

XIGUAN AFFORESTATION PROJECT IN GUIZHOU PROVINCE



Document Prepared By Shanghai Libra Investment & Management Co., Ltd

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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) Improve local production conditions and ecological environment, enhance the quality of life, create a good investment and development environment and play a leading and demonstration role.	4.2.
2) Material improvement in the welfare of the minorities living within the project area and the populations surrounding the project area.	4.2
3) Provide local village community with experience of forest planting and management in Karst region.	4.2.3
4) Maintenance of biodiversity populations, improvement and / or maintenance of existing conditions.	5

1.2 Standardized Benefit Metrics

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
GHG emission reductions or removals	Net estimated emission removals in the project area, measured against the without-project scenario	11,652,613 tCO ₂ e	3.2.4
	Net estimated emission reductions in the project area, measured against the without-project scenario	N/A	N/A
Forest ¹ cover	For REDD ² projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	N/A	N/A
	For ARR ³ projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario	25,449 Ha	2.1
Improved land management	Number of hectares of existing production forest land in which IFM ⁴ practices are expected to occurred as a result of project activities, measured against the without-project scenario	N/A	N/A
	Number of hectares of non-forest land in which improved land management practices are expected to occurred as a result of project activities, measured against the without-project scenario	N/A	N/A

¹ Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)

² Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)

³ Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)

⁴ Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Training	Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities	19,090	2.3
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	13,363	2.3
Employment	Total number of people expected to be employed in project activities, ⁵ expressed as number of full-time employees ⁶	19,090	2.3
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	13,363	2.3
Livelihoods	Total number of people expected to have improved livelihoods ⁷ or income generated as a result of project activities	19,090	2.3
	Number of women expected to have improved livelihoods or income generated as a result of project activities	13,363	2.3
Health	Total number of people for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	N/A	N/A

⁵ Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.

⁶ Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from the UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])

⁷ Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	N/A	N/A
Education	Total number of people for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	N/A	N/A
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	N/A	N/A
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	N/A	N/A
	Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	N/A	N/A
Well-being	Total number of community members whose well-being ⁸ is expected to improve as a result of project activities	19,090	2.3
	Number of women whose well-being is expected to improve as a result of project activities	13,363	2.3

⁸ Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Livelihoods, Health, Education and Water), and may also include other benefits such as strengthened legal rights to resources, increased food security, conservation of access to areas of cultural significance, etc.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation, ⁹ measured against the without-project scenario	25,449	5.2
	Expected number of globally Critically Endangered or Endangered species ¹⁰ benefiting from reduced threats as a result of project activities, ¹¹ measured against the without-project scenario	0	5.2

⁹ Managed for biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation, e.g. enhancing the status of endangered species.

¹⁰ Per IUCN's Red List of Threatened Species.

¹¹ In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit.

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (G1.2)

The Xiguan Afforestation Project is located within Anshun City, in Guizhou Province. This province is land locked and borders Yunnan to the west, Sichuan to the northwest, Hunan to the East and Chongqing to the North. The population of the province is 34million.

The Xiguan Afforestation Project (hereafter referred as “the Project”) is located within Xixiu District and Guanling Buyi and Miao Autonomous County (Guanling County or Guanling). The project is to plant native species on barren land for purposes of GHG removal whilst contributing to local sustainable development goals. The project is implemented jointly by the Forestry Bureau of Xixiu District and Forestry Bureau of Guanling County. 25,449ha of forest was planted on degraded lands in Xixiu District and Guanling County.

The project involves a total of 323 villages in Xixiu District and Guanling County, with a total population of nearly 132,897. All the barren lands for afforestation activities belong to the villagers and the village committees manage the lands on behalf of villagers. Guizhou Baiheng Fertilizer Co., Ltd (hereinafter referred to as Guizhou Baiheng or Baiheng) has been fully authorized by all the village committees to act as the project proponent to implement project management and monitoring and to sell VCUs generated from the project, which enables Baiheng to consolidate the offset resources into sizeable forestry offset projects. Baiheng will profit-share with the villagers from the sale of VCUs. The implementation of the project activity has provided 19,090 jobs for local farmers, among which 70 percent are women.

The project activity aims to:

- Sequester greenhouse gas and mitigate climate change;
- Enhance biodiversity conservation by increasing the connectivity of forests;
- Improve soil and water conservation in the Karst region and increase the forest cover;
- Generate income and job opportunities for local village communities.

There is no natural renewal and afforestation before the project, and all sites were covered by the barren land. The main species planted is Cypress and China fir which are native species according to the baseline survey.

The implementation of the project would reduce the GHG emissions amounting to 11,652,613 tCO₂e over the next 30 years, with an average annual GHG emission of 388,420 tCO₂e.

2.1.2 Project Scale

Project Scale	
Project	
Large project	✓

2.1.3 Project Proponent (G1.1)

Organization name	Guizhou Baiheng Fertilizer Co., Ltd.
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Guizhou Baiheng Fertiliser Co., Ltd is a private entity, founded in 2012 with a registered capital of US\$1.4 mln. The company has nearly 30 full-time employees and more than 300 part-time staff. Baiheng's core business involves fertilizer and agricultural products sales. Besides, Baiheng also has a team researching and developing the application of new agricultural technologies and forest nursery & breeding. Baiheng has maintained a good relationship with local governments and villagers for years through providing them with high quality agricultural goods and services. Baiheng has been entrusted by the local villagers to act as the Project Owner for the Afforestation projects and to sell VCUs generated from those projects.

2.1.4 Other Entities Involved in the Project

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Shanghai Libra Investment & Management Co., Ltd (hereinafter referred to as Shanghai Libra or Libra) is founded in 2008 with a registered capital of 5 million and 8 full-time employees. Libra has developed more than 200 offset projects in China, ranging from wind, solar and forestry, under various standards including CDM, VCS, Gold Standard and CCER.

2.1.5 Physical Parameters (G1.3)

The geographical coordinates: 105° 45'-106° 21'E and 25° 57' - 26° 15'N is the project of Xixiu; 105° 55'-106° 29'E and 25° 21'-26° 03'N is the project of Guanling.

According to CCB standard, the Xixiu District and Guanling County are defined as the project zone, and the planting area in these district and county are defined as project area. The boundaries of project area and project zone is shown in Figure1, and the KML file has also been submitted.

The basic physical parameters of the project zone are summarized as follows:

Topography

Guizhou province has a typical karst rocky desertification landform characteristic which is a process of land degradation involving serious soil erosion, extensive exposure of basement rocks, drastic decrease of soil productivity, and the appearance of desert. The potential rocky desertification area in Guizhou Province is 1971.20×103hm², accounting for 11.34% of the total province's land area; the slight rock desertification area is 2422.4×103hm², accounting for 13.94% of the province's land area¹².

Xixiu District of Anshun City is located in the hinterland of central Guizhou Province, which is a hilly and plain region of Guizhou. The terrain is higher in the northwest and lower in the southeast. The altitude in northwest is about 1400-1600 meters, central part 1300-1400 meters, and the southeast between 1150-1300 meters. There are two kinds of landform, karst landforms and non-karst landforms in the project area, characterized by dissolved landform for most part and erosional landform for little part.

¹² <https://www.docin.com/p-1009621410.html?docfrom=rrela>, Research on Forest Change, Vegetation Restoration and Rocky Desertification Control in Karst Mountains of Guizhou Province, East China Normal University

Guanling Buyi and Miao Autonomous County, under the jurisdiction of Anshun City, is located in the central part of Guizhou Province, eastern part of the Yunnan-Guizhou Plateau. The ground is higher in the northwest and lower in the southeast. The altitude of most area is between 800 and 1500 meters. The project area mountains belong to the Wumeng Mountain characteristics of high and low undulations, complex and diverse types, and widely distributed carbonate rocks. It is a typical karst mountainous area.

Soils

More than 85% of the soil in Xixiu District is mainly calcareous soil developed from carbonate rocks.. There are 7 soil classes, 27 subclasses, 87 soil genera, 142 soil species.

The soil in Guanling County is full of thick and thin calcareous soil layer, with good texture structure, high soil nutrient content and neutral to slightly alkaline. The slope soil layer is thin due to the large amount of rock, as a result of poor drought resistance; furthermore, there are many karst caves in the valley so that it is rather hard to reserve the surface water. The soil is mainly yellow lime soil and yellow soil.

Climate

The Xixiu District is in a north subtropical monsoon humid climate. The highest temperature is 34.3℃, the lowest temperature is -7.6℃ and the annual average temperature is between 13.2℃ and 15℃. It has four distinct seasons, with 960-1,300 hours sunshine. Xixiu District has abundant rainfall, with the average annual precipitation of 1,250-1,400 mm.

The climate in Guanling is diverse including spanning south temperate zone, north subtropical zone, and central subtropical zone. It is mainly dominated by the humid climate of the subtropical monsoon, with four distinct seasons. 12.5% of the low - heat valley areas are known as "natural glasshouse." The average annual temperature is 16.2 °C with 16.9 °C of the highest annual average temperature and 15.4 °C of the lowest. The rainfall is plenty, with amount of 1205.1-1656.8 mm per year.

Hydrology

The rivers in Xixiu District are divided into two major river systems, the Yangtze River and the Pearl River. The surface water and ground water are well-distributed. There are 9 major rivers, 28 tributaries, 133 creeks, 27 rivers in which tributaries is accounting for more than 20 square kilometers and rivers for more than 10 kilometers. The total amount of surface water resources is 644 million cubic meters. The groundwater resources are stored in the fissures and faults of limestone or dolomite controlled by topography, landforms and geological structures. With the changes in fissures and voids, the groundwater is getting increasing .

The rivers in Guanling County belong to the Beipanjiang River. Duanqiao River is the primary tributary originating from the Yangma River in Yongning Town, Guanling County, flowing through Hujiao, Wujiazhai, Shangba, Xinqiao, Pingzhai and Duanqiao. The total length of the Duanqiao River is 28.6 kilometers, with a drop of 663 meters. The average ratio of the main river channel is 24.77%, and the watershed area is 337.2 square kilometers.

Types of vegetation

Xixiu District is subtropical moist evergreen broad-leaved forest. The evergreen broad-leaved forest is distributed in Kowloon hills of the Xixiu District mainly fagaceae, lauraceae, theaceae. The vegetation in other areas are secondary vegetation, mainly pinus massoniana and cunninghamia lanceolata, cedar wood, birch, China Fir, poplar, camphor, pinus elliottii and yunnan pine. Moreover the lobular privet shrub tree species are mainly, camellia, camellia, and so on.

Guanling County belongs to subtropical evergreen broad-leaved forest region - subtropical evergreen broad-leaved forest region southern subtropical sub-region, in the original evergreen broad-leaved forest and limestone vegetation belt of Guizhou Mountain. Vegetation species is very rich, a variety of subtropical forest 54 family 117 genus 400 species. According to the appearance, structure, ecological characteristics and evolution rules of forest community, it can be divided into three categories: acidic soil forest vegetation, karst soil forest vegetation and cultivated vegetation. The tree species mainly include: fir, Chinese cedar, rowan, cypress, masson pine, Chinese pine, birch, willow, peach and pear, etc. The shrub species mainly include azalea, firethorn, characteristic fruit and bamboo economic forest, baihua thorn, and raspberry.

2.1.6 Social Parameters (G1.3)

The basic social parameters of the project are summarized as follows:

Main settlements

The project zone covers Xixiu District and Guanling County in Anshun City. The total population of Xixiu District is about 778,500 from 24 townships, of which 65.34% are rural population. Guanling County has a population of about 350,000 from 14 townships, of which 92.76% are rural residents.

Within the project zone, there are 323 villages from Xixiu and Guanling, with a total population of approximately 132,897 from 5 ethnic groups. Among these, Xixiu district has 199 villages, with a population of 81,878, and Guanling has 124 villages with a population of 51,019.

Land use and economic activities

Farming is the key economic activity and main income source for Xixiu and Guanling.

Prior to 2014, the project area was barren land. If this were to remain as is, it would have resulted, over time, in increased desertification, further threatening the farmlands in the area and inhibiting villagers from growing crops. Until 2017, Xixiu district is still considered one of China's most impoverished counties¹³, and as of today, Guanling county is still one of China's most impoverished counties.

¹³https://baike.baidu.com/reference/2581610/7557_a9JFOTUzkNFqVkJFVUDmIBMsdlUOPpMOylJ9mN4t3IlwZFX6MavGaEffvVVxObznVQyb8UaAXyp6cWp11Rr67DYHf_Nfat4EOEox3g, 2017 Guizhou Impoverished Counties Assessment

Relevant historic conditions

The Xixiu District and Guanling County where the project located are under the jurisdiction of Anshun City, which is the famous historical and cultural city in Guizhou Province. It is located in the watershed area of the Yangtze River Wujiang River Basin and the Pearl River North Panjiang River Basin. It has one of the largest Karst landform concentrations in the world.

In the project zone the land is all owned by the villagers collective. The land has been under severe threat of desertification and human-induced land degradation. If this situation is allowed to persist, the land will be degraded to the point where crops will no longer be able to be planted in the area. The local villagers will suffer as a result. From 2008 to 2018, Anshun city witnessed a revival due to the Afforestation activities, with areas of rocky desertification decreasing from 32.04% to 20.31%, or 1,087.24 square kilometers in absolute terms¹⁴.

Socio-cultural information

	Xixiu District	Guanling County
Population:	A total population of 778,500 villagers, of which 82% are of Han ethnicity ¹⁵ . The male-female ratio is 52%-48%. The Miao and Buyi are the largest minorities in Xixiu District.	A total population of 405,973 villagers, of which 38.9% are of Han ethnicity. It made up of 35 ethnic groups ranging from the Buyi ethnic group to the Miao ethnic group to the Yi ethnic group. In 2018, the male-female ratio stands at 52.4%-47.6%, ¹⁶
Income:	1. GDP per capita is 40,822 RMB (US\$ 5,799) 2. average annual income per capita for urban villagers is 28,935RMB (US\$ 4,110); average annual income per	1. GDP per capital stands at 21,688 RMB (US\$ 3,081) 2. average annual income per capita for urban villagers is 25,427 RMB (US\$ 3,612); average annual income per capita for rural villagers is 7,992

¹⁴ http://www.anshun.gov.cn/xwzx/asyw/201812/t20181206_3706652.html, 2008-2018 Desertification Management in Anshun

¹⁵ <http://www.xixiu.gov.cn/zjxx/xxjj/>, Introduction of Xixiu District

¹⁶ http://www.guanling.gov.cn/zfsj/sjfb/rk/201907/t20190731_5417725.html, 2018 Guanling County Population

	capita for rural villagers is 10,956 RMB (US\$ 1,556) ¹⁷ ;	RMB (US\$ 1,135) ¹⁸
Education:	180 primary schools, 39 general secondary school, 4 vocational middle schools, and 1 institution of higher education. 98.36% of the population have a primary school education or better. ¹⁹	As of 2018 , there are 58 primary schools, 8 middle schools and 2 high school. 99.54% of the population have a primary school education or better. ²⁰
Health	28 hospitals and 19 community hospitals, but they can only house 3732 patients in total at any one time. 476,744 villagers have rural medical insurance.	8 hospitals and 14 community hospitals in Guanling County, but they can only house 419 patients in total at any one time. 253,417 villagers have rural medical insurance.
Employment:	Only 23,130 persons in full-time employment in enterprises and government institutes; most of the remaining population are villagers.	Only 17,605 persons in full-time employment in enterprises and government institutes; most of the remaining population are villagers ²¹ .

