

European Investment Bank Loan

Fujian Province Soapberry Forestry Base Construction Project Non-technical Summary (NTS) Guideline

**Fujian Shunchang State-owned Forestry Farm
Shunchang Sanqing Soapberry Biotechnology Development Co., Ltd**

May 2015

Table of contents

1. Project profile:	3
1.1 Range of project	3
1.2 Construction content	3
1.3 Construction period and investment	3
1.4 Construction target	3
2. Assessment on impact of the Project on environment	3
2.1 assessment basis	3
2.2 Assessment methods and index	3
2.2.1 Assessment methods	3
2.2.2 Investigation index	4
2.3 Environment impact analysis and assessment	4
2.3.1 Positive environment impact	4
2.3.2 Present conditions of environment and environment impact in “Zero” program, namely without the project.	5
2.3.3 Negative impact on environment	5
2.3.4 Measures to reduce negative impact on environment	10
2.3.5 Summary of environment impact assessment	13
2.4 Monitoring methods and technology	13
3. Social assessment	15
3.1 Basis of social impact assessment	15
3.2 Social assessment methods and index	15
3.2.1 Social assessment methods	15
3.2.2 Social impact investigation index	15
3.3.1 Positive social impact	16
3.3.3 Measures to reduce negative impact on society of the Project	17
3.3.4 Summary of social impact assessment	18
3.4 Monitoring methods and technology	19
4. Conclusion	20
Appendix figure 1 EIB loan project area sketch	22
Appendix table 1 Pesticides	23

1. Project profile:

1.1 Range of project

To construct soapberry forestry base of 10,050.8ha, involving 4,056 forestry lands in 171 villages (work areas) of 20 townships (town and farms).

1.2 Construction content

The soapberry forestry base of 10,050.8ha, consisting of 5,281.0ha (including 2,294.1ha to continue) to be constructed by Fujian Shunchang State-owned Forestry Farm and 4,769.8ha (including 26.9ha to continue) to be constructed by Shunchang Sanqing Soapberry Biotechnology Development Co., Ltd. It is predicted the annual yield in the boom is 151,000t.

1.3 Construction period and investment

Construction period: 5 years from 2016 to 2020.

Total investment: RMB ¥ 521.285million

1.4 Construction target

To construct the soapberry raw material forestry base of 10,050.8ha with the annual yield of 151,000t in boom; to provide raw materials support to the soapberry biomass comprehensive utilization industry development; to promote the ecological, economic, social harmonious and sustainable development of the local area of the Project.

2. Assessment on impact of the Project on environment

2.1 assessment basis

The environment impact report is formulated in the Project in accordance with the requirements of *Law of the People's Republic of China on Evaluation of environmental effects*, *Rules of Environment Protection in the Construction Project and Catalog of Construction Project Environmental Protection*.

2.2 Assessment methods and index

2.2.1 Assessment methods

Fujian Soapberry Forestry Base Construction Project by Shunchang Sanqing Biotechnology Development CO., Ltd and Fujian Shunchang State-owned Forestry Farm is located in 4,056 forest lands of 171 villages (work areas) of 20 townships (towns and farms) in Shunchang County. The total investment is RMB ¥ 521.285million. Fujian Enterprises Investment Project Record Table MFGB(2012)No. H06031 by Shunchang Development and Reform Bureau shows that the project name is Soapberry Deep Processing and Matching Planting Base Construction. It will take 5 years to complete Fujian Soapberry Forestry Base Construction Project and the initial yield is relatively small. Therefore, the soapberry planting

base will be constructed and the environment impact assessment and environment protection examination and approval of Fujian Soapberry Forestry Base Construction Project will be made at first. It requires the environment examination and approval procedures and formulating the environment assessment report in accordance with the requirements of *Law of the People's Republic of China on Environment Protection 1989*, *Law of the People's Republic of China on Evaluation of environmental effects*, and *Catalog of Construction Project Environmental Protection* by State Environmental Protection Administration. The Company authorized Xiamen Sunshine Environment Protection Technology Co., Ltd. for formulating the environment impact report of the Project in February, 2014. We organize the related staff for the site investigation after the authorization and complete the environment impact report of the Project in accordance with the related technical specifications and requirements on the environment impact assessment on the basis of the investigation on the present environment conditions, data collection and investigation.

2.2.2 Investigation index

(1) Present conditions of air environment

The investigation factors are SO₂, NO₂, PM₁₀ and PM_{2.5}, which should meet the requirements of standards Level 2 to GB3095-2012 Environment Air Quality Standards.

(2) Present conditions of water environment

The investigation factors are pH, DO, ammonia-nitrogen, permanganate index, BOD₅, total phosphorus and surfactant, which should meet the requirements of related water quality standards of GB3838-2002 Surface Water Environment Quality Standards.

(3) Present conditions of acoustic environment

The investigation factor is equivalent level of L_{Aeq}, which should meet the requirements of Type 2 of Acoustic Environment Quality Standards (GB3096-2008).

2.3 Environment impact analysis and assessment

2.3.1 Positive environment impact

The environment friendly and highly effective forestation technical measures will be taken in integration in the Project, which can increase the area of forest area (broad-leaf forest) by 10,000ha and can reduce the negative impact of the artificial forestation on the environment to the minimum. It will make effective adjustment on the forest resource structure in the area of the Project, and improve the quality of the forest resources, which is beneficial in environment improvement, climate adjustment, soil improvement and soil fertility. It also can strengthen the water source maintenance and water and soil conservation, which will benefit the biodiversity, ecological diversity and landscape diversity, thus promoting the ecological civilized construction. Therefore, the Project has quite remarkable

ecological benefits.

