patterns. But in recent years, the forest rights mortgage policy enabled households to transfer their forestland allocation and has resulted in gradual aggregation of forestland, favouring large-scale intensive management of bamboo forests.

Table 9 Land Resources of Sample Households

Coverage (hectare)	Forestland		Bamboo Forestland	
	Number of Households	Ratio %	Number of Households	Ratio
≦0.07	18	7.35%	18	7.35%
0.07-0.33	25	10.20%	49	20.00%
0.33-0.67	51	20.82%	67	27.35%
0.67-1.33	39	15.92%	41	16.73%
1.33-6.67	98	40.00%	67	27.35%
≧6.67	14	5.71%	3	1.22%
Total	245	100.00%	245	100.00%

15 i.e. Defining the property rights of mountains and forests, defining hilly land allotted for private use and defining a production responsibility system

3.3.3 Analysis of the Bamboo Afforestation Subsidy Situation

3.3.3.1 General Situation

Qingyuan County has made efforts to develop their bamboo industry since 2002. In March 2004, a Bamboo Industry Development Office was established to plan, organise, coordinate and supervise the bamboo industry of Qingyuan County. In November 2005, a working meeting on the development of Qingyuan County's bamboo industry was held which defined the future development objectives for the bamboo industry. In April 2007, the Qingyuan County Party Committee and the Qingyuan County Government jointly issued 'Several Proposals on the Further Promotion of the Bamboo Industry Development by Qingyuan County Party Committee and Qingyuan County Government[16]' which affirmed the pivotal role of the bamboo industry for the economic development of Qingyuan County. It clarified the development objectives and strategies and various kinds of supportive policies, mostly as capital support and construction of infrastructure facilities and projects.

(1)Cash subsidies: The Qingyuan County Government issued 'Support Policies on the Industrialisation of Agriculture by Qingyuan County Government' in 2002, updated in 2003 and 2005. In 2007, the Qingyuan County Party Committee and the Qingyuan County Government jointly issued 'Several Proposals on the Further Promotion of the Bamboo Industry Development by Qingyuan County party Committee and Qingyuan County Government[4]' and 'Note on Printing the Management Measures of the Special Funds of Qingyuan County's Bamboo Industry Development by Qingyuan County Government' which strengthened the government's capital support to the bamboo industry.

The 2002 bamboo afforestation subsidy for forest plots more than 15 mu paid subsidies of 110 yuan/mu in western areas and 130 yuan/mu for eastern areas. There was an extra subsidy of 8 yuan/mu for afforestation of hilly land. Additionally, 2 yuan could be claimed for every moso bamboo tree. As of 2007, households with more than 3 mu could claim 100 yuan/mu in western areas, 150 yuan/mu in eastern areas, and the subsidy for scattered moso bamboo increased to 6 yuan. Those who replace cedar with bamboo get a subsidy of 4 yuan/tree.

The sample households reported a 40 yuan/mu subsidy for infrastructure construction. Other special subsidies and rewards were received for forestry projects, model corporations and environmentally-friendly bases which were initiated under the policies.

The Qingyuan County Party Committee, the Qingyuan County Government and the forestry department support and reward different activities and the forestry ministry provides services for free. Standard design and implementation of moso bamboo road construction was introduced, subsidies for roads 3-3.5 m wide was increased from 3000 yuan/km in 2005 to 6000-9000 yuan/km in 2008. Other supportive policies have been issued by Qingyuan County Government including reward funds for model townships, villages and households of 30,000 yuan, 10,000 yuan and 300 yuan respectively. Model bases can receive fertiliser subsidies of 25 per cent to 30 per cent and the committee members giving educational and informational talks to the public can claim 60 yuan per lecture.

(2)Construction of infrastructure facilities: The Qingyuan Forestry Bureau and the Bamboo Industry Developing Office launched various infrastructure projects including the 'Moso Bamboo Forest Cultivation Project 433', the 'Low-yield Moso Bamboo Forest Transformation Project', the 'Moso Bamboo Management Efficiency Project', the 'Low-yield Moso Bamboo Forest Transformation

16 No. 21 (2007)

Technology Integration and its Promotion', the 'Integrated Moso Bamboo Pest Management Project', the 'Establishment of Modern Model Base of Moso Bamboo Cultivation', and the 'Model Project of Bamboo Road Construction' to support development of the bamboo industry across the county.

In 2012, Qingyuan County Government established a fund of more than 100,000 yuan for the 'Bamboo-shoot Industry Development and Poverty Alleviation Project' to support construction of bamboo forest irrigation facilities. There is a subsidy of 200 yuan/m^3 of reservoir storage and 5 yuan/m for pipelines. 1000/yuan is paid for each set of outlet conduit and sprinkler irrigation facilities.

Since late 2013, Huangtian Town has conducted acceptance inspections for bamboo road construction projects in different villages. By the end of November, 45 bamboo forest roads with a total length of 48.40 km had been completed. Additionally, successful maintenance of 8 bamboo roads, comprising of 16.75 km, passed acceptance inspections. In total, these roads serve 3470 mu of bamboo forest and 13,730 mu of bamboo forest directly benefiting respectively.

3.3.3.2 Access and Use of Bamboo Afforestation Subsidy by Sample Households

3.3.3.2.1 Bamboo Forest Management by the Sample Households

The survey statistics found that, of the 73 households receiving bamboo forest subsidies, 60 of them conducted bamboo afforestation while 13 had not. In the total coverage of bamboo afforestation participated in by the peasant households, on average each household has 1.47 ha of which 0.19 is public welfare forest, while 1.29 ha is economic, 0.61 is job design and 1.19 is cultivation-based. Based on a labour wage of 132.3 yuan per day and a labour demand of 84 labour days/hectare, the cost of afforestation is 5529 yuan/ha.

3.3.3.2.2 Acquisition of Bamboo Afforestation Subsidy by the Sample Households

The survey found that, in 2011, each household received an average cash subsidy of 1350 yuan/ha, 1380 yuan/ha in 2012 and 1170 yuan/ha in 2013. Compared with the afforestation cost of 5529 yuan/ha noted above, this only covers ~20 per cent of the cost. The sample households get their subsidies in different ways as shown in Figure 9.

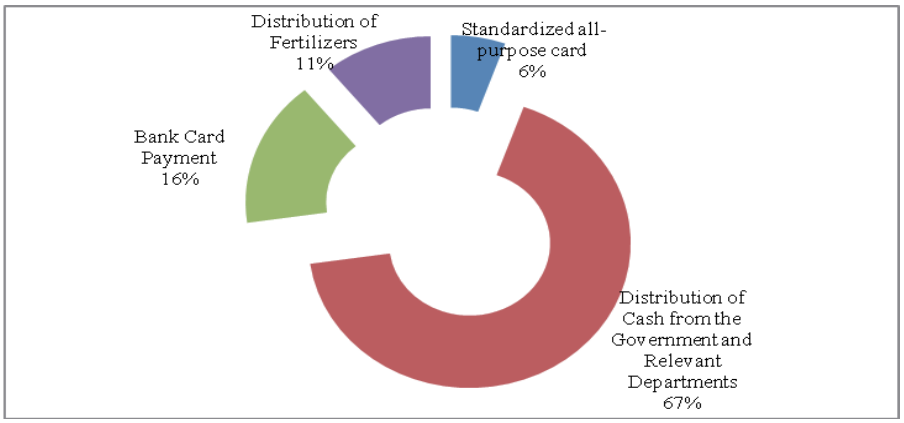

Figure 9 Methods of Receiving Bamboo Afforestation Subsidy by Sample Households

When the 73 subsidy receiving households were asked if they had received their subsidies in full, 53 (69.9 per cent) households said yes, six said no and 14 were not sure. For those who thought they had not received the full amount, the reasons given were either because their bamboo afforestation had not passed the acceptance inspection or their subsidy was embezzled. Two households had no idea why.