2.1.7 Project Zone Map (G1.4-7, G1.13, CM1.2, B1.2)

The project is located in Xixiu District, Guanling County, Anshun City, Guizhou Province, China. The geographical coordinates : 105° 45' - 106° 21' E and, 25° 57' - 26° 15' N is the project of Xixiu, 105° 55' -106° 29' E and 25° 21' - 26° 03' N is the project of Guanling.

The location of the project activity in Guizhou Province is illustrated in Figure1-1. The detail project boundaries in Xixiu District and Guanling County are delineated in Figure1-2, Figure 1-3.

¹⁷http://xixiu.gov.cn/xxgk/zdgg/zfgzbg_13381/201802/t20180205_2260123.html, 2017 Xixiu's Government Work Report

¹⁸ http://www.guanling.gov.cn/xxgk/jcgk/201901/t20190104_2173856.html, 2018 Guanling's Government Work Report

¹⁹ http://www.xixiu.gov.cn/xxgk/zdgg/tjxx_13367/tjgb/201612/t20161209_1535225.html

²⁰ http://www.guanling.gov.cn/zjgl/jfz/201907/t20190731_5435560.html, Guanling's 2018 Economic and Social Development Statistics, Guanling Government

²¹ <http://www.ahmhxc.com/tongjigongbao/15759.html> , Statistical Communique of 2017 National Economic and Social Development of Guanling Autonomous County

The geographical coordinates of the project activity in Xixiu District and Guanling County are listed below.

Table 1 Geographical Coordinates of the Project Activity in Xixiu District and Guanling County

	East longitude	North latitude
Xixiu District	105°45'-106°21'	25°57'-26°15'
Guanling County	105°55'-106°29'	25°21'-26°03'



Figure1-1 Map showing Guizhou Province, China



Figure1-2 Anshun City

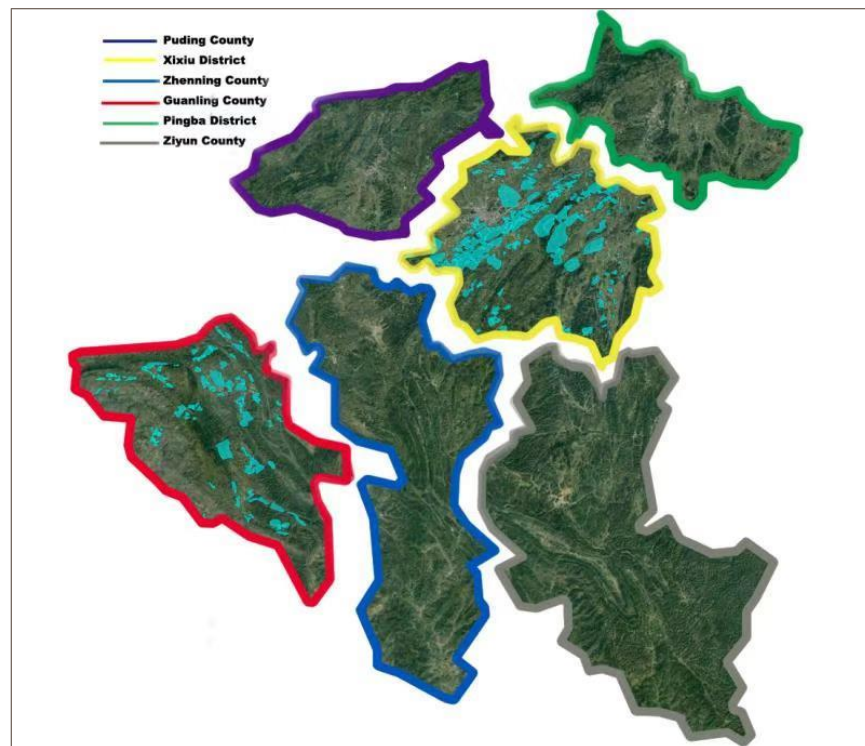


Figure1-3 Anshun City

(other stakeholder impact, and areas where biodiversity impacts are predicted)

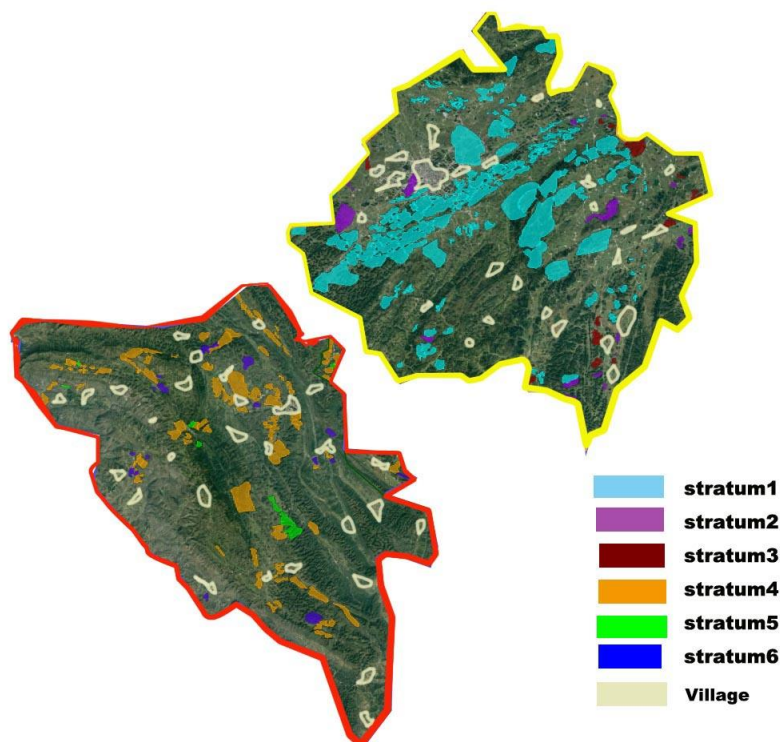


Figure1-4 project boundary

(location of stakeholders, location of communities, onsite climate impacts)

In figure 1-3, the yellow-bordered area is Xixiu District where 199 villages involved in the project are located. In this area, cypress and china fir are the main species planted in 2014 and 2015 that is indicated in the stratum 1, stratum 2 and stratum 3 respectively as described in figure 1-4.

The red-bordered area represents Guanling County where 124 villages involved in the project are located. In this area, cypress and china fir are the main species planted in 2014 and 2015 that is indicated in the stratum 4, stratum 5 and stratum 6 respectively as described in figure 1-4.

The light green shaded parts within yellow-bordered and red-bordered area represent the forestry lands from the 323 villages in both counties where the project activity occurred and communities lives in, defined as Project Boundary.

Besides, as described in the following Section 3.3.3, there is no leakage of the project, therefore, no offsite climate impacts were predicted. And as described in Section 5.3.2, there are no potential negative offsite impacts on biodiversity, thus no offsite biodiversity impacts was predicted either.

The green-, blue-, gray- and purple-bordered areas represent Pingba district, Zhenning county, Ziyun county and Puding county respectively. These counties have benefited when the afforestation activities were implemented as there have been improvements in both their climate and biodiversity.

2.1.8 Stakeholder Identification (G1.5)

There are 4 main stakeholders identified.

This stakeholder's identification starts by listing all the people or groups who might have an influence over or be impacted by a project. The local village committees and village officials were considered to be the key informants and focus groups who know best about the local villagers. In September 2013, the project participant and both Xixiu & Guanling Forest Bureau held a consultant meeting with local village committees during the PRA survey before the project start.

1) Village Communities in Xixiu District and Guanling County: (Including 132,897 local villagers of which 19,090 are migrant rural worker and 13,363 are female rural workers mentioned in section 4.2.1)

The proposed project involved planting Cypress trees and China fir in 323 villages in Xixiu District and Guanling County.

In these 323 villages, a total of 132,897 villagers have been directly affected by the activities of the project. (Described as local villagers mentioned in section 4.2.1). In addition, the lands in the project area belong to these villagers and these lands are centrally managed by the respective village committees. The representatives of these village committees can manage the land only with the consent of all the villagers. Hence, the village committees gathered the opinions and consent of the villagers located within their respective local villages through face-to-face meetings before deciding to apply to the local governments' and the forestry bureaus for permission to plant trees within the project area. The committees were also responsible for signing the cooperation agreement with the project proponent to ensure the project is developed properly.

Since December 2012, before the project started, the village committees conducted a survey of the local villagers willingness to plant trees. This was done through meetings and interviews with villagers. All the villagers agreed to use the barren lands collectively owned by the villages to plant trees. In the end, 19,090 villagers were hired to plant trees (Described as migrant rural workers mentioned in section 4.2.1), of whom 13,363 were women (Described as female rural workers mentioned in section 4.2.1), accounting for 70 percent.

The total 132,897 villages are directly impacted by the project. Moreover there are additional impact for migrant rural workers and female rural workers as the result listed in the section 4.2.1. Thus this type of stakeholders are divided into three category to specify the different impact to the community. Refer to the specific impact for the different categories as described in section 4.2.1.



The picture above was taken in Shanlan Village, Qiyangqiao Town, in Xixiu District in early 2013. The Shanlan village committee representatives organized a meeting to solicit suggestions from villagers for the implementation of project activities and their willingness to participate in planting trees.

This afforestation activity has greatly benefited the local villages and could only carry out with the villagers' consent. Hence, the villagers within the project zone are recognised to be stakeholders in the project.

2) Forestry bureaus of Xixiu District & Guanling County:

Planting techniques will be provided by the local forestry bureaus, whereupon after successful planting, inspections will also be carried out by the local forestry bureaus. In this respect, the villagers in the villages, the committees, the local governments granting permission and local forestry bureaus providing advice and inspections, are all identified as relevant stakeholders in this project.

3) Governments of Xixiu District & Guanling County

The local administration is responsible for the local social and environmental management. They are responsible and accountable to all local villagers if there is anything related to encroachments to villagers rights.

4) Village committees in project area

They are responsible for collecting opinions from the respective locals and villages with the project proponent or forestry bureaus. They also represent all the locals to sign the carbon sink project cooperation agreement with Project proponent.

2.1.9 Stakeholder Descriptions (G1.6, G1.13)

Stakeholder	Rights, Interest and Overall Relevance to the Project
Villagers living in the involved 323 villages from Xixiu District and Guanling county.	Firstly, local villagers who owns the using right of the project land through the village communities. Secondly some of them have participated in the implementation of the project by working on site clearing, digging, planting, watering and follow-up management. Consequently, they will be directly affected by the project.
Forestry Bureaus of Xixiu District and Guanling county. (other stakeholders)	The local administration is in charge of the official approval and management of the forest projects. Technicians are employed by the Forestry Bureaus. They provided the local village communities with forest trainings, planting & maintenance skills and carried out inspections of the forested areas in order to be passed by the Forestry Bureaus.
Governments of Xixiu District and Guanling county. (other stakeholders)	The local administration who is responsible for the local social and environmental management. They are responsible and accountable to all local villagers if there is anything related to encroachments to villagers rights.
Village committees in project area	They are responsible for collecting opinions from the respective locals and villages with the project proponent or forestry bureaus. They also represent all the locals to sign the carbon sink project cooperation agreement with Project proponent.

2.1.10 Sectoral Scope and Project Type

The project will be developed under VCS scope 14 “Agriculture, Forestry and Other Land Use (AFOLU)” with a project category of Afforestation, Reforestation and Revegetation (ARR). The project is not a grouped project.

2.1.11 Project Activities and Theory of Change (G1.8)

GHG emission reduction or removal activities

The project is aimed to increase carbon sequestration and contribute to local sustainable development by planting trees on rocky desertification lands. 25,449ha of forest is to be planted by direct planting on degraded lands in Xixiu District and Guanling County, there is no natural renewal and reforestation before the project.



The picture above was taken by Guanling Forestry Bureau in Pogong Town, 2010 which is within the project zone. It shows the typical karst landform in Pogong Town before the implementation of the afforestation project, in which the vegetation of this land is sparse with thin soils.

The implementation of the project would generate GHG emission removals and improve local environment through growing of the trees, enhance the capabilities of local communities and villagers by providing their relevant technical skills and training, and increase local biodiversity as a result of establishing a forest of native trees (China fir and Cypress).

The project is estimated to generate GHG emission removals of 11,652,613 tCO₂e in 30 years, with an average annual GHG emission removal of 388,420 tCO₂e.

Theory of Change

As explained in the following sections, the without project scenario may have three focal issues:

- (1) Continued low activity and interaction of local communities and community groups;
- (2) Degraded welfare conditions due to invasion of rocky desertification into the settlements of local communities;
- (3) Threat to local climate conditions and biodiversity due to continued rocky desertification.

The main objective of the project is to establish forest cover in degraded land, by planting a variety of species of native trees to address the above issues.

(1) Community activity focal issue: The project has offered more job opportunities, the income of the local households have been increased. In the absence of the project, during a PRA survey by the Guizhou Academy of Social Sciences (GASS), the average monthly income of a household within the project area is about 1,800RMB, and most villages defined as impoverished village in the project zone. After the implementation of the project, the ratio of poor households are decreased due to the income increase, and opportunities for local villagers working together were given to them. The daily salary for a tree-planting post is 60RMB and the monthly pay for each part-time technician is 200RMB, which is a considerable contribution to the income level of both the villagers and technicians. Therefore, the project significantly improved the well-being of local communities;

(2) Rocky desertification invasion focal issue: The project provided a forest cover around the settlements hence preventing rocky desertification. In the absence of the project, the project area would remain rocky desertification land and the surrounding villages would be threaten by rocky desertification invasion. By 2013 the forest area of Xixiu is 35.18%²² and Guanling is 40%²³. After the implementation of the project, the forest cover of the project zone was significantly increased which could mitigate the rocky desertification threaten. Until 2018 the ratio is raised to Xixiu with 50.15%²⁴ and Guanling with 49.68%²⁵ respectively. Therefore, the local environment will be improved and the living conditions of the communities will also be improved;

(3) Threat to biodiversity focal issue: The project increased the forest cover by applying scientific and reasonable configuration method of planting. In the absence of the project, the project area would continue to be rocky desert mountains with much threat to local climate and biodiversity condition. The implementation of the project can adjust the hydrological cycle, reduce drought and flood risk, promote soil nutrient cycle, improve local micro-climate and other ecological environment. Therefore the population of animals could be increased due to the better environment of habitat.

With implementation of the project, the expected output, outcomes and impacts are summarized in the following table:

Table 2-1 The expected output, outcomes and impacts of the project activities

Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs	Outcomes	Impacts	

²² http://dsb.gzdsdw.com/html/2014-12/08/content_35579.htm, Update on Xixiu forestry coverage, Xixiu Metropolitan Daily

²³ http://www.hstx.org/newsHtml/News_5482.html, Guizhou Guanling Promotion Conference

²⁴ http://www.anshun.gov.cn/xwzx/asyw/201903/t20190319_3777270.html, Xixiu District of Anshun City was awarded the title of “Forest Forest City of Guizhou Province”

²⁵ http://www.guanling.gov.cn/xxgk/xxgkml/jcxxgk/zcwj/xzfwj/201903/t20190304_2295042.html, Government working report of Guanling

	(short term)	(medium term)	(long term)	
Plant native species of trees, including preparing land for planting	Generate GHG emission removals	Improve the local environment; Generate GHG emission removals	Establish a forest ecosystem; Generate GHG emission removals	Climate
Offer permanent and temporary job opportunities related to forest planting and management	Create job opportunities, increase household incomes of local residents	Improve living level of local villages	Improve well-being of local villagers	Community
Provide technical skills and training of forest planting and management	Improve motivation of community groups	Enhance capabilities of local villagers	Enhance social cohesion	Community
Increase forest cover around the project area	Maintain local ecological environment; prevent frequent debris flow	Provide better habitat for wild lives; prevent rocky desertification	Increase local biodiversity; prevent rocky desertification	Biodiversity ; Community

2.1.12 Sustainable Development

The project will contribute to achieving sustainable development as following:

- Sequester greenhouse gas and mitigate climate change;
- Enhance biodiversity conservation by increasing the connectivity of forests;
- Improve soil and water conservation in the Karst region;
- Generate income and job opportunities for local village communities.