(1) To make forestation on waste mountains and to improve the capacity against natural disasters;

(2) To make water and soil conservation and water source maintenance;

(3) To clear the air and to beautify the environment;

(4) To optimize the types of forests and trees.

2.3.2 Present conditions of environment and environment impact in “Zero” program, namely without the project

(1) Direct impact

A. No management and protection measures for scattered natural vegetation and waste mountains and grass slopes with too much artificial interference, potential fires, serious water and soil loss and land deterioration, no improvement on deteriorated forest lands with low yield and efficiency, easy for diseases and pests;

B. No effective management and protection on the deteriorated forest lands, badlands with rocks exposed due to retrogression of succession;

C. Continuous soil secondary salinization and increasing area of saline and alkaline land.

(2) Indirect impact

A. Increasing requirements on wood with the social development, damages of different levels on natural forests and ecological forests of public interests, threatening the land diversity and biodiversity;

B. No management and protection measures and frequent artificial interference causes the continuous deterioration of forest lands, thus, causing water and soil loss, animal migration or disappearance or even new ecological disasters.

2.3.3 Negative impact on environment

(1) Analysis on the impact on ecological environment

A. Impact on land using

The Project will cover only a small area of wild grassland within the range of the forestry land and such part of the land will be transferred into the forestry land. Therefore, the construction of the Project will have no impact on the land pattern of Shunchang.

B. Impact on vegetation

The forest land is the industrial planted forest in highly intensive operation, involving production activities as building new roads, leveling land, building new nursery gardens and making further construction of available gardens, cultivating young forest and weeding. People’s frequent interference may affect the natural vegetation in succession in a certain way. Such periodic effect may cause interference to the natural succession of vegetation and

promote the phytocoenosis at the edges of, among forest and under forest to develop to semi-natural and semi-manual control succession. Generally speaking, the construction of the forest lands in the Project reduces the naturalness of the ecological system in the area.

C. Impact on vegetation types and space distribution

The Project is intended to develop the soapberry ecological energy forest on wild mountains suitable for forestation, sparse forest lands, waste fruit gardens of low yield and cutting lands for forest and tree types adjustment. Such forest lands are in low altitude with gentle slope. They are in high manual interference and there are no original and secondary natural forest lands.

The Project, with the purpose of reducing the related problems due to single species, takes the ecological public forests and places of interest for key protection targets in selecting the construction area and makes adequate buffer zone from the key ecological reserves to protect the typical vegetation and main species within the area of the Project. Besides, the Project doesn't occupy the farm field, gardening land and fruit garden in the construction of the forest land. Therefore, the food crops and economic crops in the farm field and fruit forests within the area of the Project will not be affected largely.

D. Impact on undergrowth vegetation

The vegetation diversity under the forest may decrease after the forest land construction in the Project. However, the forest lands in the planning are wild mountains suitable for forestation, sparse forest lands, waste fruit gardens of low yield and cutting lands for adjustment on forest and tree types. The undergrowth vegetation is not rich and there is no apparent difference in vegetation diversity under the planted forests of different types of trees. Therefore, the construction of the forestry base will have greater impact on the undergrowth vegetation in the base in the period of two years from the forest cutting and forestation. It's required to take reasonable forestation measures to reduce such impact. The impact on the undergrowth vegetation in the third year to the sixth year can be acceptable. The site survey for this assessment is made on the forestation lands for two years (Guandun Farm) and three years (Qucun Farm) in the area of the Project and adjacent types on whether the undergrowth vegetation is sparse and the biological diversity is reduced. The survey results show that the undergrowth vegetation of the planted soapberry grows well and there is no apparent difference between the vegetation at the edge and beyond the forest lands and that before the construction in the area of the Project.

E. Impact on biological diversity

The forestation pattern in the Project shows that the forests are mainly distributed in the planted forests insensitive or slightly sensitive to the biological diversity and living

environment, which can protect the biological diversity and living environment of rare protection animals and plants in a certain way. The scientific and reasonable ecological protection measures are taken in the Project to decrease or reduce the impact of the construction on the species diversity within the area. The tree type is adaptable for the land and forest and mixed forest of multiple types in patches will be built adequately to protect the original forest, secondary natural forest and rare plants and biological diversity, reducing the negative impact of the construction of the Project on the regional ecological stability.

The forestry base is constructed in such a pattern to avoid collective major habitats of animals and plants, to reduce the impact of the material base on the regional biological diversity and living environment and to reduce the impact on the regional biological stability.

The Project will have no greater impact on the natural forests and ecological public forests in the area. To make sure the sound development the forests in the base, sound forest ecological environment and the food chains with multiple biocenosis in mutual condition, the Project selects the wild mountains and waste lands suitable for forestation in priority, and then the shrub lands and sparse forest lands and lands of low yield and according to actual conditions of lands and forest, mixed forest of multiple types in patches will be built adequately to protect the original forest, secondary natural forest and rare plants and biological diversity, reducing the negative impact of the construction of the Project on the regional ecological stability.