Of the 73 subsidy receiving households, 17 (23.3 per cent) had contracts with the local forestry bureau or station. Five (6.8 per cent) households thought the task of bamboo afforestation was too difficult, 48 thought it was 'Okay' while 19 thought it was easy. The five who thought it was hard attributed this to the lack of labour and capital in their household. Regarding acceptance inspections, 68.5 per cent of households said the bureau or station staff were responsible for doing them.

Of the total 245 sample households, 133 said they would continue bamboo afforestation on their private bamboo forestland while 58 said they would not, and 54 said they would only do so if the subsidy was provided. 16 per cent of households said bamboo forestry has a low economic value and they would rather do something else, while the others cited limited land suitable for bamboo afforestation, lack of labour, lack of technological support and deficient infrastructure facilities.

Of the 172 surveyed households not receiving bamboo subsidies, 131 households blamed failure to be assigned or the lack of relevant policies. Six households said it was due to their own reluctance because they did not have sufficient labour, while five said that the subsidy does not cover the high cost of afforestation. The other 35 households cited various reasons including not meeting the minimum land requirement to qualify for a subsidy or having no land at all.

When asked about the possibility of subsidies coming to an end, 35 households thought they would voluntarily cultivate, while 20 households said they would not, of which 10 said there would be no motivation if there was no subsidy, and others cited lack of labour or the fact that the subsidy does not cover the cost.

3.3.4 Satisfaction with Bamboo Afforestation Subsidies among Sample Households

Given the critical need for satisfaction and demand of bamboo afforestation subsidies by households in order for successful and sustainable bamboo industry development, this section now presents the general perception and demand for subsidies by the sample households.

3.3.4.1 Levels of Satisfaction

3.3.4.1.1 General Perceptions of Bamboo Afforestation Subsidy

Of the 245 sampled households, 26 households said they were fully aware of the policy, 62 were aware, while 157 (64.1 per cent) did not have a clear picture of what it really was.

Figure 10 presents the data for the different communication channels by which bamboo subsidy information was received by the 26+62 subsidy-aware households. We can see that the main channel of information about bamboo policies is communication between villagers and the public information board.

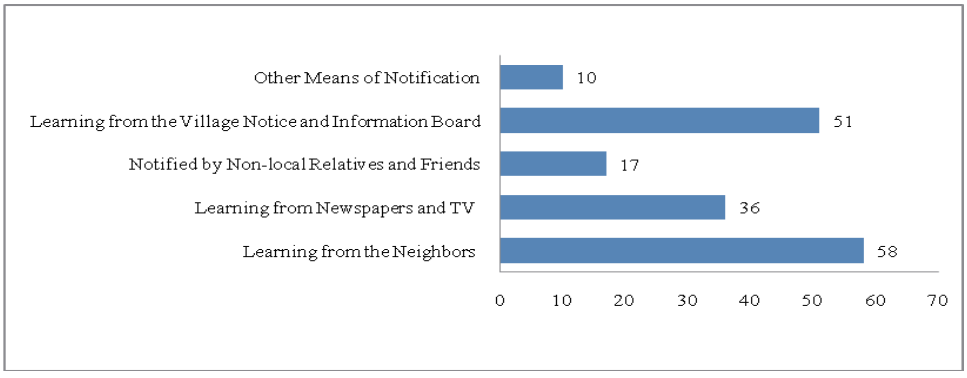

Figure 10 Bamboo Afforestation Subsidy Communication and Information Channels

Figure 11 presents the main reasons given by the 245 households for not knowing about the bamboo afforestation subsidy: 44 (18 per cent) said that the village leadership was not doing their job, others (14.3 per cent) thought that the information channel was too limited, and another group (11.8 per cent) said they did not pay much attention to such notices. Therefore, the government and village leadership need to fulfil their current responsibilities to broaden the information channels.

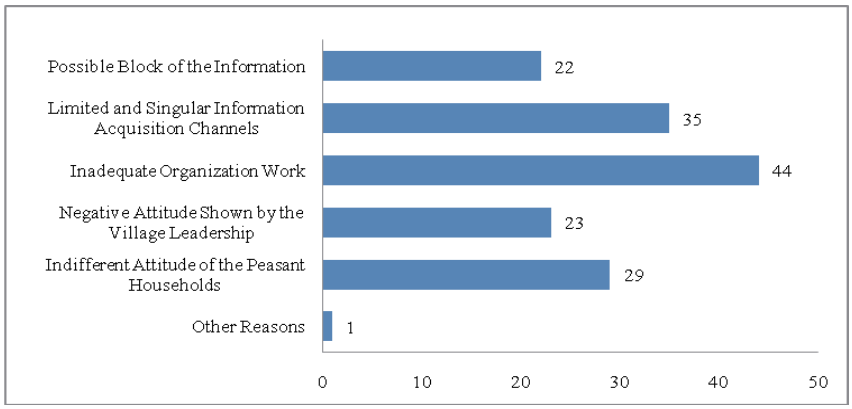

Figure 11 Reasons Given for Households' Lack of Knowledge of Bamboo Afforestation Subsidies

3.3.4.1.2 Satisfaction with Bamboo Afforestation Subsidy Levels

Figure 12 presents the views of the 245 households towards the bamboo afforestation subsidy level.

Only 37 per cent of the total sample was satisfied or very satisfied. It seems that Qingyuan County needs to earnestly consider household needs to improve satisfaction levels for subsidy implementation.

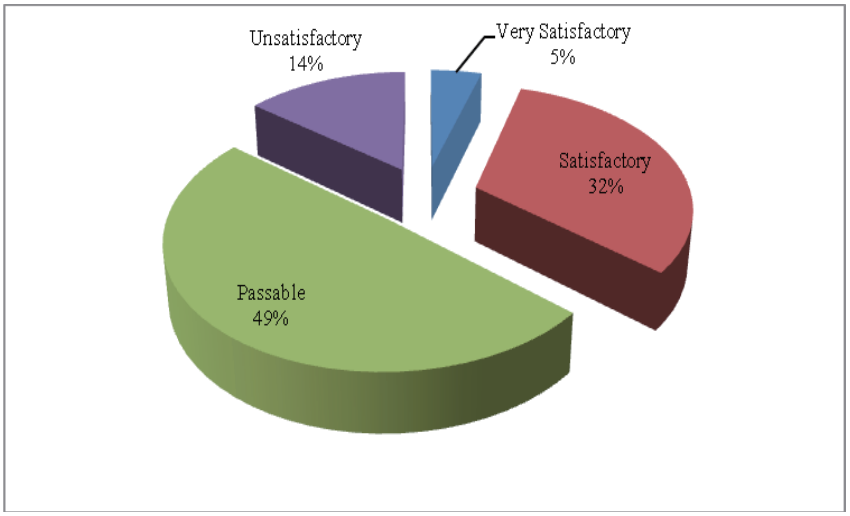

Figure 12 Bamboo Afforestation Subsidy Satisfaction Levels among Sample Households

3.3.4.1.3 Satisfaction with Bamboo Forest Road Construction

When asked their views of the bamboo roads in the village most (40.4 per cent) households expressed satisfaction (see Figure 13) which means not only subsidy receiving households appreciated the roads.