2.1.13 Implementation Schedule (G1.9)

Date	Milestone(s) in the project's development and implementation
15-10-2013	Started the baseline survey.
05-01-2014	The Project Design for Afforestation Operation was finished.
17-02-2014	The afforestation project design was approved by Anshun Forestry bureau.
03-2014	Biodiversity survey report of the project was completed.
11-03-2014	Participatory Rural Appraisal (PRA) report of the project was completed.
01-04-2014	Started planting trees (start date of crediting period)
26-10-2015	Completed planting

2.1.14 Project Start Date

According to VCS standard, the project start date is the date on which activities that lead to the generation of GHG emission reductions or removals are implemented, for this project, the project start date is 01-04-2014 when the planting started.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

Planting started: 01-04-2014, the date in which the local village communities started its activities and led to greenhouse gas removal.

The project crediting period is from 01-04-2014 to 31-03-2044, with a lifetime of 30 years which is the same as the CCB benefits assessment period.

2.1.16 Differences in Assessment/Project Crediting Periods (G1.9)

The GHG emissions accounting, climate adaptive capacity and resilience, community, and/or biodiversity assessment and periods are all the same.

2.1.17 Estimated GHG Emission Reductions or Removals

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
01/04/2014-31/03/2015	33031
01/04/2015-31/03/2016	55020
01/04/2016-31/03/2017	94466
01/04/2017-31/03/2018	140755
01/04/2018-31/03/2019	190749
01/04/2019-31/03/2020	241677
01/04/2020-31/03/2021	291269
01/04/2021-31/03/2022	337773
01/04/2022-31/03/2023	379964
01/04/2023-31/03/2024	417059
01/04/2024-31/03/2025	448642
01/04/2025-31/03/2026	474593
01/04/2026-31/03/2027	495008
01/04/2027-31/03/2028	510147
01/04/2028-31/03/2029	520374
01/04/2029-31/03/2030	526127
01/04/2030-31/03/2031	527867

01/04/2031-31/03/2032	526076
01/04/2032-31/03/2033	521221
01/04/2033-31/03/2034	513749
01/04/2034-31/03/2035	504085
01/04/2035-31/03/2036	492613
01/04/2036-31/03/2037	479683
01/04/2037-31/03/2038	465612
01/04/2038-31/03/2039	450674
01/04/2039-31/03/2040	435118
01/04/2040-31/03/2041	419149
01/04/2041-31/03/2042	402954
01/04/2042-31/03/2043	386687
01/04/2043-31/03/2044	370471
Total estimated ERs	11,652,613
Total number of crediting years	30
Average annual ERs	388,420

2.1.18 Risks to the Project (G1.10)

For the identification of probable natural risks and those induced by man, the tool approved by the VCS Standard was used: "Tool for the Risk of Non-Permanence of the Agriculture, Forestry and Other Land Uses" sector.

Identify Risk	Potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
Fire	The planting area is mostly flat barren land, thus the risk of fire is quite low in the early phase of the project. After the trees grow to a certain age (about thirty years), the risk of fire may increase, and the project proponent will adopt the necessary measures for fire preventing.	Strengthen the work of forest fire prevention publicity education to increase the awareness of forest fire prevention in the whole society. Education activities, mainly covering forest law and forest fire prevention regulation, are carried out to popularize the basic knowledge of fire prevention and extinguishing. Relying on the masses, we will implement mass prevention and control and effectively raise the people's awareness of forest fire prevention.
Diseases and Insects	There could be diseases and insects that may damage the planted trees, but the diseases and insects will be prevented by routine overseeing.	Upon routine overseeing, the diseases will be treated immediately by biological control once occurred. The chemical pesticides are allowed to be used only if there is a serious pest problem outbreak in the project area, and the pesticides will be used in accordance with the National Pesticides Policy.
Pesticide	Improper pesticide application would be	Pesticide will be strictly managed by well

	harmful to natural environment, including polluting soil, water and air conditions, as well as the habitat of the wildlife.	trained staff to minimize the potential effect. Also, the environmentally friendly measures will be adapted such as mixed species arrangement, seed and seedling quarantine. Especially the biological measures to control pests and diseases will be adopted. Therefore, the pesticide application will be limited.
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Also, please refer to Non-Permanence Risk Report of the project for more detailed analysis of project risk.

2.1.19 Benefit Permanence (G1.11)

To maintain and enhance the climate, community and biodiversity benefits, the native tree species with relative long mature age were selected to be planted in the project, which could guarantee the long term benefit throughout and beyond the project lifetime. In addition, according to the Forest Management Manual, the primary purpose of this Afforestation project is to improve the local environment by establishing forest of native trees, commercial logging will be forbidden and human interference will be minimized.

森林管理手册

贵州西关碳汇造林项目



1.林地概况

贵州西关碳汇造林项目位于贵州省安顺市西秀区和关岭县，均为荒山造林。造林总面积 25449 公顷，其中西秀区 14134 公顷，关岭县 11315 公顷。

造林树种主要为杉木和柏木，均为当地树种。造林方式为针叶林纯林，根据造林密度和造林树种的不同，一共分为 6 种造林模式，具体如下表所示：

表 1 贵州西关碳汇造林项目造林模式汇总表

造林模式	合计	西秀区	关岭县	初植树种	初植密度
1	10000	10000		杉木	3100
2	134	134		杉木	3100
3	4000	4000		柏木	3100
4	10666		10666	杉木	3100
5	200		200	柏木	3100
6	449		449	柏木	3100
合计	25449	14134	11315		

2.管理方案

贵州西关碳汇造林项目采用生态林经营，有别于经济林经营那种由效率的处理方式来追求环境所给予的资源，好获取最大净利的方式。生态林经营通常以生物多样性（物种、环境、基因）与生态功能（森林健康、空气净化、水源涵养）的角度来评价森林资源，并且所有的经营途径，均以不超过自然扰动（Disturbance）的强度为原则。

项目的主要造林树种为当地针叶树种，为了维系森林生态功能的健全，需对造林树种科学的监测和管理方法，因此项目林业技术人员参考项目所使用的造林树种，以及相关研究论文，制定了该项目的森林管理方案。

由于贵州位于云贵高原，喀斯特地貌明显，自然条件差，并且当地农户无林管理经验，幼龄林期的地较脆弱，是林地管理的重点时期。

管理重点：确保树苗成活、根系发育为主；建立围栏和护林员制度，防治牲畜和其他人为因素造成的破坏。

具体内容：

（1）林地监测

①苗木抽检：根据对造林苗木进行抽检，所选用的造林苗木必须达到《贵州省主要树种造林技术规程》规定的 II 级苗木标准。

②现场监测：实地监测造林过程，核准株距、行距、穴栽规格等是否符合协议设计。

③验收：在造林结束之后，对实施造林验收进行测量，确认非造林区域（原有林地、耕地、坡度较大的土丘等）位置及面积，明确界定边界，同时抽样核查

造林密度和成活率，成活率需达到《贵州省主要树种造林技术规程》规定的 I、II 级苗木百分率。

④生长监测：根据不同生长期，走访林地，监测抚育效果，对林地生长情况进行照片及文字记录，形成监测报告。

（2）抚育作业

①除草：由于造林地表大部分植被覆盖度较低，基本不存在除草问题。少部分地区由于覆草度较高，但是考虑到避免被菌土，对树盘产生营养竞争的草，采取人工拔除（拔除以树盘为中心，半径 50 厘米范围内的杂草），以减少人为扰动为原则，避免水土流失为原则，造林后第 1、2 年，每年人工松土、除草 2-3 次，时间为每年的 6-8 月；第三年适当松土除草 1-2 次；松土除草时要注意不要损伤幼树根系。

②围栏：在有效种植区域边缘建立围栏，防治牲畜破坏树盘，并起到封育作用。

③浇水：苗期对水份的依赖程度较高，造林第一、第二年每年灌溉 2-4 次，第三年灌溉 2 次，时间为 4-10 月，春夏旱季时增加浇水次数。

④补植：根据林地生长情况，在当年秋季或第二年春季（生长季前），进行补植。

（3）护林员制度

①组织当地农户对林地进行定期巡护

②培训当地农户相关的林业技术（修枝、间种等）

（4）数据调查

低幼龄林期间，森林重点在于苗木成活以及成林，数据调查的重点在于收集林地抚育的成活情况，并对林地造林完成度进行验证。

①指标：存活率、直径、胸径、树高、密度

②调查方法：随机抽样

③计算方法：根据国家标准 GB/T 15776-2006《造林技术规程》要求，如下：以小班或造林地块为单位，采用随机抽样方法调查造林成活率。成片造林面积在 6.66h m²以下、6.67h m²~30h m²、30.01h m²以上的，抽样强度分别为造林面积的 5%、3%、2%；防护林带抽样强度为 10%；对于坡地，抽样应包括不同部位和坡度。

造林成活率按式（1）、式（2）计算：

$$P = \frac{\sum_{i=1}^n S_i \times P_i}{S} \times 100\% \quad (1)$$

$$P_i = \frac{S_i}{N_i} \times 100\% \quad (2)$$

式中：

P—（小班）造林成活率，%；

S—第 i 样地面积（样地长度）；

Pi—第 i 样地（样行）成活率，%

S—样地总面积（样行总长度）；

n—第 i 样地（样行）成活株（穴）数；

N—每 i 样地（样行）截数总株（穴）数；

n—样地数或样行数；

造林成活率保留一位小数

3. 灾害预防

3.1 森林 防火

设立森林防火工作领导小组和火灾消防队，坚持“预防为主、积极消灭”的森林防火工作方针，认真贯彻落实《森林防火条例》，组织开展森林防火宣传教育，组织督促检查指导各乡镇和有关单位做好森林防火工作。

在森林防火期间，带班领导总负责，负责火情的上报和组织人员灭火；防火期内在林区禁止野外用火；因特殊原因需要用火时，必须严格申请批准手续；广泛开展森林防火宣传教育活动，组织力量进行经常性的防火大检查，加强防范。

防火负责人要经常性对区域进行巡回检查，对乱丢烟头、焚烧垃圾等火险隐患，要及时制止并消除；严格火源管理，消除一切火险隐患，避免发生火灾；项目森林防火领导小组不定期进行防火工作检查，对达不到防火要求和防火工作不重视的部门和人员提出限期改正外还要进行通报批评，直至追究有关人员责任。

3.2 病虫害防治

成立病虫害防治领导小组，制定森林病虫害防治宣传手册，以各县县防办牵头组织开展病虫害防治宣传和培训工作，提高认识，加强各级领导，强化目标责任制。森林病虫害防治中，应遵循“预防为主，综合防治”的原则，尤其在森林转青期间，以预防和青、疏伐与造林、抚育以及采伐的科学管理手段，对森林病虫害防治问题进行综合分析，并结合以防治为主，增加资金投入，强化监测能力，优化防治手段等措施的施行，使森林病虫害防治由被动防治向主动防治的转变。

加强森林病虫害监测预报工作，改进防治手段，加强林木检查，严防危险性病虫害传入，确定森林病虫害防治的目标，以便专人防治，定时调查和发现，及时防治与对象明确的基础上，疏理森林病虫害问题，森林病虫害防治工作的开展，在坚持生态林业的基础上，严格按照农药使用标准和生物防治手段，做好森林病虫害防治工作。

严格按照农药使用标准，禁止使用水胺硫磷、氰化乐果三氯杀螨醇、草甘膦与乙拌磷等剧毒、高残留农药，增加对植物农药（苦楝素、烟碱）和动物农药（昆虫生长素）、信息素（天敌素）以及矿物农药（波尔多液、矿物油乳剂、硫磺合剂）的选择，因此减缓对水源、环境的威胁，生物防治作为森林病虫害防治的持续性、可控性手段，以保护天敌、食物链的生存原则，维持生态平衡，从长远利益、短期利益双重标准下实施的森林病虫害防治手段。

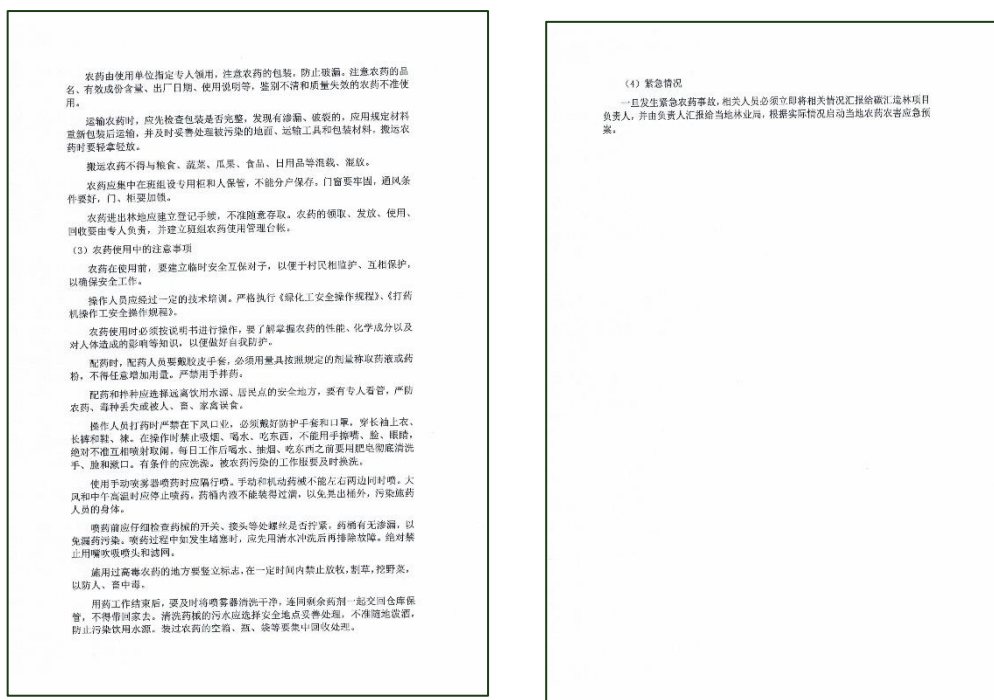
3.3 农药使用管理

（1）农药的购买和使用

造林项目所使用的农药由当地林业局指定专人统一采购。

一般情况下对于造林种树的树木不允许使用农药，如果确实因严重虫害需要使用农药，需列明使用农药的原因、数量、名称、喷洒范围，经负责人审核批准后方可使用。

（2）运输和保管



Above is the scanned cover of the Forest Management Manual written by Baiheng in June 2014. The management norms and standards of forest land and trees involved in this project are described in detail. The manual sets out the management plan for the project forest, which provides a detailed description of the methods and work specifications of forest land monitoring, care operations, ranger systems and data surveys. At the same time, in terms of disease and disaster prevention in forest management, this manual establishes specific work requirements mainly from 3 aspects including forest fire prevention, pest control and pesticide use management.

2.1.20 Financial Sustainability (G1.12)

According to the reported barren hills and wasteland data, the forestry departments at all levels counted and approved the afforestation area and the funds and provincial-level funds and local funds issued by the state to Xixiu District and Guanling County.