(2) Analysis on impact on water environment

A. Impact on water resources

The water cycle of the forest land consists of dominate trees (upper trees), lower trees, undergrowth vegetation, fallen branches and leaves, surface soil, microorganism and deep soil in close connection, of which each part plays an important role. The water cycle system lacks important lower trees, undergrowth vegetation and fallen branches and leaves and only soapberry due to the farming, collect quantities of fallen branches and leaves and leaves stratum and forest structure. The water circulation and water conservation capacity will decrease of the planted soapberry forest at the primary stage of forestation. The water circulation and water conservation capacity will recover as the soapberry growing into forest.

B. Impact on water quality

The water and soil loss will be in large proportion in the year of forestation, which will affect the water quality in a certain level and SS density will increase. However, the water and soil loss will decrease with the soapberry growing. The water and soil loss and soil productivity will be slight, making little impact on the environment after the forest comes into being (about 6 years).

C. Impact on drinking water source

The forestation land of the Project involves the following towns and townships: Dagan, Dali, Gaoyang, Yangkou, Yuankeng, Jianxi, Lanxia, Pushang, Yangdun, Zhengfang and Shuangxi Street Office. The forestation lands are not within the drinking water protection area, according to the supporting documents from various units. The biological protection will be strengthened to prevent surface pollution in the construction, cultivation and collection of the forest lands, which will have little impact on the water environment and will not affect the drinking water source meeting the standards.

D. Analysis on the impact of domestic sewage on adjacent water environment

The Project will set up the management staff of 60 approximately, all of whom will live in the office area of the forestry land for 365 days a year. With the reference to the requirements of Code for design of building water supply and drainage (GB50015-2003), the domestic sewage will be $9\text{m}^3/\text{d}$ ($1800\text{m}^3/\text{a}$), calculated with the living staff domestic sewage emission of $150\text{L}/(\text{d}\cdot\text{person})$. The sewage emission will be $7.2\text{m}^3/\text{d}$ ($2160\text{m}^3/\text{a}$), calculated with the emission coefficient of 0.8. It's recommended that the domestic sewage of the Project should be used for the irrigation of the adjacent forestry land after the treatment in septic tank. The domestic sewage will have little impact on the adjacent water environment for it is not emitted outwards.

(3) Analysis on impact on soil environment

A. Impact on soil quality

The leveling and scarifying before the forestation and in cultivation period should be made in workable period with soil water conditions. The scarifying on the dry soil will damage the granular structure of the soil and reduce the water conservation while that in the wet soil will reduce the porosity and increase the volume weight of the soil, causing soil hardening. Therefore, the leveling should be made 1 to 1.5 months before the forestation, when the soil water condition is more suitable for leveling and scarifying than other periods, which is benefit for improvement of the soil quality.

The Company will, on the basis of soil nutrient analysis and requirements of the forests on the nutrient, apply the fertilizer with scientific formula, which can fully absorbed by the soapberry. Therefore, the fertilization will not cause salinization. However, there is still the possibility to cause the soil hardening, which should be improved with other reasonable forestation measures.

Partial pesticide will go into the soil unavoidably, making a series of reaction on the solid, gas and fluid substances in the soil, thus, changing the chemicals of the soil. The pesticide with higher toxicity can even kill some insects and microorganism in the soil and restrain the

activity of the invertase of the soil, affecting the inversion of the nutrient in the soil. Such impact can be reduced by reasonable applying the pesticide, using pesticide of low toxicity and high effectiveness and biological pesticide.

B. Impact on soil productivity

Soil productivity recession and reduction once appear in the planted forests mainly of pines, firs and poplars. In the planted pure forests, some nutrients in the soil are consumed in large quantities due to the same absorption characters and same nutrients. Some used nutrients will be taken out of the ecological system in the collection.

The broad-leaved trees and shrubs are basically removed in the forestation of the planted forest. Such changing plant phytocoenosium structure will reduce the substance circulation. In the planted forest, the nutrients in the soil are consumed in large quantity and the biological circulation of the nutrients is blocked, which will have negative impact on the soil productivity of the forest lands in a long term.

The soapberry can grow in poor soil and the soil productivity consumption is connected with leveling, cultivation, applying fertilizer, operation mode and using mode. Too fine leveling and cultivation, unreasonable fertilization and collection are considered as main causes of the soil productivity recession. The improvement of operation technology and measures, scientific fertilization and reasonable collection will maintain the soil productivity of the planted soapberry forest, realizing the sustainable development of the planted soapberry forest.

(4) Analysis on water and soil conservation

A. Analysis on soil erosion

The impact of the forest land construction of the Project on the soil erosion mainly is the soapberry will increase the regional soil erosion and various activities in the construction will increase the soil erosion.

The soil erosion level and quantity will reduce when the forest lands without standing trees, sparse forest lands and slopes turn into forest lands with high vegetation thanks to the changing vegetation structure after the completion of the forest lands.

The forest land in the Project mostly is located in areas with slight and mild erosion. Some part lies in areas with medium and strong erosion but no part lies in areas with severe erosion. In the area with slight soil erosion, the construction of the forest land mainly changes the forest type structure, but the erosion modulus changes slightly. In the area with medium erosion, the soil erosion modulus decreases for the added coverage of the vegetation. In the area with strong or severe erosion, the present vegetation should be kept as much as possible and scientific exploration, planting and cultivation methods and other measures on water

conservation can avoid or reduce the water and soil loss. Therefore, the forest land construction of the Project will have no great impact on the soil erosion.