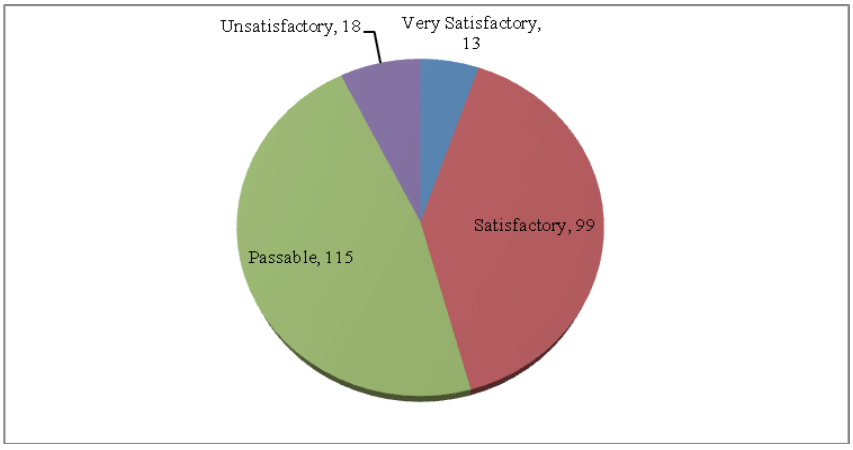

Figure 13 Households' Evaluation of the Bamboo Forest Road Construction

3.3.4.2 Levels of Demand

The analysis of the demand aims to identify opportunities for improving current policy.

3.3.4.2.1 Demand of Bamboo Afforestation

154 (62.9 per cent) of the 245 households recognised the need for afforestation. The breakdown of their motivations is shown in Figure 14 and we see that economic benefits is the main incentive.

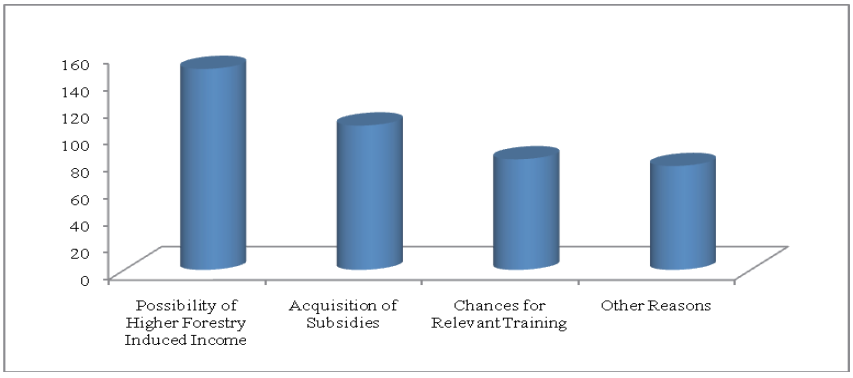

Figure 14 Sample Household Incentives for Bamboo Afforestation

Figure 15 presents the disincentives against bamboo afforestation given by households.

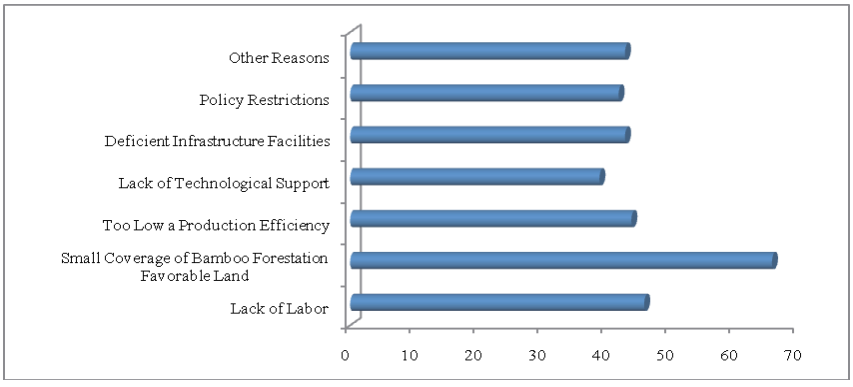

Figure 15 Sample Household Disincentives for Bamboo Afforestation

3.3.4.2.2 Demand for Bamboo Forest Road Construction

When asked whether bamboo forest roads should be built, 220 households agreed. Of these, 145 believed that roads can increase forest-related income, 137 said they helped to reduce workload, while 118 thought it lowered operation costs. When asked whether maintenance was necessary, 209 households said 'yes', while 36 of them said 'not yet'.

Those households who did not agree to the need for roads mainly said that the current situation was satisfactory.

3.3.4.2.3 Demand for Bamboo Forest Cultivation

206 of 245 households agreed that bamboo forestland needs better cultivation. 179 said it could increase forest-related income, 134 said they could get subsidies, 112 thought they could access training and 99 thought there would be other positive benefits, such as the improvement of the environment.

Of the 39 who disagreed with active cultivation, 23 cited lack of labour, 17 lack of technological support, 19 to the bad quality of soil unsuitable for enhanced management, 16 to deficient infrastructure facilities, 17 to policy restrictions and 20 to other unclear reasons.

3.3.5 Bamboo Afforestation Subsidy Implementation Challenges

To maximise the benefits realised so far in Qingyuan County's bamboo industry, the following issues also need to be addressed.

3.3.5.1 The Policy Itself

3.3.5.1.1 Low Value of Subsidies

The field survey data recorded the household labour wage for bamboo afforestation at 132.3 yuan/day, while the labour required for afforestation is 5.6 labour days/mu, which gives a rate of 368.6 yuan/mu. However, the bamboo subsidy policy only pays households an average subsidy of less than 100 yuan/mu, about 25 per cent of the afforestation cost.

The survey indicates that, although the absolute value of bamboo forest-related income and subsidies has increased slightly in recent years, its proportion of the total household income has decreased. This is one reason for the low household satisfaction towards the bamboo afforestation subsidy.

3.3.5.1.2 Lower Prioritisation of Bamboo Resource Cultivation

The development of the bamboo industry not only requires bamboo afforestation but also requires active management. Currently, the coverage of bamboo afforested land is decreasing, making effective cultivation even more crucial. However, Qingyuan Government policies still focus on bamboo afforestation and there is less emphasis on cultivation.