Stakeholder seriously considered the carbon revenue and thought the revenue could help to mitigate the economic barrier. Guizhou Baiheng signed the Consulting Agreement with Shanghai Libra. In addition, Guizhou Baiheng signed Emission Reduction Purchase Agreement (ERPA) with Shell Energy (China) Ltd. who will purchase the carbon credits generated from the project in the following years. The project proponent will use the carbon revenue for the continuous management and maintenance of the forest.

2.1.21 Grouped Projects

This is not a grouped project.

2.2 Without-project Land Use Scenario and Additionality

2.2.1 Land Use Scenarios without the Project (G2.1)

The baseline scenario is the same as the conditions existing prior to the project initiation. There is no forestry land in the project area before the project. The lands will remain barren without the project.

2.2.2 Most-Likely Scenario Justification (G2.1)

The most-likely scenario is the same as baseline scenario, please refer to section 3.1.4 for detailed information.

2.2.3 Community and Biodiversity Additionality (G2.2)

Project activity would not have been implemented under the without-project scenario due to technological, investment, and social barriers. Therefore, the community and biodiversity benefits would not have the opportunity to occur either.

Community benefits

In the absence of the project, people would continue to depend on the agricultural economy. This pathway suggests people would continue with limited knowledge of the long-term benefits of forests for biodiversity and climate change. Interview with local village communities indicated that local villagers were usually short of access to quality seed sources and lack skills for producing high quality seedlings and for successful tree planting, as well as for preventing planted trees from being subject to fire, pest and disease attack. This is one key barriers to the local villages in planting trees on their lands. In the proposed project activity, the local forestry bureau as well as project proponent had organized the training for local village communities on seed and seedling selection, nursery management, site preparation, planting models and integrated pest management. Without this project, local people would have trouble with developing alternative livelihood, resulting in a worse economy. The training for employees is held once a year, mainly in the aspects of employee safety and health and technology. The training content is related to the knowledge of forest land clearing, how to plant trees, afforestation and management, carbon sink afforestation and carbon emission. The project mobilized the participation of the entire community, including women, minorities and the poor. It provided everyone with equal opportunities to get a job.

Biodiversity benefits

In the absence of the project, continued loss of habitats for animals, of vegetal biodiversity, as well as general landscape deterioration would be expected. The soil erosion and degradation would be continuing causing soil erosion and degradation. The project activities generate new habitats for

biodiversity by increasing quality and quantity of forest cover.

The project is focused on afforestation, biodiversity and conservation of ecosystem services. However, investment barriers, current ecological conditions of the land, and social conditions limit these kinds of initiatives. These barriers have negative repercussions on production. (Please refer to section 3.1.4 for detailed information.)

2.2.4 Benefits to be used as Offsets (G2.2)

Community benefits: To maximize the socio-economic benefit, the project design was prepared with a participatory approach. PRA methods were adopted by interviewing and consulting local farmer in the project areas to acquire the villagers' preferences, wishes and concerns, so that the proposed project activity would better meet their desires for livelihood development. Please refer to section 4 for detailed information regarding community benefits.

Biodiversity benefits: After the afforestation project is fully launched, it not only produces positive benefits to soil erosion control, but also has far-reaching significance to wildlife resources protection. In the future, efforts should be made to strengthen the protection of natural forests, and the felling of natural forests should be banned in an all-round way. Meanwhile, the non-forested areas of most suitable forests should be restored as natural forests, which is more conducive to the survival and development of wildlife. Please refer to section 5 for detailed information regarding biodiversity benefits.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

The full project documentation will be published on VCS and CCB website for public comments, as well as the project summary in Chinese version, and the local village communities and other stakeholders can easily download from the website. All the document of project will be available in village committees and the local forestry bureaus for whom cannot use the internet. The project proponent will notice local stakeholders through the routine villager assembly regarding every milestones of the project development, including listing, registered, issuance, etc.

2.3.2 Dissemination of Summary Project Documents (G3.1)

Along with the project implementation, the project documentation will be published on VCS and CCB website for all stakeholders to obtain the detailed project information and development progress. Also, the summary of project description in local language will also be disseminated to local village communities through local government, as long as the summary of monitoring reports during each verification.

2.3.3 Informational Meetings with Stakeholders (G3.1)

In order to ensure the effectiveness of all parties involved, the investigation team conducted a participatory rural assessment (PRA) of the Xixiu District and Guanling County before the start of the project, so as to obtain basic data and information on the local socio-economic status and environmental issues, and to further understand the stakeholders. The main socio-economic and environmental issues, collect opinions and suggestions from project participants, and analyse the potential impact of the project.

2.3.4 Community Costs, Risks, and Benefits (G3.2)

In December 2013, during the, during PRA surveys and stakeholder meetings(see the picture below), project proponent explained the potential costs, risks, and benefits to relevant villagers and stakeholders, and then asked for feedback.

Potential Costs	1. Massive manpower needed for planting 2. occupy the roads during the planting 3. short time impact on water resource for planting
Potential risks	1. emergent disease when planting 2. nature disaster
Benefits	1. carbon credit revenue 2. long term living condition improvement due to the better air quality 3. Soil improvement 4. increasing rainfall benefit the crops 5. provide abundant job opportunities 6. rocky desertification control



This picture above shows the PRA surveys and stakeholder meetings organized by GASS in December

2013, during which there were about 30 village representatives from 20 involved villages participating.

2.3.5 Information to Stakeholders on Validation and Verification Process (G3.3)

The status and process of the project for CCB and VCS validation and verification would be published through routine villager assembly and posted on local bulletin boards, also the mobile phone number of contact person of the project was provided to all the stakeholders so they can directly make a call in case they have any problem about the project.

2.3.6 Site Visit Information and Opportunities to Communicate with Auditor (G3.3)

The auditor surveyed the site plots and forests of the project. On 11th April 2019, the project proponent arranged a stakeholder meeting with the auditor, the Forestry Bureau, local villagers and technicians were interviewed to verify the project status²⁶.

During the meeting, the land owners, representative of forestry bureaus, Xixiu and Guanling government officers expressed their opinions about the project activities. The land owners have participated in the project from beginning to present. All of them expressed their willingness to be involved in the project not only because of the revenue obtained from job opportunities created for the local village communities but also improvement in living conditions. The officers expressed very clear support for the continuation of the project.

2.3.7 Stakeholder Consultations (G3.4)

Stakeholder consultations include PRA surveys and stakeholder meetings, requiring stakeholders to present their opinions on project design and their willingness to participate.

Before afforestation, the Guizhou Academy of Social Sciences, authorized by Anshun Forestry bureau, conducted a Participatory Rural Appraisal and CCB survey to meet the requirements of carbon sink project. GASS organized a team of people to interview the village representatives, relevant governmental officers and distribute the questionnaires to gather land owners' opinions. The surveys took 2 months to complete (picture is shown in section 2.3.4).-The feedback collected is summarized below.

- Most local villagers are aware of the benefits of afforestation. They understand that forestry can prevent soil erosion, clean the air, protect the land, and reduce natural disasters. They will also have a strong sense of protection for native animals and plants.
- Prior to the meeting, most local villagers had not heard of carbon trading, VCS, or carbon credits. After the introduction, they strongly agreed that the project should be registered as a carbon sink project and participate in the carbon trading market.

²⁶ Notice was published on each village office before the auditor site visit.

- Local villagers believe that the project can 1) create jobs; 2) get more benefits from selling carbon credits; 3) improve the local environment, protect cultivated land, and reduce natural disasters; 4) improve the social status of 13,363 females by hiring them for tree planting; Therefore, the stakeholders have no opinions on the project implementation, and no need to change the project design.

安顺市西关林业碳汇造林项目
参与式调查问卷
新场镇大寨村 您的民族: 汉族 日期: 2013.4.10

问题	回答(勾选或填写)
1. 你认为植树造林对自然有利吗?	①是 ②否
2. 您了解的植树造林的益处有哪些?	①减少土壤侵蚀 ②净化空气 ③保护水土 ④增加生物多样性
3. 您的家庭有几口人? 年收入是多少? 主要的经济来源是什么?	人口数: 5人 年收入: 1500元 主要经济来源: 种植
4. 您的家庭成员中共有男性多少人、女性多少人?	男性: 2人 女性: 3人
5. 您的家庭成员分别从事什么行业工作?	①农林牧渔从业人员 ②工业从业人员 ③建筑业从业人员 ④交通运输和邮电业从业人员 ⑤信息传输、计算机服务和软件业 ⑥零售业餐饮业从业人员 ⑦其他从业人员
6. 您家庭成员外出打工的人数及性别?	男性: 1人 女性: 2人
7. 您的家庭以哪种生产活动为主?	①畜牧业 ②林业 ③种植业 ④其他
8. 您有宗教信仰吗?	①是 ②否
9. 您的文化水平是什么?	①小学 ②初中 ③高中 ④专科 ⑤本科 ⑥不识字
10. 您会保护出现在您生活环境中的动物吗?	①是 ②否
11. 请问项目涉及的土地权属是否清晰?	①是 ②否
12. 请问在此之前您了解交易吗?	①是 ②否
13. 通过工作人员对交易的介绍, 您会支持本项目中申请开发为碳汇项目吗?	①支持 ②不支持
14. 如果本项目成功申请开发为碳汇项目, 您认为可以带来哪些好处?	①创造就业机会 ②获得更高收入 ③改善当地环境, 减少自然灾害 ④保护耕地
15. 您愿意参与本项目的种植工作吗? 期望的工资是多少?	①愿意 ②不愿意 期望工资: 150元
16. 您支持本项目中雇佣女性参与林本种植和管理吗?	①支持 ②不支持
17. 您认为本项目的实施或实施方案有需要改进的地方吗? 请提出您宝贵的意见。	无

安顺市西关林业碳汇造林项目
参与式调查问卷
新场镇大寨村 您的民族: 汉族 日期: 2013.4.10

问题	回答(勾选或填写)
1. 您认为植树造林对自然有利吗?	①是 ②否
2. 您了解的植树造林的益处有哪些?	①减少土壤侵蚀 ②净化空气 ③保护水土 ④增加生物多样性
3. 您的家庭有几口人? 年收入是多少? 主要的经济来源是什么?	人口数: 5人 年收入: 1500元 主要经济来源: 种植
4. 您的家庭成员中共有男性多少人、女性多少人?	男性: 2人 女性: 3人
5. 您的家庭成员分别从事什么行业工作?	①农林牧渔从业人员 ②工业从业人员 ③建筑业从业人员 ④交通运输和邮电业从业人员 ⑤信息传输、计算机服务和软件业 ⑥零售业餐饮业从业人员 ⑦其他从业人员
6. 您家庭成员外出打工的人数及性别?	男性: 1人 女性: 2人
7. 您的家庭以哪种生产活动为主?	①畜牧业 ②林业 ③种植业 ④其他
8. 您有宗教信仰吗?	①是 ②否
9. 您的文化水平是什么?	①小学 ②初中 ③高中 ④专科 ⑤本科 ⑥不识字
10. 您会保护出现在您生活环境中的动物吗?	①是 ②否
11. 请问项目涉及的土地权属是否清晰?	①是 ②否
12. 请问在此之前您了解交易吗?	①是 ②否
13. 通过工作人员对交易的介绍, 您会支持本项目中申请开发为碳汇项目吗?	①支持 ②不支持
14. 如果本项目成功申请开发为碳汇项目, 您认为可以带来哪些好处?	①创造就业机会 ②获得更高收入 ③改善当地环境, 减少自然灾害 ④保护耕地
15. 您愿意参与本项目的种植工作吗? 期望的工资是多少?	①愿意 ②不愿意 期望工资: 150元
16. 您支持本项目中雇佣女性参与林本种植和管理吗?	①支持 ②不支持
17. 您认为本项目的实施或实施方案有需要改进的地方吗? 请提出您宝贵的意见。	无

Above are 5 PRA and CCB questionnaires from GASS filled out by villagers.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

There is a Suggestion Book published on the notice board in each of the 323 villages throughout the lifetime of the project. Stakeholders can write their comments or suggestions in the book anytime anonymously should they wish. The project proponent will check the book regularly and collect all the comments received.

On the other hand 95 technicians have been working on forest management and tree and CCB monitoring. They will report any situations to the work group established by Guizhou Baiheng periodically.

The technicians as the project monitoring executor have surveyed the project area. As the distance from one village to another is so short that if the locals have any opinions, they can talk directly to the technicians even the local forestry bureaus. Meanwhile, technicians will also pay a regular visit to the villages and collect comments if any. Lastly, a third party, such as GASS would be invited to do the CCB

survey at least every 5 years after project registration, If there is any improper management, the corrective action will be immediately initiated.

2.3.9 Stakeholder Consultation Channels (G3.5)

Local villagers directly impacted by the project were invited through their most convenient way: the routine villager assembly. Local policy makers and forest experts were also invited by phone calls. All the stakeholders have been informed directly or through their legitimate representatives.

2.3.10 Stakeholder Participation in Decision-Making and Implementation (G3.6)

Guizhou Baiheng as a local fertilizer supplier has a good relationship with local villagers and familiar the planting processing. The relevant government invited Guizhou Baiheng as the project proponent.

In the project planning phase, the villagers were fully involved in decision-making for instance the land selection and planting pattern selection through villagers meetings and PRA methods. PRA methods include meetings, household interviews, questionnaires and telephone contact to collect villagers' willingness to plant trees. The final PRA results showed that all villagers unanimously agree and most young adults, women want to participate in tree planting. All the meeting notices would be published on the notice board outside of each village committee office together with the contact numbers so that those who missed the meetings can also share their opinions. The meeting would introduce the purpose, process, benefits, potential costs, risks, etc. Consequently, the villagers agreed to join the project and were willing to participate in the planting of trees.

During the project implementation, the local village communities and government will play as the direct implementers of the project, and the project proponent will play as coordinator who is in charge of the overall management.

All the critical information regarding decision-making will be published to local stakeholders, and the decision should be revised according to further discussion in case there is any feedback from stakeholders.

The project periodic development will be published on the notice board also with the contact persons' information. If there is any negative feedback, a meeting will be immediately held in the village.

2.3.11 Anti-Discrimination Assurance (G3.7)

The project proponent should obey Labor Law of the People's Republic of China with anti-discrimination assurance, and workers will sign up voluntarily regardless of gender, race, religion or any other basis. In case of any discrimination, the project proponent will demand the person who is responsible for

discrimination end his/her involvement with the project immediately and find someone else to take over his/her job.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

If there is a conflict of interest between the parties, the stakeholders can appeal through the village representative or directly to the local forestry bureau, which is the most effective way to solve the problem. They appeal through the phone number of the relevant contact or file a complaint during the meeting. In addition, the villagers participate in project implementation and can identify or seek to resolve conflicts and dissatisfaction in the project.

The project proponent has appointed a staff member to record and collect conflicts and dissatisfaction from local villagers. Employed forest patrols will play an important role in dealing with common conflicts and dissatisfaction and report to the Forestry Bureau. Upon receipt of the patrolman's report, the relevant management unit will contact and discuss with the relevant villagers or other stakeholders within 3 days. The specific staff member shall propose a solution and mediation plan within one week based on all the information collected by the relevant parties, and the conflict shall be handled within 30 days.

2.3.13 Accessibility of the Feedback and Grievance Redress Procedure (G3.8)

The procedure of feedback and attention of claims will take into account the traditional methods that the village communities and other actors use to resolve their conflicts, which will be available to all interested parties, the village community and other actors; said information will be available from consultation.