B. Analysis on water and soil loss strength in forestation

The forest land selected in the Project mostly is located in areas with slight and mild erosion. Some part lies in areas with medium and strong erosion but no part lies in areas with severe erosion.

In the period of forest lands clearing to the first year of forestation, the undergrowth vegetation coverage and biomass are reduced but the forest tops are still not closed due to cutting, clearing, leveling of the forest lands and young forest cultivation. The water and soil loss is higher in such period and a certain protection measures are required to take to reduce such impact.

After the second year, the forest tops will be growing large, the artificial interference will reduce gradually and the forest closing density will increase gradually, thus, the vegetation coverage, biomass and biological diversity will recover and the water and soil loss will decrease greatly in the forest lands. A certain water and soil loss may be caused by the weeding. The cut grasses will be kept in the forest lands. The impact of the forestation measures on the water and soil loss is basically acceptable in such period.

In sixth year, the forest is closed fully with the closing density of 0.7 approximately. The forest land requires no cultivation and the undergrowth vegetation recovers to the level before the forestation. The water and soil loss will become less and less in the period. Especially the soapberry has deep roots, making sure strong capacity of water and soil conservation, thus, the water and soil loss will be slight.

In summary, the Project has remarkable positive benefits as well as some negative impact on the environment, such as vegetation damages, water and soil loss and pesticide and fertilizer pollution, which can be reduced with effective measures on the pollution precaution and control and ecological protection. The Project has sound quality of the present local environment within the area to be constructed and has no obvious environment restrictive factors. The Project is considered feasible in the environment protection in the assessment, provided the timely implementation of various measures on pollution precaution and control and ecological protection.

2.3.4 Measures to reduce negative impact on environment

2.3.4.1 Measures to reduce impact on biological diversity

(1) The forest land in the Project should be limited strictly within the timber forest ranges by the state and the cutting lands, forestation preparation lands and planning forestation lands are in priority in selection of planting area;

(2) Natural broad-leaved trees and shrubs at gullies and ridges and natural wetlands should be protected in leveling for forest planting;

(3) The undergrowth vegetation, original vegetation between leveling lands and vegetation at the edges of forests should be protected;

(4) It's forbidden to burn maintains in clearing and leveling lands for forests;

(5) The local forestry sector makes guidance for other forest farmers by making reasonable pattern of types of commercial trees and adjusting the cutting index limit, to avoid the planting of soapberry of a large area and large area of pure forest of soapberry;

(6) The economic forest in the Project is mixed with original timber forest, ecological forest and bamboo forest in patches, adding the ecological stability of the forest lands, maintaining the soil productivity and avoiding pure forest in a large area;

(7) The comprehensive pesticide control should be promoted and the forest protection should be strengthened and the chemicals should be minimized;

(8) It should be avoided to use the herbicide in large area, which should be used only in the period with grasses in vigorous growth in springs and summers;

(9) The reasonable patterns of forest lands should be adopted and biological buffer zone should be established to provide corridors for migration of wild animals.

2.3.4.2 Measures to reduce soil deterioration

(1) Not to make leveling in dry period and after rains as less as possible to keep the physical and chemical property of the soil in the forest lands;

(2) To make fertilization with scientific formula: to make physical and chemical property analysis and soil nutrient diagnosis before the forestation and fertilization; according to the diagnosis results, to select the type of fertilizer and to make fertilization with formula to maintain the balance of soil nutrients;

(3) To select reasonable fertilizing time and mode, to improve the utilization efficiency of the fertilizer; the clearing and leveling mode is also an important measure to avoid the water and soil productivity loss; to avoid the water and soil productivity loss due to unreasonable forest operation measures;

(4) To forbid the forest land clearing by burning mountains, providing effective protection on the humus layer and reducing water and soil loss and surface evaporation.

2.3.4.3 Measures to reduce species simplification

(1) The original forests and secondary broad-leaved forests and shrubs adjacent to the forestation area should be protected in leveling for forestation. It's forbidden to cut natural forests to develop into mixed forests in patches;

(2) The broad-leaved trees and shrub and grass in sparse forest/ditch and valley should

be kept for the protection and recovery of the biological diversity;

(3) The horizontal vegetation zone of 3m in the width should be kept every 100m in case of the slope surface exceeding 200m; the original vegetation zone of 1-2m in the width should be kept every 50m for the slope forest lands;

(4) It's forbidden to burn maintains in clearing and leveling lands for forests;The leveling should be made according to the different gradients in the forestation in slopes: ①to make overall leveling on the slopes with the angel of less than 15-24°and the horizontal vegetation zone of 3m in the width should be kept every 100m in case of the slope surface exceeding 200m;②to make patch (cave cultivation)leveling for the slopes with the angle of larger than 25°; the planting points should be arranged along counter lines in Y-shape in large caves, from which the top soil should be separated from subsoil;

(5) The related education is made on related environment protection for the staff of different level in the construction of the Project to improve their sense and quality of protection. It's forbidden to hunt and kill wild animals and the protection on the wild plants and animals should be made consciously

2.3.4.4 Reduction measures on soil erosion

(1) The clearing method in strip along counter lines is made in the Project. The original vegetation zone of 3m in the width should be kept every 100m in case of the slope surface exceeding 200m; the original vegetation zone of 1-2m in the width should be kept every 50m for the slope forest lands;

(2) To select proper clearing timing for the forest lands, avoiding clearing and weeding for young forest in rains;

(3) to take reasonable leveling method for different slops and the measures on water and soil conservation should be taken before the leveling in partial slopes with serious water and soil loss;

(4) The secondary vegetation protection zone of 10m above in width must be kept between the farm land and edges of forestation lands;

(5) To cover the ground with fallen branches and leaves after leveling, to avoid the surface soil in exposure;

(6) The ground vegetation should be recovered and maintained as much as possible while keeping forests in normal growth;

(7) The excavation and refilling should be avoided or reduced as much as possible in the forest road construction. If it's impossible to avoid, the excavation should be treated properly and the vegetation on the slope surface should be recovered as soon as possible to fix the soil.