3.3.5.2 Implementation Challenges

3.3.5.2.1 Limited Communication and Information Channels

As presented in Figure 10 and 11 above, the households main information sources are other villagers and the village public information board. They hardly get any information from media such as TV, newspaper or meetings.

3.3.5.2.2 Low Subsidy Efficiency

Based on conversations with the sample households, the cash subsidies are mostly spent on non-

bamboo–related expenses. Replacing cash with fertilisers or other materials may improve capital efficiency.

Additionally, the surveyed households expressed higher satisfaction with direct investment of capital in bamboo road construction than household cash subsidies. Additionally, due to the low level of infrastructure subsidies, most of the time the households have to contribute to the cost, which contributes to their reluctance to cooperate and difficulty in raising the funds.

Therefore, the Qingyuan Government needs to consider how to maximise the capital efficiency of bamboo subsidies.

3.3.5.3 Stakeholder Specific Issues

3.3.5.3.1 Low Public Understanding of the Importance of Bamboo Afforestation and Cultivation

The survey results show that the main household interest in afforestation activities is economic benefit, and households are not aware of the other benefits of bamboo afforestation and cultivation.

As noted above, most households said they would give up the cultivation for economic reasons if there was no subsidy, and, in fact, the subsidy has led to valorisation of new bamboo plantation over management.

3.3.5.3.2 Labour Shortages

Currently, there is a severe shortage of labour with few young people willing to stay in the villages and participate in forest activities. Due to the intensity of labour required for bamboo forest management, older men and women are not able to contribute. Most younger people have left for better job opportunities in urban areas which is affecting the industry.

3.3.6 Bamboo Afforestation Subsidy Suggestions

Based on the survey, the following suggestions are made for further development of the bamboo industry of Qingyuan County.

3.3.6.1 The Policy Itself

3.3.6.1.1 Increase Bamboo Afforestation Subsidy Levels

It is clear that short-term interests are the main incentive for households to participate in bamboo afforestation. As noted in 3.3.3.2.2, the 2013 subsidy standard of 1170 yuan/ha only covers 20 per cent of the 5529 yuan/ha afforestation cost. Given the increasing wage levels and cost of tools and fertilisers, it is advised that the bamboo afforestation subsidy levels be raised in accordance with the local economic situation.

3.3.6.1.2 Encourage Bamboo Resources Cultivation

In order to reap long-term benefits, beyond motivating new plantation through cash subsidies, the government should now shift focus to promote bamboo cultivation. This needs to start with appropriate policies through to cultivation subsidies, to increase household uptake of bamboo management.

3.3.6.2 Implementation Suggestions

3.3.6.2.1 To Broaden Information Sharing and Communication Channels

The survey found that households only have a very vague understanding about bamboo afforestation subsidy policies due to limited information and communication channels. The government should

diversify the channels and advertise through picture displays, videos and the distribution of brochures. The range of information is also narrow. Households need to be aware of the policies as well as subsidy standards and the purpose and significance of bamboo afforestation. Only then will they realise that bamboo afforestation is beneficial for local forest economic development, that this is something they should do even without subsidies, and hopefully increasing their participation and support.

3.3.6.2.2 Address Subsidy Inefficiencies

The subsidy component of household incomes is quite limited. Therefore, the government should consider how to maximise the impact and efficiency of subsidies for afforestation and cultivation. Qingyuan County is hilly and infrastructure facilities are limited, therefore, every year, a lot of effort is wasted and cost incurred through manual transportation of materials through the hills. Given the fact that bamboo forest management is a long-term plan, it is advised that, as well as increasing the total subsidies distributed, funds should also be allocated for establishment and maintenance of infrastructure such as bamboo forest roads, which will decrease labour costs, increase capital efficiency and encourage long-term bamboo management.

3.3.6.3 Stakeholder Group Suggestions

3.3.6.3.1 Encourage Bamboo Resources Cultivation

At present, the households still have low awareness of the importance of bamboo afforestation and bamboo cultivation and their attention is focused on accessing the subsidies available for afforestation. Therefore, the government needs to introduce appropriate policies through cultivation subsidies, to increase uptake of bamboo management by households.

3.3.6.3.2 Address Labour Shortages Through Labour Pooling and Increased Technology Use

Quite a few households expressed their willingness to participate in bamboo forest management but said the shortage of family labour prevents them from doing so. The local government could, based on the labour price and professional technology, build rural mutual-aid teams and professional project teams to conduct professional technology training and learning so as to solve the local labour shortage problem.

3.4 Longyou County of Zhejiang Province

Longyou County, a newly-emerging county with bamboo industry development and has enhanced its policy support for bamboo afforestation and the bamboo industry in recent years. With preferential policies and exploring the use of abundant bamboo resources, Longyou County has embraced unprecedented development of the bamboo industry, which is gradually developing into the leading industry of the county.

3.4.1 Data Sources

3.4.1.1 Households

Based on relevant factors such as geography, natural resources, etc, the study chose five sample townships (towns). A total of 10 executive villages were selected from the five townships (towns) as presented in Table 10.

Table 10 Sample Village locations in Longyou County

Township (Town)	Dajie Township		Xikou Town		Luojia Township	Muchen Shezu Township		Miaoxia Township		
Sample Village	Dajie Village	Xincao Village	Bianshi Village	Hongluo Village	Mafudun Village	Sheli Village	Kentou Village	Meilin Village	Chen Village	Changsheng Village

Data Source: Survey Data

The study selected 25 households from each village totalling 258 households yielding 252 valid questionnaires (survey validity rate of 97.67 per cent).

3.4.1.2 Other Information Sources

Interviews were also conducted with the Longyou Forestry Bureau.

3.4.2 Case Study Site Features

3.4.2.1 Introduction to Longyou County

Located on the western border area of Zhejiang Province, east of Quzhou City, Longyou County covers 1143.22 km^2 with a forest coverage of 56.8 per cent. Blessed with a subtropical monsoon climate, Longyou County is generally warm and humid with abundant sunshine and rainfall and distinct seasons of flood and drought. The county has a total population of 4,037,000 of which 338,600 (83.87 per cent) rely on agriculture. In 2012, the total production of Longyou County reached 16.30 billion yuan, of which bamboo forestry accounted for 1.30 billion yuan, secondary industries for 9.55 billion yuan and tertiary industries 5.45 billion yuan. The per capita GDP was 40,378 yuan, and 1.25 billion yuan of total annual revenue. The average disposable income of the whole county was 25,242 yuan, while rural residents earned an average net income of 11,306 yuan.

Listed as an 'Ecological Friendly County', Longyou County covers 68,700 ha, taking up a percentage of almost 30 per cent, of which 60,200 ha is arable land. The average arable land per person is 0.17 ha. Longyou County is one of the key bamboo forest bases of Zhejiang Province, known as the 'West Zhejiang Bamboo Warehouse'. The county has forest coverage of 2.37 ha (34.5 per cent) of which 2.27 ha is moso bamboo forest with a total number of 55 million moso bamboo.