2.3.14 Worker Training (G3.9)

Interview with local village communities indicated that local villagers are usually short of access to quality seed sources and lack skills for producing high quality seedlings and successful tree planting, as well as for preventing planted trees from being subject to fire, pest and disease attack. This is one of the most important barriers of local village communities in planting trees on their lands. In the proposed project activity, the local forestry bureau as well as project proponent had organized the training for local village communities on seed and seedling selection, nursery management, site preparation, planting models and integrated pest management. The training for technicians is held on every October, starting from 2013, mainly in the aspects of physical safety and health and technology. The training content is related to the knowledge of forest land clearing, how to plant trees, afforestation and management, carbon sink afforestation and carbon emission drafted by afforestation experts in forestry bureau. Any of the employees t, who can't finish the training, can't be a forest technician. As the training is held every year, the newly enrolled technicians will get the trainings.

2.3.15 Community Employment Opportunities (G3.10)

The project mobilized the participation of almost the entire village communities, including women, minorities and the poor providing to everyone with equal opportunities to get a job.

During the implementation of the project, the total number of local villagers involved in planting was approximately 19,090, of which 70% were women. All the planting opportunities are provided to the locals preferentially under on one condition that the candidate must be an adult without any disease. However in Guizhou large parts of adult male are working in the developed provinces for higher salary. Hence, women played a big role in the planting of trees. After the planting, they get the payment for the number of trees they planted.



In this picture above, taken by Guanling Forestry Bureau in April 2015, a Buyi woman who is picking water.

As mentioned previously, Guizhou Baiheng also signs long-term part-time employment contracts with 95 skilled technicians from local forestry bureaus and pays 200RMB each technician every month to do the regular monitoring work which is required by of the project. The local forestry bureaus will supplement if there are any part-time technicians terminate the contract or get retired.

2.3.16 Relevant Laws and Regulations Related to Worker's Rights (G3.11)

The local people were under the protection of *Labor Law of the People's Republic of China* and no forced labour is forbidden, and they are free to establish and join any labor organizations as they wish. In addition, by posting the labor law propaganda materials in the village, the villagers are aware of their right to participate in labor.

2.3.17 Occupational Safety Assessment (G3.12)

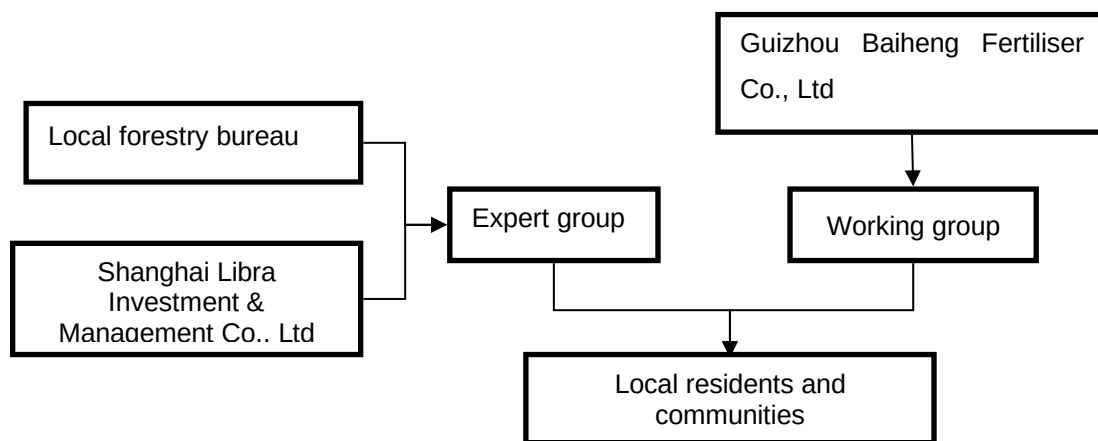
The project proponent has referenced Safety and Healthy in Forestry Work published by ILO and Labor Law of the People's Republic of China and adapted them to meet the local conditions to ensure workers' health and safety. The workers' health and safety policy, including items covering the health insurance scheme for workplace accidents and evacuation plans is made available for workers and implemented by the village committee.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

The Project Management Offices (PMOs) that have been established by the project proponent will be responsible for coordinating the project participants and providing technical services.

The local Forestry bureau will provide technical advice and training to technicians and project entity staff to measure and monitor actual greenhouse gas removals and leakages from proposed project activities. Shanghai Libra Investment & Management Co., Ltd has relevant experience in implementing carbon emission projects, and has set up a project expert group with relevant technical personnel from the forestry bureau to manage the project.



2.4.2 Required Technical Skills (G4.2)

The project requires technical skills of community engagement, biodiversity assessment and carbon measurement and monitoring in order to implement the project activities. Table below outlines the skills required per project activity.

Table 2-2 Key skills required to implement the project activities

Project Activity	Sub-project Activity	Key Skills Required
Carbon stock measurements and monitoring	Aboveground and belowground biomass measurement, land cover mapping, subsidence monitoring, climate monitoring, biodiversity monitoring, community monitoring, and fire monitoring.	forestry, GIS/ remote sensing, forest inventories, statistics, forest fire management and carbon monitoring, reporting, and verification (MRV)
Community engagement and development	Stakeholder consultation, livelihood development, and education program.	Community organizing, conflict resolution, business management, adult education, livelihoods and social science surveys.
Biodiversity assessment and monitoring	Habitat conservation and management and biodiversity monitoring	Forest conservation, conservation biology, and biodiversity monitoring

2.4.3 Management Team Experience (G4.2)

As mentioned above, the local forestry bureaus and Shanghai Libra Investment & Management Co., Ltd. will play as the expert group (Management team) which is in charge of guiding and coordinating the project's overall implementation and decision-making.

Forestry bureaus already set up an expert pool on the land, soil, vegetation, animals and other natural resources affected by forests. Besides, forestry bureaus fed massive data to the biodiversity report and the experts from that pool will provide assistance and share experience during the biodiversity monitoring.

The project proponent Guizhou Baiheng Fertiliser Co., Ltd. has rich experience in forest management in Guizhou Province, including artificial afforestation, forest protection and management, forest damage control and technical training.

Shanghai Libra Investment & Management Co., Ltd. is experienced in carbon measurement and monitoring. In the past, Libra has successfully developed many different carbon projects in China, including validation and verification under GS, VCS and CDM standard. The experience will help the project proponent to ramp up the capability of project implementing and management.

2.4.4 Project Management Partnerships/Team Development (G4.2)

Guizhou Baiheng, Shanghai Libra and Forest bureau are the management team experience in forest project management and carbon project development.

Guizhou Baiheng as a agricultural product seller is full of experience on communication with villagers and technicians. They also have a team to do the research on seed cultivation under different climate. Guizhou Baiheng has field teams in the project zone to keep a good relationship and communication with local villagers.

Forestry Bureau provide instruction of afforestation and forest management, conduct the specific supervision of the implementation. The local forestry bureau and local governments would provide technical support for forest management.

Shanghai Libra has already registered over 100 carbon credits projects including CDM, VCS and Chinese CCER projects. It is a professional carbon credit project consultant with mature experience on developing and monitoring the project.

2.4.5 Financial Health of Implementing Organization(s) (G4.3)

The project participants are all legally registered company in China, and according to the public information listed in National Enterprise Credit Information Publicity System, none of them were involved in nor complicit in any form of corruption such as bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion. For more information, please refer to Section 2.1.3 and 2.1.4.

2.4.6 Avoidance of Corruption and Other Unethical Behavior (G4.3)

In the institutional policy, in its code of ethics, all types of acts of corruption such as bribery, embezzlement, fraud, favoritism, patronage, nepotism, extortion, and collusion are rejected.

2.4.7 Commercially Sensitive Information (Rules 3.5.13 – 3.5.14)

None of the project documents will be considered as commercially sensitive information, and all of the documentations are available to any stakeholders.

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

According to the "Constitution of the People's Republic of China" and the "Forest Law of the People's Republic of China", the land is village collective property. Local villagers have the right to use the land within the project boundary. The number of the land owners is so big that they authorized Guizhou Baiheng as project proponent. The project proponent and forestry department are responsible for the comprehensive implementation and management of the project.

The local government proved that the land belongs to all the villagers so no one can encroach as private property and change the land usage. No matter whether the afforestation project applied for VCS project or not the land is village collective property. The local government is responsible for all local villagers if there is anything relating to the encroachment of the locals' rights to the land.

2.5.2 Recognition of Property Rights (G5.1)

The ownership of the forest land of the afforestation project belongs to the village collective, and the right to use the forest land belongs to the villagers. The land is a barren hill suitable for planting trees. Since these lands are all legal forestry land, the ownership is clear, and there is no dispute over land ownership in the project site.

Furthermore, they also have right to authorize Guizhou Baiheng as a representative of project owner and Guizhou Baiheng only has all right related to carbon sink project including decide which kind of carbon credit project to develop, who to sell, selling price etc²⁷.

2.5.3 Free, Prior and Informed Consent (G5.2)

Prior to the project initiation, all of the project land are collective-owned by local villagers. In September 2013, the project participant and both Xixiu & Guanling Forest Bureau held a consultant meeting with local village committees during the PRA survey before the project start. PRA surveys and stakeholder meetings collected stakeholders' opinions on project design and their willingness to participate. More details is described in section 2.3.7.

To make sure the successful development of the project, Guizhou Baiheng Fertiliser Co., Ltd. and the village collective which had the ownership of forest land had signed a carbon sink afforestation cooperation and development agreement, which clarifies the forest land rights by all parties during the project crediting period. So the project will not encroach on private property, community property or government property.

The project documents on information of the project such as the nature, size, pace, the scope of the project, the reason for it, and its duration are presented in native language to villagers.

2.5.4 Property Rights Protection (G5.3)

Prior to the project implementation, the project area is mainly barren land, villagers voluntarily use these lands to plant trees, therefore the project activities will not lead to involuntary removal or relocation of

²⁷ Source: carbon sink project cooperation agreement signed between village committee and Guizhou Baiheng

property rights holders from their lands or territories, and does no force rights holder to relocate activities important to their culture or livelihood²⁸.

2.5.5 Illegal Activity Identification (G5.4)

Under current law of China, any illegal logging activities will be fined or sentenced to punishment. Currently all project lands are defined for forestry purpose by local government. Deforestation must be carried on under the approval of local Forestry Bureau, and the forests are nursed by project staff regularly as a result of the implementation of the project, routing inspected by forest police, so there will not be illegal deforestation. If there is any illegal deforestation happened, it will be punished based on Chinese law--“Forest Law” published in 1984. The project benefits are gained from legal activities. Therefore, the project’s climate, community and biodiversity impacts will not be affected by the illegal activities

2.5.6 Ongoing Disputes (G5.5)

As the project proponent signed a carbon sink project cooperation agreement with the village committees, the forest land was developed reasonably and legally, meanwhile, there is no ongoing disputes have been informed about to the project developer during stakeholders meetings.

2.5.7 National and Local Laws (G5.6)

The project conforms to all kinds of regulations in the forestry field, as listed below:

PRC Constitution, PRC Forest Law, PRC Forest Law Implementing Regulations, PRC Wildlife Protection Law, Forest Fire Prevention Regulations, Insect Control Regulation, PRC Production Safety Law, PRC Labor Law;

Technology regulation of national ecological public welfare forest construction;

Inspection and acceptance regulation of ecological public welfare forest construction;

The main provisions of technical design and investigation of forest resources;

Measurement and monitoring guide to afforestation project carbon sinks;

Design code for afforestation operation;

Technical specification for afforestation;

²⁸ Evidence on carbon sink project cooperation agreement signed between village committee and Guizhou Baiheng

Regulations for tending of forest;

The planning and design principles of ecological public welfare forest construction;

Seedling quality classification of main afforestation tree species.

According to the Inspection and Acceptance Report of the project, the project has complied with the above regulations and laws during construction period and will be under regular inspection by local government during the implementation period to ensure the continuous compliance.

2.5.8 Approvals (G5.7)

The forestry bureau of Anshun approved the operational design of the afforestation project on 17-02-2014.

2.5.9 Project Ownership (G5.8)

According to the "Constitution of the People's Republic of China" and the "Forest Law of the People's Republic of China", the land is village collective property. Local villagers have the right to use the land within the project boundary, and the project proponent and forestry department are responsible for the comprehensive implementation and management of the project.

2.5.10 Management of Double Counting Risk (G5.9)

This project will not seek to generate or has received any form of environmental or social credit.

2.5.11 Emissions Trading Programs and Other Binding Limits

The project is not involved in an emission trading program or any other mechanism that includes GHG allowance trading.

2.5.12 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit.

2.5.13 Participation under Other GHG Programs

The project has not been registered, or is seeking registration under any other GHG programs.

2.5.14 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG programs.

2.5.15 Double Counting (G5.9)

The credits generated from the project will be sold as offsets on VCS registry, the series number of the issued credits can be tracked to avoid any potential double counting.

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology

Consolidated afforestation and reforestation baseline and monitoring methodology AR-ACM0003/Version 2.0.0 “Afforestation and reforestation of lands except wetlands” is applied.

<http://cdm.unfccc.int/methodologies/DB/C9QS5G3CS8FW04MYXDFQDPXWM4OE>

The following methodological tools, to which the selected methodology refers to, are used:

Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version 01)

- Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2).

3.1.2 Applicability of Methodology

Consolidated afforestation and reforestation baseline and monitoring methodology AR-ACM0003/Version 2.0.0 “Afforestation and reforestation of lands except wetlands” is applicable under the following conditions:

- a) The land subject to the project activity does not fall in wetland category.
- b) Soil disturbance attributable to the project activity does not cover more than 10 per cent of area in each of the following types of land, when these lands are included within the project boundary:
 - i. Land containing organic soils.

The soil disturbance due to this project is in line with the requirements of soil and water conservation. Afforestation density was 3,100 plant/Ha, soil disturbance area ratio was 4.96%²⁹, less than 10%, and there was no repeated disturbance.

²⁹ Proportion of soil disturbed area: $0.16 \text{ m}^2 \times 3100 / 10000 \text{ m}^2 = 4.96\%$, 0.16 m^2 was derived from the surface area calculated from the specification of artificial afforestation cavities in the Project Design (40cm*40cm)

- ii. Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in Appendix 1 and Appendix 2 in the methodology.

The afforestation plot of this project belongs to the forestry land stipulated by the state, and there is no agricultural activity before or after the afforestation activity of this project; therefore, there is no situation where existing agricultural activities have been transferred.

Therefore, AR-ACM0003 (Version 2.0.0) is applicable for the proposed project.

Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version 01) is applicable under the following conditions:

- a) Forestation of the land within the proposed project boundary performed with or without being registered as the VCS project activity shall not lead to violation of any applicable law even if the law is not enforced.

Forestation of the land within the project boundary does not lead to violation of any applicable law.

- b) The tool is not applicable to small-scale afforestation and reforestation project activities.

The proposed project is large-scale afforestation project.

Therefore, combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version 01) is applicable for the proposed project.

Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2) has no internal applicability conditions.

3.1.3 Project Boundary

The boundaries are the administrative boundaries of villages and forest farm, which is illustrated from Figure 1 before. The project location has the following qualifications:

- All the project plots were not forestry land on January 1st 2000 and even before.
- The afforestation land ownership is clear.
- The project is aiming to protect local biodiversity, mitigate water and soil erosion, and stimulate the development of local economy.