2.3.4.5 Measures for environment pollution

(1) To avoid the recharge area of drinking water source in selecting the forest lands, to keep a certain protection distance on both sides of rivers, 50m for main rivers and 20m for branches;

(2) To make fertilization with scientific formula: to make physical and chemical property analysis and soil nutrient diagnosis before the forestation and fertilization; to select the type of fertilizer and to make fertilization with formula to maintain the balance of soil nutrients, according to the diagnosis results;

(3) Not to use or use less pesticides; to select pesticides of low residue and toxicity; it's forbidden to use highly toxic pesticides with long residual period; the pollution-free pesticides should be used in priority; To apply the pesticides in accordance with related codes in weather without wind and rain, to prevent pesticides from flowing into the water;

(4) It's forbidden to spray fertilizer on the ground surface, which must be applied in ditches or pits and covered with soil and then covered with fallen leaves and grasses;

(5) The package of fertilizer bags and pesticide bottles suitable for recycle can be recycled. Other packages and pesticide bottles and simple tools should be recollection for further treatment, which should not be left in the forest lands.

2.3.5 Summary of environment impact assessment

In summary, the Project has remarkable positive benefits as well as some negative impact on the environment, such as vegetation damages, water and soil loss and pesticide and fertilizer pollution, which can be reduced with effective measures on the pollution precaution and control and ecological protection. The Project has sound quality of the present local environment within the area to be constructed and has no obvious environment restrictive factors. The Project is considered feasible in the environment protection in the assessment, provided the timely implementation of various measures on pollution precaution and control and ecological protection.

2.4 Monitoring methods and technology

(1) Monitoring on water and soil loss in the operation period

A. To set up monitoring points

The water and soil loss monitoring points will mainly be set up on mountainous forest stands and new forest lands to make sure the monitoring points are typical for the main forestation areas and forestation tree types of the Project. Two monitoring points will be set up in the forest stands with serious water and soil loss in one project area within the County as planned.

B. Monitoring contents

Rainfall, duration and intensity of rainfall, surface runoff, quantity of soil loss, analysis

on water quality (analysis on the contents of nitrogen, phosphate and potassium in the lost water), analysis on soil sample (analysis on the contents of organic matters, total nitrogen, phosphate and potassium, quick-acting nitrogen, phosphate and potassium in the lost soil), records on forestation and forest cultivation and growing within the area of the Project.

(2) Monitoring on ground water in the operation period

A. To set up monitoring points

One or two ground water monitoring points will be set up at the ground water drinking water source and adjacent drinking wells as planned.

B. Monitoring contents

Water level and temperature, pH, chroma, scent, taste, turbidity, potassium permanganate index, BOD₅, nitrate nitrogen, nitrite nitrogen, ammonia-nitrogen, total phosphorus, volatile phenols and total coliform.

(3) Monitoring on soil fertility in the operation period

A. To set up monitoring points

Two soil fertility monitoring points will be set up within the new forestation lands and peasants' forestation lands of 15 areas of the Project on the basis of the typical types of various forest stands.

B. Monitoring index

Soil pH, hydrolytic acidity and the contents of organic matters, total nitrogen, quick-acting nitrogen, phosphate and potassium, slowly acting potassium, exchangeable calcium and magnesium in the soil.

(4) Monitoring on diseases and pests in the operation period

A. To set up monitoring points

Four diseases and pests monitoring points will be set up in the present area of the Project, 2 for the available forests and new forests respectively.

B. Monitoring contents

Types of diseases and pests, trees (rate) with diseases and pests, average pest density of single tree and damage level of forest stand.

(5) Monitoring on biodiversity in the operation period

A. To set up monitoring points

Two investigation sample lands will be set up respectively in the present eucalyptus forest, eucalyptus forest restructured from other types of trees, shrubbery, planning forestation lands, waste lands, depending on the type of selected forestation lands.

B. Monitoring contents

Types of plants, quantity of plants, height and coverage of herbal level of the shrubbery

level.

3. Social assessment

3.1 Basis of social impact assessment

- (1) *Forest Law of People's Republic of China*;
- (2) *Regulations on Contracting of Collectively-owned Forestry Land*, State Forestry Bureau, 2008;
- (3) *EIB Loan Fujian Soapberry Forestry Base Construction Project Feasibility Report*;
- (4) *Law of the People's Republic of China on Rural Land Contracting*;
- (5) *Rules on Forestation on non-planning forestry lands*;
- (6) *Opinions on Promoting Enterprise to Construct Industrial and Forestation Base*;
- (7) *Management Methods on Fujian Ecological Public Interest Forests*;
- (8) Related policies documents of Shunchang County.