3.4.2.2 Introduction to the Case Sites

3.4.2.2.1 Dajie Township

Located in the southern mountainous area of Longyou County, Dajie Township is composed of 10 executive villages and 79 natural villages which are distributed into 103 villager groups, having a total population of 7745 people in 2429 households. With a total coverage of 44.8 km^2 comprised of 3754.6 ha of arable land, Dajie Township has forest coverage of 2648.8 ha of which 2533.3 is moso bamboo forest. Dajie Township has a forest coverage rate of 85 per cent, mainly producing bamboo products, machine-made paper and boiled bamboo shoots etc. In 2011, the average disposable income of the rural residents in Dajie Township was 6500 yuan with a net income of 4000 yuan, which increased to 4200 yuan in 2012.

3.4.2.2.2 Xikou Town

Abundant with moso bamboo and known as the 'Pearl of the West Zhejiang Bamboo Township', Xikou

Town sells fresh bamboo shoots, especially winter and spring bamboo shoots throughout the year. It has an annual output of more than 800 million bamboo, and 52,000 tons of fresh bamboo shoots. The town manufactures bamboo plywood, canned boiled bamboo shoots, bamboo crafts, bamboo tableware, bamboo mats and bamboo charcoal, with more than 70 processing enterprises in the whole town. Xikou is composed of 14 executive villages and a residents' committee, with a total population of 23,807. The town has a forest area of 7305 ha and had an average rural income of 7453 yuan in 2009.

3.4.2.2.3 Luojia Township

Located in the south-eastern area of Longyou County, covering 58.51 km^2, Luojia Township is composed of 10 executive villages and 13 village committees distributed into 124 villager groups with a total population of 9980 in 3354 households. The township is dominated by agriculture based on tea, bamboo shoots, watermelon, mushroom and characterised by high-yield, high-quality and efficiency. Luojia Township currently has 72,149 ha of mountains and forests of which 3401.5 ha are bamboo forests, including 3380.7 ha of moso bamboo forests and 63.26 ha of ecological public welfare forests.

3.4.2.2.4 Muchen Shezu Township

The only national minority in the western area of Zhejiang Province, with a total population of 1120, Muchen Shezu Township is located in the 'Great Western Zhejiang Bamboo Ocean Ecological Leisure Tourism Zone', with over 50,000 mu of natural moso bamboo forestland. Covering 828,000 km^2 of which 706.2 ha is arable land and 5751.4 ha is forests. The township has a forest reserve of 404.68 million m^3, with bamboo as the main non-wood forest product, and a 4057 ha moso bamboo forest with more than 15 million bamboo plants. The bamboo sector is the pillar of local industry with more than 10 bamboo processing enterprises in town and an output value of up to 6 million yuan, it is able to process 1.12 million kilograms of bamboo per year.

3.4.2.2.5 Miaoxia Township

Located in the southern mountainous area of Longyou County, Miaoxia Township has 13 executive villages and a total population of 13,150 in 3995 households. It covers 82.9km^2 of which 8615 mu is arable land and 97,000 mu of forests, of which 79,000 mu is bamboo forest. Miaoxia Township is known as 'The Great Bamboo Ocean Forest Park of Zhejiang' and 'The Hometown of Moso Bamboo in Zhejiang'. The township has 239 small-scale, low-tech bamboo product factories, over 1300 households making bamboo products, and over 200 households dealing with raw bamboo and bamboo products, totalling ~4000 processors. In 2009, the output value for bamboo shoots was 5.25 million yuan, and the bamboo-shoot processing industry output value was 180 million yuan. The bamboo industry accounted for 70 per cent of the average household income. Although the output of industry and agriculture was 242 million yuan, peasant households' average net income was 7090 yuan, which is low by national standards.

3.4.2.3 The Sample Households

Of the 252 surveyed households, only 27 (10.47 per cent) had received bamboo afforestation subsidies as shown in Table 11.

Table 11 Households receiving bamboo afforestation subsidy

Sample Township(Town)	Number of Subsidized Peasant Households	Number of Peasant Households Not Subsidized	Total Samples
Dajie Township	10	40	50
Xikou Town	4	56	60
Luojia Township	0	25	25
Muchen Township	9	41	50
Miaoxia Township	4	63	67
Total	27	225	252

Data Source：*Survey Data*

3.4.2.3.1 Sample Household Demographics

The surveyed household respondents had an average age of 55.3. Among the 252 household respondents 209 (83 per cent) were male and 43 were female. 51 of respondents were village cadres while the remaining 201 (79 per cent) were ordinary villagers. On average, each household had 4 members with 2.6 being full-time labourers and 1 had migrated to urban areas. Figure 16 presents the educational level of the household respondents, 50 per cent had a primary education and 38 per cent had junior high education. Only 1 per cent had a college education.

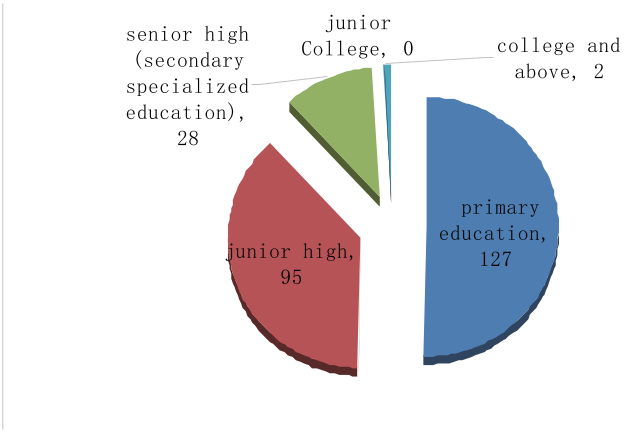

Figure 16 Educational Level of the Longyou Sample Household Respondents

3.4.2.3.2 Income Status of the Longyou Households

Table 12 presents the income data for the 252 sample households which shows 62.7 per cent was from wages and 33.4 per cent from forest activities. From 2009 to 2012, there was a 50 per cent increase in average income, the majority of which was increases in wages (65 per cent) as well as forest activities (60 per cent), of which the bamboo increase was 77 per cent, but the bamboo afforestation subsidy contribution decreased by 51.3 per cent.

Table 12 Income Data for the Sample Households

Income Type	2009		2012	
	Average Income per Household（Yuan）	Proportion in the Total（%）	Average Income per Household（Yuan）	Proportion in the Total（%）
Agricultural Income	4446	12.01%	7683	13.84%
Forest Induced Income	11600	31.32%	18555	33.43%
Of which: bamboo management income	*9363*	*25.28%*	*16590*	*29.89%*
Of which: bamboo afforestation subsidy	*37*	*0.10%*	*18*	*0.03%*
Wage Income	21098	56.97%	34813	62.71%
Self-employment Income	10489	28.32%	14295	25.75%
Property Income	3832	10.35%	4239	7.64%
Transfer Income	1091	02.94%	1064	1.92%
Total	37035	100%	55510	100%

3.4.2.3.3 Land Resources of Sample Households

The sample households have an average of 3.07 plots of forestland. Table 13 shows that the majority (74.2 per cent) of sampled households had forest of less than 2 ha, while 78.57 per cent had bamboo forest of less than 2 ha.