Source		Gas	Included?	Justification/Explanation
Baseline	Above-ground biomass	CO ₂	Yes	This is the major carbon pool subjected to project activity
		CH ₄	No	Not included in carbon pool
		N ₂ O	No	Not included in carbon pool
	Below-ground	CO ₂	Yes	Carbon stock in this pool is expected to

Source		Gas	Included?	Justification/Explanation
	biomass			increase due to the implementation of the project activity
		CH ₄	No	Not included in carbon pool
		N ₂ O	No	Not included in carbon pool
	Dead wood Litter and Soil organic carbon	CO ₂	No	Insignificant and exclusion is conservative.
		CH ₄	No	Not included in carbon pool
		N ₂ O	No	Not included in carbon pool
Project	Above-ground biomass	CO ₂	Yes	This is the major carbon pool subjected to project activity
		CH ₄	No	Not included in carbon pool
		N ₂ O	No	Not included in carbon pool
	Below -ground biomass	CO ₂	Yes	Carbon stock in this pool is expected to increase due to the implementation of the project activity
		CH ₄	No	Not included in carbon pool
		N ₂ O	No	Not included in carbon pool
	Burning of woody biomass	CO ₂	No	CO ₂ emissions due to burning of biomass are accounted as a change in carbon stock
		CH ₄	Yes	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology
		N ₂ O	Yes	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology

3.1.4 Baseline Scenario

The baseline scenario is defined by using “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” (Version 01).

STEP 0. Preliminary screening based on the starting date of the A/R project activity

The project start date is 01/04/2014, when the activities that lead to the generation of GHG emission removals were first implemented. The planting activity was conducted from April 2014 to November 2015,

According to the Project Design for Afforestation Operation, before the project implementation, the local Forest bureau has seriously considered the incentive from carbon trading, which also has been confirmed by the Project Approval.

STEP 1. Identification of alternative land use scenarios to the proposed A/R CDM project activity

Sub-step 1a. Identify credible alternative land use scenarios to the proposed project activity

According to additionality tool, the alternative land use scenario of the proposed project includes:

1. Continuation of pre-project land use (i.e. Lands remain barren.)
2. Agricultural use of the land
3. Forestation of the land within the project boundary without being registered as the VCS project

In identification of the alternative land use scenario, field survey and data from the local forestry bureau has been applied. The identified scenarios are deemed realistic and credible.

Sub-step 1b: Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations

National, local and sectoral land-use policies or regulations since 1980s are listed below:

China has successively issued and revised a series of laws and administrative regulations related to forestry, such as the Regulations for Implementing the Forest Law, the Regulations for Grain for Green, the Regulations for the Protection of Wild Plants and Animals, the Regulation for Nature Reserve, the Regulation for Forest Fire Control, and the Regulation for Forest Diseases and Pests Control, etc.

To facilitate the restoration of forest resources, Chinese government has launched several programs over the past years, such as the Grain for Green Program (started in 2001) that subsidizes farmers to convert degraded cropland to forests, the Natural Forest Conservation Program (launched in 1998), the Nature Reserve Development and Wild Conservation Program (started in 2000), etc.

Although these programs had set overall development goals for forestry development and were started before the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001), none of the programs mandate the forestation on barren lands. Moreover, these programs have not been written in laws. Whether these programs can meet the initial targets highly depends on whether the program is fully funded, but the funding gap is very big. Thus, the project activity can hardly get any subsidy from the government. Thus Scenario 1 remains possible baseline scenario.

The afforestation activity location is legally defined as forestry land. Farming and grazing is not allowed in these plots. Thus the second scenario “agricultural use of land” is not feasible.

Scenario 3 faces the investment and technical barrier which will be discussed in the next section. However it does not violate any existing enforced mandatory applicable laws and regulations.

In sum, scenario 1 and 3 are in compliance with mandatory legislation and regulations.

STEP 2. Barrier analysis

Sub-step 2a: Identification of barriers that would prevent the implementation of at least one alternative land use scenario

1. Investment barrier

Debt funding not available for the land use scenarios. Commercial loan from banks for the purpose of afforestation is very unlikely due to the high risk and the economical unattractiveness in the context of remote lands.

In addition, no credit mechanisms are in place for farmers to make long term investment in plantation forestry. The community baseline survey by GASS in 2014 shows that villagers the project area average annual income of 2700-3500 yuan/year, and according to the 2013 Statistical Report on the National Economic and Social Development of Anshun City, the per capita income of rural villagers is 5,801 yuan/year³⁰, The income of villagers in the project area is lower than the general level of local townships and counties.

Therefore, there would be no direct revenue from the implementation of the afforestation project expect for environmental and ecological benefits, this project definitely has the financial barrier.

2. Technological barriers

The project is located in Xixiu District and Guanling County. It is hard for them to register their afforestation projects as individual projects and apply for financial support. So these villagers were gathered up by Guizhou Baiheng and signed contracts with Guizhou Baiheng, and Guizhou Baiheng, then represented these local villagers to sign contracts with consulting firm (Shanghai Libra in this project) Therefore, although the forest companies and organizations are project proponents, local villagers are actually the project participants who planted trees and enjoyed the benefits thereafter.

Local villagers lack access to good quality saplings or seedlings as well as the necessary tending and forest management technique. They also lack the skills needed to produce high quality seedlings and successful tree planting, and lack the skills needed to prevent planted trees from being subject to fire, pest and disease attack. In addition, the lack of organizational instruments also prevents them from overcoming technological barriers.

The technical barriers are summarized as 1) lack of access to planting materials; 2) lack of silvicultural and forest management technology; and 3) lack of skilled or properly trained labor force. If planting trees within the project boundary without registration as a VCS project (scenario 3), these technical barriers would be applied to the local villagers, and lead to the failure of the project.

Guizhou Baiheng invited local villagers to discuss whether a not to registered the project as a VCS project. The locals agreed to register the project as a VCS project and apply for additional carbon fund, they also agreed to Guizhou Baiheng to being their representatives. After which Guizhou Baiheng worked with the Shanghai Libra Investment & Management Co., Ltd to come up out better implementation plan for the

³⁰ http://www.anshun.gov.cn/zfsj/sjkt/tjgb/201807/t20180712_3418079.html, Anshun's 2013 Economic and Social Development Statistics, Anshun Government

project, and help local villagers to conduct the planting activity better. Without applying for VCS, local villagers would face the above-mentioned technical barriers.

Sub-step 2b: Elimination of land use scenarios that are prevented by the identified barriers.

Scenario 1 does not require extra investment or labor force. Thus it is not prevented by any of the identified barriers.

Scenario 2 faces the investment and technical barriers.

In sum, Scenario 2 is not feasible. Scenario 1, continuation of pre-project use (i.e. lands remain barren), remains the possible baseline scenario.

STEP 3. Investment analysis (if needed)

Scenario 1 remains the only possible baseline scenario, which makes investment analysis not necessary.

STEP 4. Common practice analysis

Only converting farmland to forest is eligible for the subsidy. Planting activities that changing barren land such as this project is not eligible for the subsidy. Different from forestry in other provinces, forest in Guizhou Province is mainly Public welfare forest and stone desertification control forest land³¹.

There were some afforestation and reforestation in the project regions on lands similar to the degraded lands of the proposed A/R CDM project activity, but this in small scales. In Guizhou Province, the afforestation activities were mainly established several years ago by a small number of relatively wealthy communities and villagers at a time when there were not many alternative investment opportunities³². As it was not profitable and there was little market incentive, the activities could not be extended by investors. As the forestry industry has developed rapidly in recent years in Guizhou and the cost of labour and planting materials including seedling and fertilizers has increased significantly, the villagers and forest companies turn to plant short-rotation and fast-growth species in accessible areas rather than planting long-term local species in remote, degraded land, which is not economically attractive, due to slow tree growth, low land productivity and high transportation costs. Also, in recent years, large increases in the price of seedling and fertilizers, as well as the cost of labor, has greatly reduced the expected economic return.

All the above reasons explain that it is very difficult to conduct afforestation activity in project zone. So that's why there is no similar afforestation activity in the Guizhou Province. Since there is no similar afforestation activity within the common practice boundary, there is no need to conduct common practice analysis for this project. No similar projects in Guizhou Province have successfully applied for CDM projects or CCER projects.

Thus, the proposed project is not a common practice.

³¹ http://www.gywb.cn/content/2014-12/10/content_2003257.htm, News on Guizhou Forestry Ecology Bottomline, Qianzhong Morning News

³² <http://gzrb.gog.cn/system/2015/02/15/014118852.shtml>

3.1.5 Additionality

Additionality has been fully analyzed in the above section 3.1.4 Baseline Scenario with “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” (Version 01).

Based on above demonstration, the proposed project is additional.

3.1.6 Methodology Deviations

No deviations from the procedures indicated by the methodology have been made.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

As described above, the baseline scenario is the continuation of existing land use i.e. lands remain barren. Based on the applied methodology AR-ACM0003 (Version 2.0.0), the baseline net GHG removals by sinks is estimated as follows:

$$\Delta C_{BSL,t} = \Delta C_{TREE_BSL,t} + \Delta C_{SHRUB_BSL,t} + \Delta C_{DW_BSL,t} + \Delta C_{LI_BSL,t} \quad (1)$$

Where:

$\Delta C_{BSL,t}$	=	Baseline net GHG removals by sinks in year t; t CO ₂ -e
$\Delta C_{TREE_BSL,t}$	=	Change in carbon stock in baseline tree biomass within the project boundary in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO ₂ -e
$\Delta C_{SHRUB_BSL,t}$	=	Change in carbon stock in baseline shrub biomass within the project boundary, in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO ₂ -e
$\Delta C_{DW_BSL,t}$	=	Change in carbon stock in baseline dead wood biomass within the project boundary, in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO ₂ -e
$\Delta C_{LI_BSL,t}$	=	Change in carbon stock in baseline litter biomass within the project boundary, in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO ₂ -e

With baseline scenario, dead wood biomass and litter biomass would not be changed by local villagers. All the plots in Xixiu District and Guanling County had been barren and do not change after 1970s and before the project. Thus, the change in carbon stock in baseline dead wood biomass and litter biomass can be negligible.

According to Participatory Rural Appraisal (PRA) Report of the project, most of the project area are bare land with very little grasses, therefore changes in carbon stocks in trees and shrubs in the baseline can be accounted as zero based on the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”.

For simplicity, the baseline net GHG removal by sinks is considered to be 0 tCO₂-e.

3.2.2 Project Emissions (Actual net GHG removals by sinks)

According to the applied methodology AR-ACM0003 (Version 2.0.0), GHG emissions resulting from removal of herbaceous vegetation, combustion of fossil fuel, fertilizer application, use of wood, decomposition of litter and fine roots of N-fixing trees, construction of access roads within the project boundary, and transportation attributable to the project activity shall be considered insignificant and therefore accounted as zero.

The actual net GHG removals by sinks shall be calculated as the sum of the changes in carbon stocks in the project minus the increase in non-CO₂ GHG emissions within the project boundary, which is shown as follows:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t} \quad (2)$$

Where:

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year t ; t CO₂-e

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t ; t CO₂-e

$GHG_{E,t}$ = Increase in non-CO₂ GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year t , as estimated in the tool “Estimation of non-CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity”; t CO₂-e

According to the tool, the use of fire for site preparation and/or to clear the land of harvest residue prior to replanting is specifically excluded from the project management and therefore non-CO₂ GHG emissions are estimated as zero.

$$GHG_{E,t} = 0$$

Change in the carbon stocks in project, occurring in the selected carbon pools in year t shall be calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t} + \Delta C_{SHRUB_PROJ,t} + \Delta C_{DW_PROJ,t} + \Delta C_{LI_PROJ,t} + \Delta SOC_{AL,t} \quad (3)$$

Where:

$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; t CO ₂ -e
$\Delta C_{TREE_PROJ,t}$	=	Change in carbon stock in tree biomass in project in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO ₂ -e
$\Delta C_{SHRUB_PROJ,t}$	=	Change in carbon stock in shrub biomass in project in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO ₂ -e
$\Delta C_{DW_PROJ,t}$	=	Change in carbon stock in dead wood in project in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO ₂ -e
$\Delta C_{LI_PROJ,t}$	=	Change in carbon stock in litter in project in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO ₂ -e
$\Delta SOC_{AL,t}$	=	Change in carbon stock in SOC in project, in year t, in areas of land meeting the applicability conditions of the tool “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities”, as estimated in the same tool; t CO ₂ -e

For conservativeness, only change in carbon stock in tree biomass of project will be considered. Therefore, the above equation can be simplified as:

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t} \quad (4)$$

And the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activity” (Version 04.2) is used to estimate the change in carbon stock above the ground. According to the tool, change in carbon stock in trees between two points of time is estimated by using one of the following methods or a combination thereof:

- (a) Difference of two independent stock estimations;
- (b) Direct estimation of change by re-measurement of sample plots;
- (c) Estimation by proportionate crown cover;

(d) Demonstration of “no-decrease”.

Method (b) is efficient when there is a significant correlation between the plot biomass values on the two occasions (e.g. when there has been no harvest or disturbance in a stratum and therefore no significant spatial re-distribution of biomass has occurred in the stratum after the first estimation) For the project, there will be no harvest or disturbance during the project period, thus Method (b) should be selected to be selected, but this method is applicable only in ex-post estimation of change in carbon stock in trees for monitoring of project activities. Therefore, Method (a) is used for the ex-ante estimation during validation, and method (b) will be used in the monitoring of the following verification.

Under Method (a), the change in carbon stock in trees and the associated uncertainty are estimated as follows:

$$\Delta C_{TREE} = C_{TREE,t1} - C_{TREE,t2} \quad (5)$$

$$u_{\Delta C} = \frac{\sqrt{(u_1 \times C_{TREE,t1})^2 + (u_2 \times C_{TREE,t2})^2}}{|DC_{TREE}|} \quad (6)$$

Where:

ΔC_{TREE}	=	Change in the carbon stocks in trees during the period between two points of time t1 and t2; t CO ₂ -e
$C_{TREE,t1}$	=	Carbon stock in trees as estimated at time t1; t CO ₂ -e
$C_{TREE,t2}$	=	Carbon stock in trees as estimated at time t2; t CO ₂ -e
$u_{\Delta C}$	=	Uncertainty in ΔC_{TREE}
u_1, u_2	=	Uncertainties in $C_{TREE,t1}$ and $C_{TREE,t2}$ respectively

Carbon stock in trees at a point of time is estimated by using one of the following methods or a combination thereof:

- (a) Estimation by measurement of sample plots;
- (b) Estimation by modelling of tree growth and stand development;
- (c) Estimation by proportionate crown cover;
- (d) Updating the previous stock by independent measurement of change.

For the project, Method (b) is used for the ex-ante estimation during validation.

According to the Tool, under Method (b), existing data are used in combination with tree growth models to predict the growth of trees and the development of the tree stand over time, and ex-ante estimation (projection) of carbon stock in tree biomass is not subjected to uncertainty control. Stand parameters such as stocking (e.g. number of stems per hectare or basal area per hectare), age-class structure, and species composition at different points of time are simulated from assumed (planned) tree planting and management practices (e.g. planting density, survival rate, thinning and pruning operations and their timing).

Tree growth (e.g. diameter or height increment) is simulated by taking into account local tree-growth data from past experience (e.g. age-diameter curves, yield tables, yield curves) while also considering relevant site factors (e.g. soil, terrain, slope, aspect, precipitation) and stand parameters.