3.2 Social assessment methods and index

3.2.1 Social assessment methods

To establish the social assessment team; to make various promotions and reports on the project involving different social walks and different interest groups, making sure it's widely known; to hold forum of leaders of related sectors and villagers representative meeting, making sure more people learning about the target, contents and operation procedures of the Project; to make interview with farmers by the social assessment team in questionnaire, to invite different concerned parties for assessment on the social impact of the Project, to make statistics and analysis on the investigation data; to guide related units and individual to sign the project participation contract, forestry land leasing contract, making sure the equal and voluntary participation in the forestry base construction of different interest groups and different types of farmers.

3.2.2 Social impact investigation index

Such index includes: quantities of villages, farmers and forestry farms participating in the Project; quantities of farmers of minority ethnic group participating in and benefiting from the Project; quantities of farmers into negotiation and rate (%) of the total famers under the impact of the Project; quantities of poor farmers participating in the negotiation and rate (%) of the total poor farmers and total farmers of the Project; quantities of women participating in and benefiting from the Project and rate (%) of the total people participating in the Project; possible labor income by the management farmers from the Project.

3.3 Social impact analysis and assessment

The social assessment team collects the opinions and expectation of the construction of

the Project by different concerned parties, including farmers of low income, medium farmers, rich farmers and women. The assessment team discovers, after the investigation and analysis, the different correlations on the Project of different concerned parties and the different expectations and interests on the construction of the Project.

3.3.1 Positive social impact

(1) The soapberry forestry base will be built with cultivation of improved types, planting in large scale, cultivation with a certain purpose and comprehensive utilization, to develop the forestry industry focusing on the soapberry, meeting the requirements of the development strategy of national industrial raw material forests.

(2) The soapberry has high value in comprehensive utilization, which is widely used in the daily chemicals, bio-pharmaceuticals and biopesticide including the natural shampoo and various cosmetics for skin cleaning and care. It will obtain stable benefits for many years after planting.

(3) More than 60% of the forests in Shunchang are coniferous, meaning various ecological problems such as single type of trees, poor ecological stability and potential risks of fire in forests. To build soapberry forests can add the proportion of the broad-leaved forest, making favorable adjustment in the types of trees and improving the ecological quality of the forests.

(4) To develop the soapberry planting with the deteriorated forests, waste mountains and lands suitable for forestry and non-planning forestry lands will bring about sound ecological function and higher economic values as well to improve the income of the farmers. It will also neutralize the negative impact of the limits on the wood cutting.

(5) The soapberry can grow in poor lands for its well adaptability, which can make sound water and soil conservation, protection on the ecological environment, rich forest resources and landscapes, thus, improving the ecological functions and biodiversity of forests.

(6) The Project can promote the development of the soapberry industry in Shunchang and the scale production and industrial operation of the base and can also adjust the forestry structure, providing raw materials for the soapberry environment friendly series products.

(7) The Project can improve the infrastructure of the area of the Project, promote the new rural construction, maintain the ecological safety, beautify the environment by planting and promote the third industry including ecological tourism.

(8) The Project means the forestry science achievements into the productivity, making overall improvement of masses of forestry farmers on the thought, cultural and science quality and production skills with the model and radiation effect.

(9) The Project requires quantities of labor force, 4,600 people each year in the construction period, which is beneficial for development of rural economy, improvement of the income of

farmers, social stability and promotion of mountainous culture.

3.3.2 Negative impact on society of the Project

(1) It's the first time that the government of Shunchang applies for EIB loan, which means possible risks of repayment and tight financial budget of the County.

(2) The state-owned forestry farms operate in plan. Participating in the construction of the soapberry base means adjustment on the original plan. The large area of soapberry in maintains requires cultivation and fruit picking every year, causing higher operation cost. Thus, the economic benefit of the forestry farm will be impacted in case of the benefits not higher than those of the traditional spruce operation.

(3) The soapberry planting in large areas has a certain risk on the operation mode, technical measures, fires and diseases and pests.

3.3.3 Measures to reduce negative impact on society of the Project

(1) The government of Shunchang authorizes the Finance Bureau of the County to formulate the loan project management system, making guidance and supervision on the capital, finance, debts of the loan and supervising the implementation and utilization of loan capital and supporting capital. The Bureau will, with the authorization of the Ministry of Finance, be responsible for the payment of loan capital and special account management and liability division and repayment of capital and interests as well as other fees of the loan capital. The Bureau will make guidance and supervision on the purchasing of the loan project jointly with other related sectors.

(2) Shunchang Project Office is responsible for loan from EIB and the Finance Bureau of the County issues the loan repayment commitment. The debtor, Shunchang Project Office, is responsible for repayment of the capital and interests. The debt is in EU while the capital is appropriated in RMB. The foreign exchange risk lies in Shunchang Project Office in actually incurring amount. There is no risk for the owners of the forestry land in the load repayment. However, Shunchang Project Office, the debtor of the Project loan, will have the risk of repayment in case of any risk in the Project, so will Shunchang Finance Bureau, the guarantor. The load interest within the operation period (including construction period) will be RMB ¥39.497million and the capital and interests to be repaid will be RMB ¥279.497million in accordance with the loan repayment conditions. The capital for repayment will come from the amortization and undistributed profit. Measures to control risks: Shunchang Finance Bureau formulates the loan repayment policies and makes clear the relation of credit and debt. Shunchang Project Office opens the repayment reserve fund account and makes positive collection of repayment reserve fund, to avoid possible repayment risk. Shunchang Project Office will strengthen the R&D of soapberry fruit processing and comprehensive utilization

and the development of new products to improve the industrial level and economic benefits, income of the enterprise, thus, reducing the risk on the loan repayment.