Table 13 Land Resources of Sample Households

Coverage（hectare）	Forestland		Bamboo Forestland	
	Number of Households	Ratio	Number of Households	Ratio
≦1.00	114	45.24%	131	51.98%
1.00-2.00	73	28.97%	67	26.59%
2.00-3.00	20	7.94%	17	6.75%
3.00-5.00	18	7.14%	11	4.37%
5.00-10.00	14	5.56%	15	5.95%
≧10.00	13	5.16%	11	4.37%
Total	252	100%	252	100%

3.4.3 Analysis of the Status Quo of the Bamboo Afforestation Subsidy

3.4.3.1 General Situation

In recent years, the bamboo industry has gradually grown into one of the pillar industries of Longyou County and has become an important source of farmers' income.

(1) Cash Subsidy: Longyou County issued; `Note on Printing the Bonus-Replace-Subsidy on Forestry of Longyou County', `Several Proposals on the Promotion of Accelerating the Development of Bamboo Industry of Longyou County,' `Proposals on Supporting Works with Households on Credit Loan for Bamboo Plantation' and other supporting policies. During the period of the `10th Five-Year Plan', the county financial bureau allocated 15.87 million yuan for the development of the bamboo industry, mainly for bamboo plantation and cultivation, formulation of standards, technology promotion, new infrastructure, etc. In addition to 1 million for afforestation and cultivation every year, the county's financial bureau also provided 1 million yuan for agriculture corporation loans, rewards for new product projects and established an export subsidy of more than 3 million. The finance sector prioritised development of forestry credit loans and issued more than 100 million yuan.

(2) Construction of infrastructure facilities: With technical support from the domestic bamboo industry research institutions, Longyou County implemented `115 Bamboo Industry Development', `Income per capita Increases over Thousand Yuan with Bamboo Mountains,' `Three Bamboo Shoots from One Bamboo', `South to North Bamboo Extension Project', `100 Thousand mu of Low-Yielding Bamboo Forest Transformation', `100 Kilometres Bamboo Green Corridor' and more than 10 projects in total. As a result, bamboo forests of 16,000 ha in 1985 have increased to 29,500 ha today, equivalent to a 21 million to 55 million bamboo volume, and output value from 4.5 million yuan to 1 billion yuan.

Longyou County established Xikou Bamboo Wood Industrial Park and Chengnan Industrial Park, becoming the county's major bamboo shoot and bamboo products processing centre. In Chengnan Industrial Park, there are more than a dozen bamboo shoot and bamboo processing enterprises led by a foreign bamboo-shoot factory, while, in Xikou Industrial Park, there are more than a dozen bamboo product enterprises led by Zhejiang Tenglong Bamboo Group. There are now more than 80 large scale bamboo processing enterprises in the parks. The county government established an investment projects library, which has attracted 15 bamboo processing enterprises contributing an investment of more than 10 million yuan and totalling 246 million yuan overall.

From 2007 to 2012, Longyou County planned and constructed 569.5 km of bamboo forest roads, of which 456 km was new and 113.5 km upgraded/maintained. As of the 2013 acceptance inspections, the network was 813.5 km, representing 8.51 million yuan of construction investment since 2007.

3.4.3.1.1 Access and Use of Bamboo Afforestation Subsidy by Sample Households

3.4.3.1.2 Bamboo Forest Management by the Sample Households

The survey statistics found the average sample household has 13.3 mu of which 1.27 is public welfare forest, 12.03 is economic, 245.5 is with job design and 322.5 is cultivation based. At a labour wage of 183.2 yuan/day and a demand of 6.6 labour days/mu, the afforestation cost is 1383.3 yuan/mu.

3.4.3.1.3 Acquisition of Bamboo Afforestation Subsidy by the Sample Households

The survey found only 27 of the 252 sampled households had received bamboo afforestation subsidies. For these 27, the average household cash subsidy was 24.3 yuan/ha in 2011, 8.9 yuan/mu in 2012 and 13 yuan/mu in 2013. The sample households received their subsidies in different ways as shown in Figure 17.

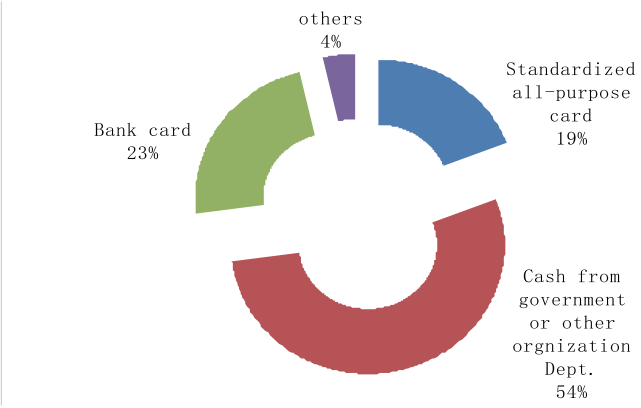

Figure 17 Methods of Receiving Bamboo Afforestation Subsidy by Sample Households

When the 27 subsidy-receiving households were asked if they had received their subsidies in full, 19 (73.08 per cent) said 'yes', 1 said 'no' and 7 were 'not sure'. For those who thought they had not received the full amount, they had no idea why. Only 3 of the 27 (11.11 per cent) households had contracts with the village or other households. Five (18.52 per cent) households responded that bamboo afforestation work was too difficult, 14 of them thought it was 'okay', while eight households thought it was easy. The five who thought it was hard attributed this to their lack of labour and capital. Regarding acceptance inspections, 55.56 per cent of households said the bureau, government or committee staff was responsible for conducting them.

Of the total 252 sample households, 137 said they would continue bamboo afforestation of their own private bamboo forestland, while 63 said they would not, and 52 said they would only do so if a subsidy was provided. The main (33 per cent) reason given was that bamboo forestry has a low economic value and they would rather do something else, while others cited limited land suitable for bamboo afforestation, lack of labour, lack of technological support and deficient infrastructure facilities.

Of the households who had never received subsidies, 110 blamed failure to be assigned or the lack of relevant policies. Three households said it was due to their own disinterest as they did not have sufficient labour and one said that the subsidy did not cover the cost of afforestation. The other 114 households cited lack of relevant policies, failure to be assigned and not owning enough forest land to be eligible. When asked about the possibility of subsidy suspension, of five households who received subsidies last year but not this year, four said they would voluntarily cultivate the forestland, while one household said they would not because of the lack of labour and the fact that the subsidy won't cover the cost.

3.4.4 Satisfaction with Bamboo Afforestation Subsidies among Sample Households

3.4.4.1 Levels of Satisfaction

3.4.4.1.1 General Perceptions of Bamboo Afforestation Subsidy

33 of 252 households said they were fully aware of the subsidy, 63 were aware, while 156 (61.9 per cent) don't have a clear idea of what it really is. Figure 18 presents the survey data for the different communication channels by which bamboo subsidy information was received by the subsidy-aware households. We see that the main source of information is communication between villagers and the village public information board.