For the project, the growth curve equations are used to estimate the average volume of one tree, and the carbon stock in trees in the tree biomass estimation strata is estimated as follows:

$$C_{TREE,i,j} = \sum_{i,j} A_i \times N_{i,j} \times \frac{44}{12} \times CF_{TREE,j} \times B_{TREE,j} \quad (7)$$

$$B_{TREE,j} = V_{TREE,j} \times D_j \times BEF_j \times (1 + R_j) \quad (8)$$

Where:

$C_{TREE,i,j}$	=	Carbon stock in trees of tree species j of strata i ; t CO ₂ -e
A_i	=	Area of strata i ; Mu
$N_{i,j}$	=	Number of the tree species j of strata i ; trees/ha
$CF_{TREE,j}$	=	Carbon fraction of tree biomass for tree species j ; t C/t d.m.
$B_{TREE,j}$	=	Biomass of one tree of tree species j ; t d.m.
$V_{TREE,j}$	=	Stem volume of one tree of tree species j ; t d.m.
D_j	=	Density of tree species j ; t d.m/m ³
BEF_j	=	Biomass expansion factor for conversion of tree stem biomass to above-ground tree biomass, for tree species j ; dimensionless
R_j	=	Root-shoot ratio for tree species j ; dimensionless

Research Progress of Production Equations of Masson Pine, Chinese Fir and Slash Pine in Northwest A&F University and Study on biomass growth rule and forest biomass change of main

vegetation types in Banqiao river small watershed at the early stage of governance [Guizhou forestry science and technology, 1991, vol. 19, no. 4] page 24.

For the ex-post estimation during the following verification, the allometric equations of each tree species will be used to calculate the stem volume, and the allometric equation used will be demonstrated to be appropriate for the purpose of estimation of tree biomass by applying the tool “Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities” in project monitoring report.

Referring to equation (12), (13) and (14) in the Tool, the mean carbon stock in trees within the tree biomass estimation strata is estimated as follows:

$$C_{TREE,i,j} = \sum_{i,j} A_i \times N_{i,j} \times \frac{44}{12} \times CF_{TREE,j} \times B_{TREE,j} \quad (9)$$

And the biomass of tree is estimated as follows by referring to equation (5) in Appendix 1 of the Tool:

$$B_{TREE,j} = V_{TREE,j} \times D_j \times BEF_j \times (1 + R_j) \quad (10)$$

Where:

$C_{TREE,i,j}$	=	Carbon stock in trees of tree species j of strata i ; t CO ₂ -e
A_i	=	Area of strata i ; Mu
$N_{i,j}$	=	Number of the tree species j of strata i ; trees/ha
$CF_{TREE,j}$	=	Carbon fraction of tree biomass for tree species j ; t C/t d.m.
$B_{TREE,j}$	=	Biomass of one tree of tree species j ; t d.m.
$V_{TREE,j}$	=	Stem volume of one tree of tree species j ; m ³ .
D_j	=	Density of tree species j ; t d.m/m ³
BEF_j	=	Biomass expansion factor for conversion of tree stem biomass to above-ground tree biomass, for tree species j ; dimensionless
R_j	=	Root-shoot ratio for tree species j ; dimensionless

The tree species adopted in the project are China fir and Cypress. Local growth curves are used to estimate the average merchantable volume of one tree ($V_{TREE,j}$)

<i>China fir</i> ³³	$V=0.1962(1-e^{-0.08A})^{3.9012}$
<i>cypress</i> ³⁴	$V=0.20420(1-e^{-0.05A})^{4.66995}$

Where,

V_{it} = average merchantable volume of one tree in category i , at time t ; m^3 /tree

A – stand age, year

Wood density (D), biomass expansion factor (BEF), root-shoot ratio and carbon fraction for China fir and Cypress are listed in the below.

Table 3-1 Wood density, BEF, Root-shoot ratio and carbon fraction used in the proposed project activity

Parameter	factor	Source	factor	Source
Wood density (tonnes d.m.m-3)	0.307	The tree species involved in the proposed project can be obtained from the table using the values in the second national bulletin on climate change of the People's Republic of China "list of land-use change and forest greenhouse gases"	0.478	The tree species involved in the proposed project can be obtained from the table using the values in the second national bulletin on climate change of the People's Republic of China "list of land-use change and forest greenhouse gases"
BEF	1.634		1.732	
Root-shoot ratio	0.246		0.220	
CF	0.520		0.510	

According to the growing years of the description of the project activity, the above ground biomass can be categorized six stratification.

Table 3-2 Project Stratification of Cypress and China fir

Project Stratifications number	Category of tree	Plant site	Tree number per ha in category	Year to plant	Area (ha)
Proj -1	China fir	Xixiu District	3100	2014	10000
Proj -2	China fir	Xixiu District	3100	2015	134
Proj -3	Cypress	Xixiu District	3100	2014	4000
Proj -4	China fir	Guanling	3100	2014	10666

³³ Research Progress of Production Equations of Masson Pine, Chinese Fir and Slash Pine in Northwest A&F University.

³⁴ Study on biomass growth rule and forest biomass change of main vegetation types in Banqiao river small watershed at the early stage of governance [Guizhou forestry science and technology, 1991, vol. 19, no. 4] page 24.

		County			
Proj -5	Cypress	Guanling County	3100	2015	200
Proj -6	Cypress	Guanling County	3100	2014	449

Table 3-3 Number of trees per hectare for the six stratifications

Time year	Proj-1 No. of trees	Proj-2 No. of trees	Proj-3 No. of trees	Proj-4 No. of trees	Proj-5 No. of trees	Proj-6 No. of trees
01/04/2014-31/03/2015	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2015-31/03/2016	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2016-31/03/2017	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2017-31/03/2018	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2018-31/03/2019	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2019-31/03/2020	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2020-31/03/2021	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2021-31/03/2022	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2022-31/03/2023	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2023-31/03/2024	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2024-31/03/2025	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2025-31/03/2026	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2026-31/03/2027	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2027-31/03/2028	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2028-31/03/2029	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2029-31/03/2030	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2030-31/03/2031	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2031-31/03/2032	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2032-31/03/2033	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2033-31/03/2034	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2034-31/03/2035	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2035-31/03/2036	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2036-31/03/2037	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2037-31/03/2038	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2038-31/03/2039	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2039-31/03/2040	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900

01/04/2040-31/03/2041	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2041-31/03/2042	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2042-31/03/2043	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900
01/04/2043-31/03/2044	31,000,000	415,400	12,400,000	33,064,600	620,000	1,391,900

Taking all the above information into the formula, we reach the table below.

Table 3-4 The GHG Removals by Sinks of the Project Activity

Year	Estimated annual project removals of Proj-1 (tCO ₂ e)	Estimated annual project removals of Proj-2 (tCO ₂ e)	Estimated annual project removals of Proj-3 (tCO ₂ e)	Estimated annual project removals of Proj-4 (tCO ₂ e)	Estimated annual project removals of Proj-5 (tCO ₂ e)	Estimated annual project removals of Proj-6 (tCO ₂ e)	Estimated total annual project removals (tCO ₂ e)
01/04/2014-31/03/2015	15751	0	432	16800	0	48	33031
01/04/2015-31/03/2016	25947	211	1048	27675	21	118	55020
01/04/2016-31/03/2017	44296	347	2270	47246	53	254	94466
01/04/2017-31/03/2018	65555	594	4110	69921	113	462	140755
01/04/2018-31/03/2019	88225	878	6598	94101	206	741	190749
01/04/2019-31/03/2020	110983	1182	9719	118374	329	1090	241677
01/04/2020-31/03/2021	132762	1488	13421	141605	486	1507	291269
01/04/2021-31/03/2022	152771	1779	17628	162945	671	1979	337773
01/04/2022-31/03/2023	170468	2047	22249	181821	882	2497	379964
01/04/2023-31/03/2024	185537	2284	27181	197894	1112	3051	417059
01/04/2024-31/03/2025	197837	2486	32320	211012	1359	3628	448642
01/04/2025-31/03/2026	207365	2651	37568	221176	1616	4217	474593

01/04/2026- 31/03/2027	214224	2779	42827	228492	1879	4807	495008
01/04/2027- 31/03/2028	218587	2871	48014	233144	2141	5390	510147
01/04/2028- 31/03/2029	220671	2929	53050	235368	2401	5955	520374
01/04/2029- 31/03/2030	220724	2957	57874	235424	2652	6496	526127
01/04/2030- 31/03/2031	218997	2957	62428	233583	2894	7008	527867
01/04/2031- 31/03/2032	215748	2935	66671	230117	3121	7484	526076
01/04/2032- 31/03/2033	211219	2891	70570	225286	3334	7921	521221
01/04/2033- 31/03/2034	205639	2830	74100	219334	3528	8318	513749
01/04/2034- 31/03/2035	199219	2756	77246	212488	3705	8671	504085
01/04/2035- 31/03/2036	192151	2669	80003	204947	3863	8980	492613
01/04/2036- 31/03/2037	184600	2575	82367	196895	4000	9246	479683
01/04/2037- 31/03/2038	176720	2474	84343	188490	4118	9467	465612
01/04/2038- 31/03/2039	168635	2368	85941	179866	4217	9647	450674
01/04/2039- 31/03/2040	160458	2260	87174	171144	4297	9785	435118
01/04/2040- 31/03/2041	152278	2150	88057	162420	4359	9885	419149
01/04/2041- 31/03/2042	144176	2040	88611	153778	4403	9946	402954
01/04/2042- 31/03/2043	136213	1932	88852	145285	4431	9974	386687
01/04/2043- 31/03/2044	128439	1825	88804	136993	4442	9968	370471

3.2.3 Leakage

According to the applied methodology AR-ACM0003 (Version 2.0.0), leakage emission is estimated as follows:

$$LK_t = LK_{AGRIC,t} \quad (11)$$

Where:

LK_t = GHG emissions due to leakage, in year t; tCO₂-e

$LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year t, as estimated in the tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”; tCO₂-e

According to the A/R Methodological tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”, leakage emission resulting from displacement of the activities is composed of decrease in carbon stock in the carbon pools of the land and change in soil organic carbon stock due to land-use change in the land.

$$LK_{AGRIC,t} = \frac{44}{12} \times (DC_{BIOMASS,t} + DSOC_{LUC,t})^{35} \quad (12)$$

Where:

$LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year t; tCO₂-e

$DC_{BIOMASS,t}$ = Decrease in carbon stock in the carbon pools of the land receiving the activity displaced in year t; t d.m

$DSOC_{LUC,t}$ = Change in soil organic carbon (SOC) stock due to land-use change in the land receiving the displaced activity in year t; tC ha

The project was implemented by manual operation, rather than mechanical operation. Besides, no weeding, chopping, pruning, intermediate cutting activities are going to be conducted during the crediting period because of the natural condition, the economic condition and the slow growth pattern. Fertilization and watering are not going to take place, neither. Therefore, there is no expected leakage due to decrease in carbon stock in the carbon pools of the land and change in soil organic carbon stock. In other words, there is no expected leakage due to the displacement of agricultural activity from the project activity.

Therefore, leakage is zero for the proposed project.

3.2.4 Net anthropogenic GHG removals by sinks

The net anthropogenic GHG removals by the project shall be calculated as follows:

³⁵ Equation (1) in page 5 in the A/R Methodological tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity” (Version 02.0)

$$\Delta C_{AR,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t \quad (13)$$

Where:

$\Delta C_{AR,t}$	=	Net anthropogenic GHG removals by sinks, in year t ; t CO ₂ -e
$\Delta C_{ACTUAL,t}$	=	Actual net GHG removals by sinks, in year t ; t CO ₂ -e
$\Delta C_{BSL,t}$	=	Baseline net GHG removals by sinks, in year t ; t CO ₂ -e
LK_t	=	GHG emissions due to leakage, in year t ; t CO ₂ -e

The net anthropogenic GHG removals by the project are summarized below.

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
01/04/2014-31/03/2015	0	33031	0	33031
01/04/2015-31/03/2016	0	55020	0	55020
01/04/2016-31/03/2017	0	94466	0	94466
01/04/2017-31/03/2018	0	140755	0	140755
01/04/2018-31/03/2019	0	190749	0	190749
01/04/2019-31/03/2020	0	241677	0	241677
01/04/2020-31/03/2021	0	291269	0	291269
01/04/2021-31/03/2022	0	337773	0	337773
01/04/2022-31/03/2023	0	379964	0	379964
01/04/2023-31/03/2024	0	417059	0	417059
01/04/2024-31/03/2025	0	448642	0	448642

01/04/2025- 31/03/2026	0	474593	0	474593
01/04/2026- 31/03/2027	0	495008	0	495008
01/04/2027- 31/03/2028	0	510147	0	510147
01/04/2028- 31/03/2029	0	520374	0	520374
01/04/2029- 31/03/2030	0	526127	0	526127
01/04/2030- 31/03/2031	0	527867	0	527867
01/04/2031- 31/03/2032	0	526076	0	526076
01/04/2032- 31/03/2033	0	521221	0	521221
01/04/2033- 31/03/2034	0	513749	0	513749
01/04/2034- 31/03/2035	0	504085	0	504085
01/04/2035- 31/03/2036	0	492613	0	492613
01/04/2036- 31/03/2037	0	479683	0	479683
01/04/2037- 31/03/2038	0	465612	0	465612
01/04/2038- 31/03/2039	0	450674	0	450674
01/04/2039- 31/03/2040	0	435118	0	435118
01/04/2040- 31/03/2041	0	419149	0	419149
01/04/2041- 31/03/2042	0	402954	0	402954
01/04/2042- 31/03/2043	0	386687	0	386687

01/04/2043-31/03/2044	0	370471	0	370471
Total	0	11,652,613	0	11,652,613

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation

Data / Parameter	Ai																																															
Data unit:	ha																																															
Description:	Area of category i																																															
Source of data:	Field measurement																																															
Value applied:	The difference among planting category is sapling size of China fir and cypress. Tree plantation within each category is the same. The area of each category (Ai) is listed below. <table><tr><th>Project Stratifications number</th><th>Category of tree</th><th>Plant site</th><th>Tree number per ha in category</th><th>Year to plant</th><th>Area (ha)</th></tr><tr><td>Proj -1</td><td>China fir</td><td>Xixiu District</td><td>3100</td><td>2014</td><td>10000</td></tr><tr><td>Proj -2</td><td>China fir</td><td>Xixiu District</td><td>3100</td><td>2015</td><td>134</td></tr><tr><td>Proj -3</td><td>Cypress</td><td>Xixiu District</td><td>3100</td><td>2014</td><td>4000</td></tr><tr><td>Proj -4</td><td>China fir</td><td>Guanling County</td><td>3100</td><td>2014</td><td>10666</td></tr><tr><td>Proj -5</td><td>Cypress</td><td>Guanling County</td><td>3100</td><td>2015</td><td>200</td></tr><tr><td>Proj -6</td><td>Cypress</td><td>Guanling County</td><td>3100</td><td>2014</td><td>449</td></tr></table> The total area is 25449 ha.						Project Stratifications number	Category of tree	Plant site	Tree number per ha in category	Year to plant	Area (ha)	Proj -1	China fir	Xixiu District	3100	2014	10000	Proj -2	China fir	Xixiu District	3100	2015	134	Proj -3	Cypress	Xixiu District	3100	2014	4000	Proj -4	China fir	Guanling County	3100	2014	10666	Proj -5	Cypress	Guanling County	3100	2015	200	Proj -6	Cypress	Guanling County	3100	2014	449
Project Stratifications number	Category of tree	Plant site	Tree number per ha in category	Year to plant	Area (ha)																																											
Proj -1	China fir	Xixiu District	3100	2014	10000																																											
Proj -2	China fir	Xixiu District	3100	2015	134																																											
Proj -3	Cypress	Xixiu District	3100	2014	4000																																											
Proj -4	China fir	Guanling County	3100	2014	10666																																											
Proj -5	Cypress	Guanling County	3100	2015	200																																											
Proj -6	Cypress	Guanling County	3100	2014	449																																											
Justification of choice of data or description of measurement methods and procedures applied:	N/A																																															
Purpose of Data	The parameter is used to calculate actual net GHG removals.																																															
Comments	N/A																																															