(3) To make sure the smooth implementation of the Project, Shunchang Project Office has made reasonable adjustment on the production plan of 2016-2020 of the state-owned forestry farm. Shunchang State-owned Forestry Farm and Sanqing Company, before the commencement of the Project, operate with the provincial Forestry Department and Forestry Science Academy to build the soapberry nursery gardens, scion-plucking gardens and model forests, thus, accumulating the operation technology and management experience. The professional management team is also established. The mixing mode of soapberry and spruce in the State-owned Forestry Farm can avoid the soil fertility deterioration of the spruce forestry lands and make sure the benefits from spruce. The proportion of spruce is larger than that of the soapberry, which can promote the growing and timber of the spruce. However, it impacts the growing and fruiting of the soapberry. The key technology is how to make time-space control by timely intermediate cutting of the spruce, reducing the closing density and promoting the fruiting of the soapberry.

(4) There is a long history of planting soapberry in Shunchang, without risks of freezing damages and little impact from typhoon and windstorm. No serious diseases and pests have been found in the soapberry so far. However, Shunchang Project Office operates with the firefighting office and forest control station of the County in reserving the funds for forest protection, firefighting and diseases and pests control, strengthening the infrastructure construction and completing the perfect forest firefighting and diseases and pests control system, thus, reducing the risks to the minimum.

(5) The poor farmers cover 15% approximately of all farmers. They are eager to participate into the construction of the Project. However, they have the risk of marginalization due to limited capital and little experience. To make sure the economic benefits for such disadvantaged groups, the Project Office will emphasize the support to the farmers with lower income to allow them participate in the Project with the labor service, but not capital, thus, reducing the possible risks. The social assessment team considers that there is little possibility of marginalization to woman, for they play a sound role in the seeding cultivation and fruit picking. The Project involves the people of She Ethnic Group, a minority, who have no remarkable difference in the economy and political system with the mainstream society. Considering the specific difficulties of She Ethnic Group to participate in the Project, Shunchang Project Office will provide the support in the capital and technology, making sure the benefits for the minority.

3.3.4 Summary of social impact assessment

After referring to the related documentations of statistics yearbooks of Shunchang County, site investigation and interview on 179 villages (work areas) of 20 townships (towns and farms) and repeated negotiations and questionnaires with the concerned parties, the social assessment teams discovers that 99% of the investigated people understand the purpose of the Project, more than 95% know about the project construction by Shunchang Project Office, 87.2% consider the base construction will benefit the social and economic development of Shunchang County and support the social impact. It means the forestry farmers have higher concern on the Project, making sound mass foundation for the construction of the Project.

In the investigation people, the people of medium income have higher concern on the construction of the Project, showing the forestry farmers are positive to participate in the construction of the Project, to promote the economic development of the town and to increase the income of the forestry farmers. More than 77.3% of the farmers are willing to cooperate or contract while 58.9% of the farmers consider the Project will have no or little impact on the firewood cutting and herding of villagers.

In terms of the base construction program, forestation mode and technical measures, 89.8% of investigated people consider the construction program is feasible or basically feasible. 84.6% consider the social responsibility management system in the base construction is perfect or relatively perfect. As to the labor force in the base construction, most farmers consider it's suitable for contract operation. More than 65% of the investigated people consider the soapberry project has serious impact on the development of the rural economy while more than 85% consider the risks are preventable and controllable.

3.4 Monitoring methods and technology

The project monitoring is intended for the realization of the target, making sure the smooth implementation of the Project according to the design program and making sure the participation and benefits of the target groups. Therefore, the soapberry forestry base project will establish the monitoring and assessment system on the social impact at the county level and town level in the following specific procedures:

(1) To collect the data information of the typical units or farmers with interview and questionnaire;

(2) To make interview of county level (including State-owned Forestry Farm) and town level, to collect the secondary data on the achievement information of the Project, meanwhile to collect related documents in the country and towns, to make comparison with the baseline data in the social assessment;

(3) To summarize and analyze the collected achievement information of the Project, to draw the assessment conclusion, to include such actual data into the annual, intermediate and final monitoring assessment reports, to report to the sectors of the upper level and to make feedback to the State-owned Forestry Farm, villages and Sanqing Company.