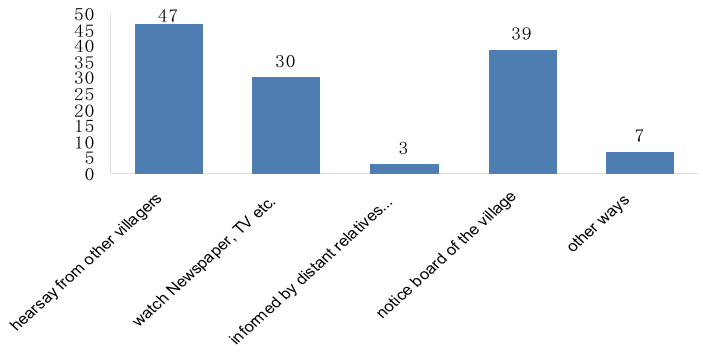

Figure 18 Bamboo Afforestation Subsidy Communication and Information Channels

Figure 19 presents the main reasons given for not knowing about the bamboo afforestation subsidy. 49 (31.4 per cent) said that limited information channels were the main problem, while others thought that the village leadership was not doing their job. Therefore, the government and village leadership need to fulfil their current responsibilities as well as broaden the information channels.

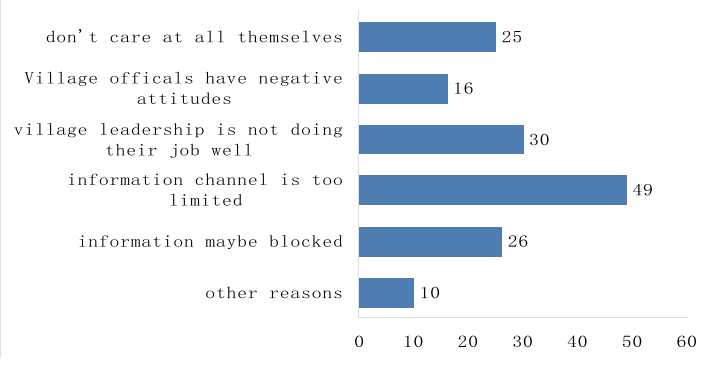

Figure 19 Reasons Given for Households' Lack of Knowledge of Bamboo Afforestation Subsidy

3.4.4.1.2 Analysis of the Satisfaction Towards Bamboo Afforestation Subsidy Standards

Figure 20 presents the views towards the bamboo afforestation subsidy levels. It seems that Longyou County should better consider the needs of the households when making policies so as to improve bamboo afforestation subsidy implementation satisfaction levels.

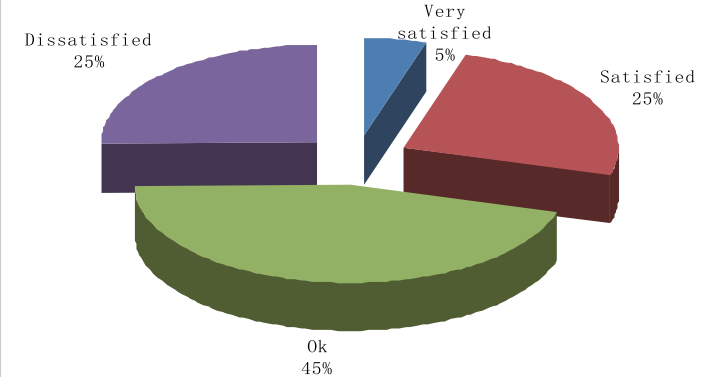

Figure 20 Bamboo Afforestation Subsidy Satisfaction Levels among Sample Households

3.4.4.1.3 Satisfaction with Bamboo Forest Road Construction

When asked their views of the bamboo roads in the village, most (30.6 per cent) expressed satisfaction (see Figure 21), which means not only the subsidy-receiving households thought there was a benefit.

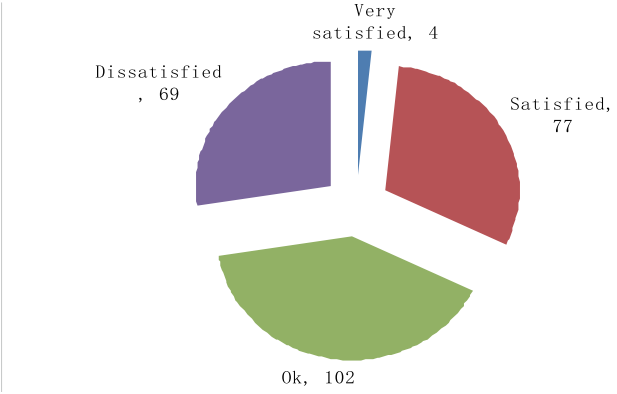

Figure 21 Households' Satisfaction of Bamboo Forest Road Construction

3.4.5 Levels of Demand

The analysis of the demand aims to identify opportunities for improving current policy.

3.4.5.1.1 Demand for Bamboo Afforestation

Figure 22 presents the main sample household motivations for bamboo afforestation. Much like in the Qingyuan County, financial benefit is the main motivator for bamboo afforestation in Longyou County.

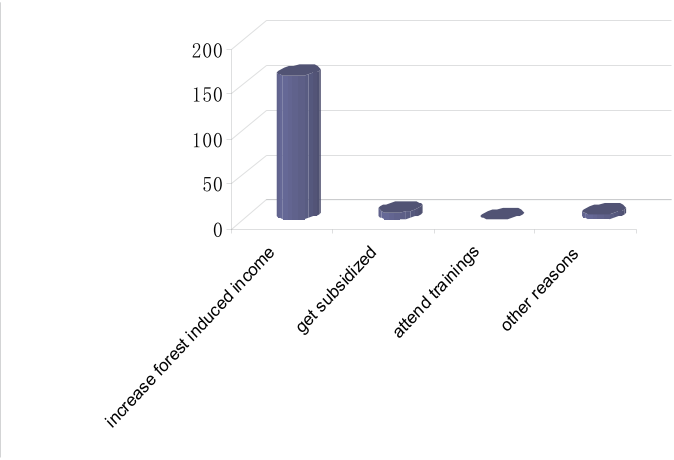

Figure 22 Sample Household Incentives for Bamboo Afforestation

Figure 23 presents the disincentives cited by the remaining 164 households against bamboo afforestation.

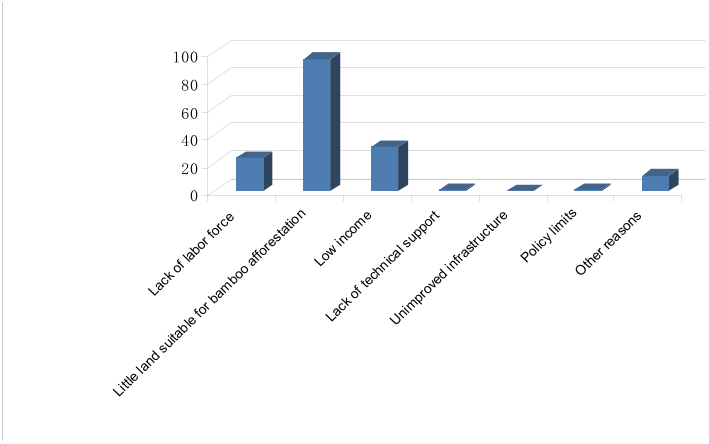

Figure 23 Sample Household Disincentives for Bamboo Afforestation

3.4.5.1.2 Demand for Bamboo Forest Road Construction

When asked whether bamboo forest roads should be built, 233 households agreed. Of these, 156 believed that roads increased forest-related income, 77 said it helped reduce workload, while 95 thought it lowered operation costs. When asked whether maintenance was necessary, 199 households said 'yes' while 34 of them said 'not yet'.

Those households who did not agree to the need for roads mainly said that the current situation was good enough.

3.4.5.1.3 Demand for Bamboo Forest Cultivation

212 of 252 households agreed that their bamboo forestland needed better cultivation. Of these households, 166 said it could increase forest-related income, 26 said they could get subsidies, 17 thought they could access training while the remaining there thought there would be other positive benefits, such as improvement of the environment.

Of the 40 who disagreed with active bamboo forest cultivation, 20 cited lack of labour, three said there was a lack of technological support, two thought that the soil quality was unsuitable for enhanced management, four cited deficient infrastructure facilities, three cited policy restrictions and eight disagreed because they believe the bamboo has already grown in the forest and species diversity levels are good.

3.4.6 Bamboo Afforestation Subsidy Implementation Challenges

To maximise the benefits realised so far, the following issues need to be addressed.

3.4.6.1 The Policy Itself

3.4.6.1.1 Low Value of Subsidies

The field surveys confirmed previous analysis regarding the relatively low impact of the subsidies on farmers. Household wages for conducting bamboo afforestation is 183.2 yuan/day, while the labour required for afforestation is 99 labour days/ha, which gives a rate of 20,750 yuan/ha. However, the bamboo subsidy policy only pays households an average of less than 25 yuan/mu.

The survey indicates that, although the absolute value of bamboo forest related income and subsidies

has increased slightly in recent years, its proportion of the total household income has decreased. This is one reason for the low satisfaction of households towards the bamboo afforestation subsidy.

3.4.6.1.2 Lower Prioritisation of Bamboo Resources Cultivation

The development of the bamboo industry not only requires bamboo afforestation but also depends on active management. Currently, the bamboo afforestation coverage is decreasing, so effective cultivation is crucial. However, Longyou Government policies still focus on bamboo afforestation and there is lower prioritisation for cultivation.

3.4.6.2 Implementation Challenges

3.4.6.2.1 Limited forest Road Coverage

It is generally accepted that forest roads support forest management as well as harvesting and marketing activities. During the survey of Longyou County, as each group reflected, the biggest problem is the poor quality of forest roads which greatly increases the cost of forestland management. During bamboo harvesting, the lack of forest roads means half of the income is used to pay for labour and manual transportation at an average of 1.6 yuan/kg due to shortage of rural labour. Thus, the construction of forest roads could greatly reduce the access costs for harvesting and direct costs of transportation, while also improving efficiency and increasing households' income. Increasing the forest road network is an essential part of the development of the bamboo industry in Longyou County.

3.4.6.2.2 Low Subsidy Efficiency

There appears to be issues with the inefficiency of government funds as well as problems of distribution. After the Direct Support Funds System was adopted, towns and villages lost the right to charge fees though they remain responsible for the implementation. Therefore, the direct funding system reduced towns' and villages' enthusiasm to conduct bamboo development activities, which is not conducive to the development of the industry as a whole.

In fact, farmers themselves rarely take any initiative to invest capital in bamboo development activities. The Longyou Government needs to consider the incentive effects of subsidies to maximise the efficiency of investments being made.

3.4.6.3 Stakeholder Specific Issues

3.4.6.3.1 Low Awareness of Forestry Management Methods

The field survey found low awareness of management methods amongst households such as. over-harvesting and long-suppressed tending which results in sparse bamboo, mixed shrubs, uneven length, random bamboo age distribution and forest soil degradation. This negatively affects bamboo shoot growth, lowers yields and quality, lowers forest humidity, decreases water and nutrient retention, while it increases the frequency and extent of pests and diseases. Therefore, better efforts are needed to promote forestry science and technology in the area by educating the population on modern forestry techniques to improve the practices of forestry households.

3.4.6.3.2 Labour Shortage

As more young people migrate for work, women, children and the elderly have been left behind to work in bamboo forestry, resulting in low efficiency. Many villagers responded that labour shortages have emerged in Longyou County and that young migrant labourers lack experience and knowledge of bamboo forest work. It seems these shortages will become more prominent and will be a significant restriction to the development of the bamboo forest industry.

3.4.7 Bamboo Afforestation Subsidy Suggestions

Based on the survey, the following suggestions are made for the development of the bamboo industry of Longyou County.

3.4.7.1 The Policy Itself

3.4.7.1.1 Rational Allocation of Forest Rights

The survey found that unequal allocation of forestland and forest rights was widespread, even though rational allocation of rights is a prerequisite to optimise the use and benefits of forest resources.

With the outflow of labour, some afforested land lies unused since those people have not transferred their land allocation to others.

3.4.7.1.2 Increase Bamboo Afforestation Subsidy Levels

The survey showed that the cash subsidy was the main motivator for households but also that the current bamboo afforestation subsidy is relatively low and does not cover the labour cost of bamboo afforestation. Given the increasing level of wages, as well as the cost of tools and fertilisers, it is advised that the bamboo afforestation subsidy levels be raised in accordance with the local situation.

3.4.7.1.3 Encourage Bamboo Resources Cultivation

In order to reap long-term benefits, beyond a focus only on plantation, the government should now shift focus to promote bamboo cultivation. This needs to start with appropriate policies through to cultivation subsidies, to increase uptake of bamboo management by households.

3.4.7.2 Implementation Suggestions

3.4.7.2.1 Increased Investment in Infrastructure

One major challenge for mountain farmers is underdeveloped public infrastructure, no modern means of transport, lack of basic public communication facilities and even forest roads, the most basic of facilities for successful forestry. The survey data found that most villagers are looking forward to government-funded construction projects.

3.4.7.2.2 Address Subsidy Inefficiencies

For the majority of farmers who have small areas of forest, they are not involved in afforestation much or at all. Even for those who have sufficient land to participate in large scale afforestation, the subsidy value is too low to encourage bamboo afforestation. Therefore, the ministry level of government should implement policies to address equitable allocation of forest ownership, ensure subsidies complement each other, and coordinate the support to the bamboo industry.

3.4.8 Stakeholder Group Suggestions

3.4.8.1.1 Address Labour Shortages through improved Social Security

One reason for the slow development of the bamboo industry is the lack of and low quality of labour. Currently, poor mountain farmers desire nothing but to leave the mountains and move to the cities to enjoy modern life. Educated young people in rural areas are not interested in forestry but are more likely to move from their hometowns to search for jobs and opportunities in big cities. This has directly led to labour shortages and low quality of labour, therefore, improving the social security system to ensure the quantity and quality of human resources is necessary for sustained development of the bamboo industry.

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China's bamboo industry is the largest in the world, valued at some USD 30 billion per year. Bamboo plays a key role in several national poverty alleviation and reforestation schemes, as well as carbon storage initiatives. Subsidies play an important role in the promotion of bamboo afforestation locally. This report considers several types of bamboo afforestation subsidies which the Chinese government applies, and produces some policy recommendations.