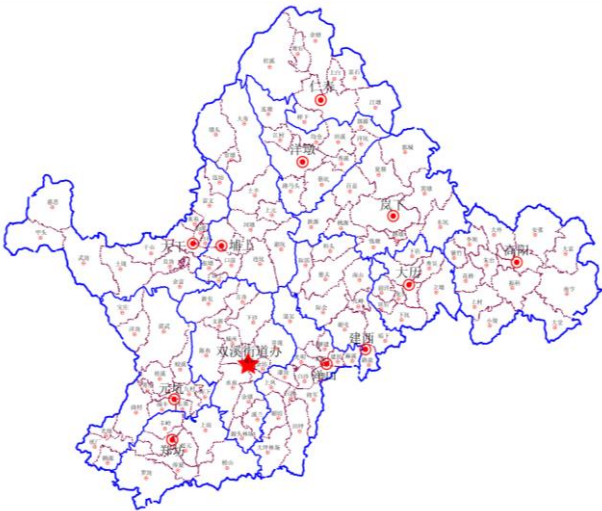
In the monitoring of the Project, the Project Office of the County will determine the monitoring assessment assignment for each year according to the development of the Project, to include the project monitoring assessment guidance and training expenses of the county level into the county project management expenses budget, which will be paid from the supporting expenses of the county level. The County Project Office and Sanqing Company will be responsible for the monitoring assessment on the participation negotiation by the State-owned Forestry Farm, Sanqing Company and villages in the planning period. The monitoring assessment on the participation of the State-owned Forestry Farm and villagers, benefits and social effect will be made simultaneously with the monitoring assessment on the achievements of the Project after the commencement of the Project. The township or town forestry stations will be responsible for collecting the social impact dynamic data. Each assessment on the social impact will be made each half years on the basis of the collection and summary of dynamic changing data of various townships or towns of the Project. The assessment results and conclusion will be an integrated part of the half year and annual development reports. The County Project Office will be responsible for preparing the monitoring assessment report of the Project achievements and submit to the provincial project office.

4. Conclusion

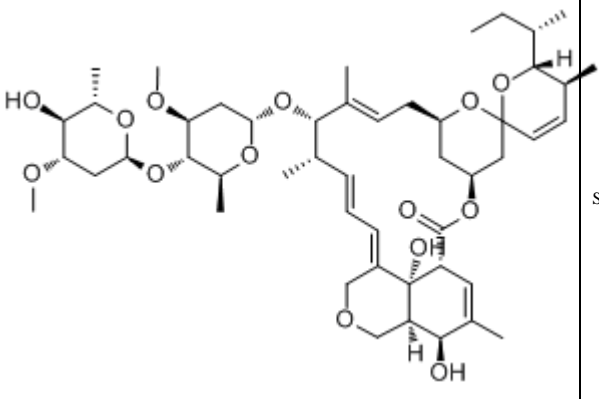
Shunchang has the natural conditions for the construction of the soapberry forestry base. The high concern and positive promotion of the government of Shunchang provides the guarantee and support for the development of the soapberry industry. The farmers have accumulated a certain techniques and experience on forestation and Sanqing Company has stronger technical force in the development of the soapberry series products. The investigation and analysis by the social impact assessment team shows that the financial Internal rate of return each ha of the soapberry forestry base of 10,000ha will be 19%. The Project has the overall financial internal rate of return of 16%, larger than the base earning ratio of 8%, the financial net present value of RMB ¥523.80million, static payback period (including construction period) of 12.58years and dynamic payback period (including

construction period) of 14.77years, the return of investment of 21.3%, profit and tax investment ratio of 21.3, which shows the sound financial benefits. The Project can provide the employment opportunities of more than 4,600 each year in the construction period and more than 27,800 in the operation period, which can improve the income of the farmers. The Project makes full use of the cutover lands, low-yield orchard and waste farmlands for planting soapberry, which increases the forestry area, improves the proportion of broad-leaf forests, optimizes the structure of tree types, thus controlling the impact on the ecological environment, water environment, soil environment and water and soil loss. The Project has little impact on the ecological environment, water environment, soil environment and water and soil loss in the operation period, making huge ecological benefits and social benefits as well.

Appendix figure 1 EIB loan project area sketch



Appendix table 1 Pesticides

No	Common name, trade name/object	Chemical components	Application (purpose, tree type, planting forest type)	Classification of WHO	Registration number or other evidence in case of obtain the approval of China	EU registration number	CAS No. (optional)
Insecticide							
1	Carbendazim	Carbendazim; methyl-1H-2-Benzimidazole carbamate; N-(2-benzimidazole) Methyl carbamate; N-(2-benzimidazole)Methyl carbamate; methyl-benzimidazole-2-Methyl carbamate	Soapberry		234-232-0	234-232-0	10605-21-7
2	Spinosad	Spinosad A: (2R, 3aS, 5aR, 5bS, 9S, 13S, 14R, 16aS, 16bR)-13-[(2R, 5S, 6R)-5-(dimethylamino) tetralin -6-methyl-2H-pyran-2-yl]butoxy-9-ethyl-2,3,3a,5a,5b,6,7,9,10,11,12,13,14,15,16a,16b,1-hexadecanol-14-methyl-7,15-dioxo-1H-as-Indene pentene [3,2-tetraazacyclododeca-2-yl]methyl- α -L-mannopyranoside; Spinosad D: (2R, 3aS, 5aR, 5bS, 9S, 13S, 14R, 16aS, 16bR)-13-[(2R, 5S, 6R)-5-(dimethylamino) tetralin -6-methyl-2H-pyran-2-yl]butoxy-9-ethyl-2,3,3a,5a,5b,6,7,9,10,11,12,13,14,15,16a,16b,1-hexadecanol-4,14-dimethyl-7,15-dioxo-1H-as-Indene pentene[3,2-d]tetraazacyclododeca-2-yl]methyl- α -L-mannopyranoside.	Soapberry		187166-40-1	Plant protection product	131929-60-7 168316-95-8
3	Suspended sulphur	sulphur	Soapberry		231-722-6	231-722-6	7704-34-9
4	Abamectin		Soapberry		LS2013002 1	265-610-3	71751-41-2