Data / Parameter	BEF _{2,j}
Data unit	Dimensionless
Description	Biomass expansion factor for conversion of stem biomass to above-ground biomass
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013
Value applied:	See Table 3-1 for details
Justification of choice of data or description of measurement methods and procedures applied	National authority data
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

Data / Parameter	CF _{TREE}
Data unit	t C t ⁻¹ d.m.
Description	Carbon fraction of tree biomass for species or group of species j
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013
Value applied:	See Table 3-1 for details
Justification of choice of data or description of measurement methods and procedures applied	National authority data
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

Data / Parameter	D _j
Data unit	t d.m.m ⁻³
Description	Basic wood density
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013
Value applied:	See Table 3-1 for details
Justification of choice of data or description of measurement methods and procedures applied	National authority data

Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

Data / Parameter	R_j
Data unit	Dimensionless
Description	Root-shoot ratio
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013
Value applied:	See Table 3-1 for details
Justification of choice of data or description of measurement methods and procedures applied	National authority data
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

3.3.2 Data and Parameters Monitored

Data / Parameter	$V_{TREE,j}$; $V_{TREE,l,p,j,i}$
Data unit	m^3
Description	Stem volume of tree species j ; Stem volume of tree l of species j in sample plot p of stratum i
Source of data	Calculated
Description of measurement methods and procedures to be applied	For ex ante estimation, the growth curve (age-volume) equations are used to estimate the stem volume. For the ex-post estimation during the following verification will use allometric equations of each tree species to calculate the stem volume.
Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	Quality control/quality assurance (QA/QC) procedures prescribed under National Forest Inventory are applied. In absence of these, QA/QC procedures from published handbooks or from IPCC GPG LULUCF 2003 may be applied.
Purpose of data	The parameter is used to calculate actual net GHG removals.
Calculation method	For the ex-post estimation during the following verification, using

	allometric equations based on tree dimensions to calculate the stem volume. The tree dimensions usually comprise of height and diameter at breast height.
Comments	N/A

Data / Parameter	$H_{l,p,j,i}$; $DBH_{l,p,j,i}$
Data unit	m; cm
Description	Height of tree l of species j in sample plot p of stratum i ; Diameter at breast height of tree l of species j in sample plot p of stratum i
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. The measure is in line with LY/T 2253-2014 <Guidelines on carbon accounting and monitoring for afforestation project>
Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	Measuring bars, measuring lines, diameter tape, height measuring instrument.
QA/QC procedures to be applied	Quality control/quality assurance (QA/QC) procedures prescribed under National Forest Inventory are applied. In absence of these, QA/QC procedures from published handbooks or from IPCC GPG LULUCF 2003 may be applied. The measure is in line with LY/T 2253-2014 <Guidelines on carbon accounting and monitoring for afforestation project>
Purpose of data	The parameter is used to calculate actual net GHG removals.
Calculation method	These two parameters are used for stem volume calculation of trees in volume equations.
Comments	For the ex-post calculation during the following verification, the allometric equations will be used to calculate the stem volume, and for the purpose of estimation of tree biomass by applying the tool "Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities" in project monitoring report.

Data / Parameter	A_i ; $A_{PLOT,i}$
Data unit	ha

Description	Area of stratum i ; Size of sample plot in stratum i
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	Diameter tape
QA/QC procedures to be applied	<i>The measure is in line with LY/T 2253-2014 <Guidelines on carbon accounting and monitoring for afforestation project></i>
Purpose of data	The parameter is used to calculate actual net GHG removals
Calculation method	N/A
Comments	N/A

Data / Parameter	$N_{i,j}$
Data unit	tree/ha
Description	Number of the tree species j of strata i
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	<i>The measure is in line with LY/T 2253-2014 <Guidelines on carbon accounting and monitoring for afforestation project></i>
Purpose of Data	The parameter is used to calculate actual net GHG removals
Calculation method	N/A
Comments	N/A

3.3.3 Monitoring Plan

Monitoring process

Monitor the applicability conditions listed in methodology and tools have been met

As mentioned in Section 3.1.2, the methodology AR-ACM0003 (version 2.0.0) is applicable under the following conditions:

- a) The land subject to the project activity does not fall in wetland category.
- b) Soil disturbance attributable to the project activity does not cover more than 10 per cent of area in each of the following types of land, when these lands are included within the project boundary:
 - i. Land containing organic soils.
 - ii. Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in Appendix 1 and Appendix 2 in the methodology.

The soil disturbance due to this project is in line with the requirements of soil and water conservation. Afforestation density was 3,100 plant/Ha, soil disturbance area ratio was 4.96%³⁶, less than 10%, and there was no repeated disturbance.

To monitor the applicability conditions, the following steps will be taken:

Method for estimation of the change in carbon stock

As stated in section 3.2.2, the actual net GHG removals by sinks are calculated by the equation (4):

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t}$$

Where:

$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; t CO2-e
$\Delta C_{TREE_PROJ,t}$	=	Change in carbon stock in tree biomass in project in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO2-e

And the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activity" (Version 04.2) is used to estimate the change in carbon stock above the ground, and

³⁶ Proportion of soil disturbed area: $0.16 \text{ m}^2 \times 3100 / 10000 \text{ m}^2 = 4.96\%$. Proportion of soil disturbed area: $0.16 \text{ m}^2 \times 3,100 / 10,000 \text{ m}^2 = 4.96\%$, among them, 0.16 m^2 was derived from the surface area calculated from the specification of artificial afforestation cavities in the Project Design (40cm*40cm)

Method (b) (Direct estimation of change by re-measurement of sample plots) will be applied for the monitoring during the following verification.

Under this method, the change in carbon stock and the associated uncertainty are estimated as follows:

$$\Delta C_{TREE} = \frac{44}{12} \times CF_{TREE} \times \Delta B_{TREE} \quad (14)$$

$$\Delta B_{TREE} = A \times \Delta b_{TREE} \quad (15)$$

$$\Delta b_{TREE} = \sum_{i=1}^M w_i \times \Delta b_{TREE,i} \quad (16)$$

$$u_{\Delta C} = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^M w_i^2 \times \frac{s_{\Delta i}^2}{n_i}}}{|\Delta b_{TREE}|} \quad (17)$$

Where:

ΔC_{TREE}	=	Change in carbon stock in trees between two successive measurements; t CO ₂ -e
CF_{TREE}	=	Carbon fraction of tree biomass; t C/t d.m.
ΔB_{TREE}	=	Change in biomass within the biomass estimation strata; t d.m.
A_i	=	Sum of the area of the biomass estimation strata; ha
Δb_{TREE}	=	Mean change in tree biomass per hectare within the biomass estimation strata; t d.m./ha
w_i	=	Ratio of the area of stratum i to the sum of areas of biomass estimation strata (i.e. $w_i = A_i/A$); dimensionless
$\Delta b_{TREE,i}$	=	Mean change in tree biomass per hectare in strata i; t d.m./ha
$u_{\Delta C}$	=	Uncertainty in ΔC_{TREE}
t_{VAL}	=	Two-sided Student's t-value for a confidence level of 90 per cent and degrees of freedom equal to $n - M$, where n is total number of sample plots within the tree biomass estimation strata, and M is the total number of tree biomass estimation strata
$s_{\Delta i}^2$	=	Variance of mean change in tree biomass per hectare in stratum i; (t d.m. ha-1) ²

n_i = Number of sample plots, in stratum i, in which tree biomass was re-measured

Methods of plot biomass measurement

Tree biomass per hectare in a sample plot is estimated by applying one of the plot measurement methods provided in Appendix 1 of the Tool. For the project, we will choose the measurement of fixed area plots for the calculation.

In this method, sample plots of the same size (e.g. or of a hectare) are installed in a stratum. All trees in a sample plot above a minimum dimension are measured and the biomass of each tree is estimated. The biomass of the individual trees is added and the sum is divided by the area of the sample plot to obtain the plot biomass value.

The plot biomass value (i.e. per-hectare tree biomass at the centre of the plot) is estimated as follows (all time-dependent variables relate to the time of measurement):

$$b_{TREE,p,i} = \frac{B_{TREE,p,i}}{A_{PLOT,i}} \quad (18)$$

$$B_{TREE,p,i} = \sum_j B_{TREE,j,p,i} \quad (19)$$

$$B_{TREE,j,p,i} = \sum_l B_{TREE,l,j,p,i} \quad (20)$$

Where:

$b_{TREE,p,j}$ = Tree biomass per hectare in sample plot p of stratum i; t d.m./ha

$B_{TREE,p,j}$ = Tree biomass in sample plot p of stratum i; t d.m.

$A_{PLOT,i}$ = Size of sample plot in stratum i; ha

$B_{TREE,j,p,j}$ = Biomass of trees of species j in sample plot p of stratum i; t d.m.

$B_{TREE,l,j,p,j}$ = Biomass of trees l of species j in sample plot p of stratum i; t d.m.

Biomass of a tree in a sample plot is estimated by using the following equation:

$$B_{TREE,l,j,p,i} = V_{TREE,l,p,j,i} \times D_j \times BEF_j \times (1 + R_j) \quad (21)$$

Where:

$B_{TREE,l,p,j,i}$ = Biomass of tree l of species j in sample plot p of stratum i; t d.m.

$V_{TREE,l,p,j,i}$ = Stem volume of tree l of species j in sample plot p of stratum i, estimated from the tree dimension(s) as entry data into a volume table or volume equation; m³

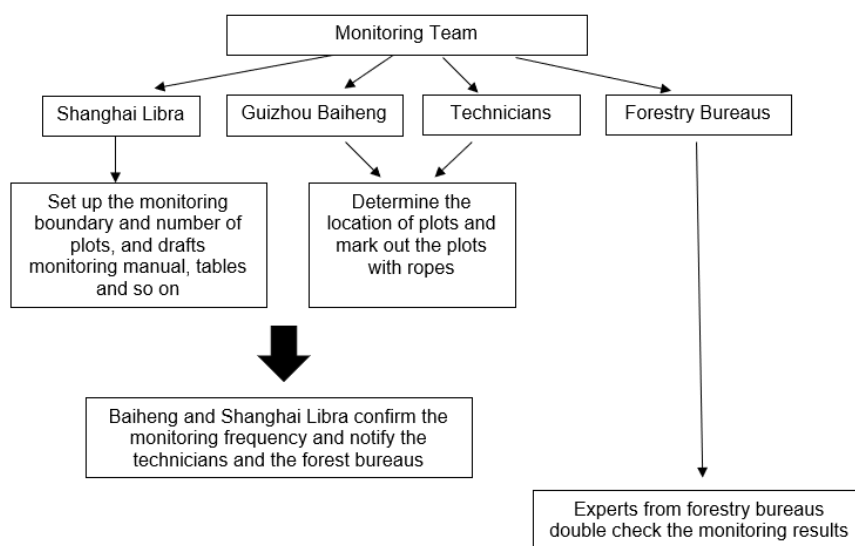
D_j = Density of tree species j; t d.m/m³

BEF_j = Biomass expansion factor for conversion of tree stem biomass to above-ground tree biomass, for tree species j; dimensionless

R_j = Root-shoot ratio for tree species j; dimensionless

Monitoring Team

The monitoring team consists project proponent, Shanghai Libra, technicians and the forestry bureau. Firstly Shanghai Libra sets th monitoring boundary, and number of plots, and drafts monitoring manual, tables and so on. Secondly project proponent and technicians determine the location of plots and mark out the plots with ropes. Thirdly project proponent and Shanghai Libra confirm the monitoring frequency and notify the technicians and the forestry bureaus. Lastly the monitoring results will be double checked by experts of the forestry bureaus.



Monitoring of boundary

The coordinate of the project boundary should be measured and managed strictly in accordance with regulations and saved in KML files. Boundary information such as original records, needs to store in both electronic and printed archive in the project proponent, and participants should keep a backup. Files need to be saved at least two years after the end of the crediting period.

In order to obtain valid and reliable boundary information, monitor team need to use the KML or other verifiable methods to verify the project boundary. If the actual boundary is larger than the boundary in the project design, the excess section is not included in project boundary; instead, if the actual border boundary is smaller than the boundary in the project design, project boundary should be based on the actual boundary. If there are any changes to the boundary, the modified KML files must be provided for example(satellite imagery).

Post-stratification and determining the number of plots

The first time of monitoring, if there are changes in the area and boundary, the carbon stratification of the project needs to update. In addition, if the number of carbon stratum and the area change, the number of sample plots need to be recalculated.

Although prior stratification from baseline survey is the basis for project monitoring in the future. But the variables in the project implementation make the actual situation deviate from plan. Therefore, the project needs to consider tree species, patterns and other factors in actual planting, and update stratification to post-stratification.

Using tool "Calculation of the number of sample plots for measurements within A/R CDM project activities (Version 02.1.0)" gets the number of plots within each stratum. In order to ensure the statistical independence of each stratum, the number of sample plots is at least 3.

Setting sample plots

Monitoring team needs to set fixed sample plots for every verification. According to GB/T 30363-2013³⁷, stratified sampling method is applied to get the accuracy 90%. There are 6 stratifications of the project; the plots will be selected within each stratification at random.

Plot size is set to be a circular area with a diameter of 30m, perimeter of 95m. The plot needs to determine the location at the centre point of the plot with timber pile. Then 15m away from the centre point is the plots edge measured by tape where the colourful flag would be fixed for sign. The distance between flags is about 3-5 meters. Thus totally 19-35 flags are used to circle the plot.

Determine the sample location

The sample is fixed circular area with a diameter of 30m each. When a sample on a slope is to be selected, the gradient must be monitored, and the horizontal long should be converted into oblique long. The management methodology (irrigation, fertilization, etc) within the samples must be the same as those outside the samples. If fire breaks out, the GHG removal of the stratum where the fire breaks out will be accounted for 0tCO₂.

Monitoring frequency

³⁷ <http://www.zbgf.org/2/StandardDetail2425769.htm>, Technical Specification for Forest Vegetation Monitoring, 2013

The monitoring of the project implementation will take place at least every five year after the project registration in order to ensure the continuity of the benefits. Periodic verification and quantitative monitoring of the project will take place every five years.

Data management

All data collected as part of monitoring is archived electronically. All information should be stored by the technology department of the project proponent and all the materials have a physical copy for backup. And all data collected shall be archived for a period of at least two years after the end of the last crediting period of the project activity.

QA/QC

We have a systematic internal review and correction process. The technicians will provide the original record forms and Baiheng will do a check on the data and when spotted any negative growth which might be caused by data entry errors, Baiheng then will feedback to the technicians and correct the data before sharing with Libra. Libra will draft the monitoring report based on the raw data and cross check with the forestry bureau experts. If there are no further comments from the experts, Libra will finalise the report. All parties are required to reply to any questions raised within 30 days. The monitoring equipment should be updated annually if there are new versions or more efficient monitoring tools available. The forestry bureaus are responsible for the monitoring equipment renewal or update.

3.3.4 Dissemination of Monitoring Plan and Results (CL4.2)

The monitoring will publish in the notice board outside of each village committee office until the planting finished. During every year's training after the plan published, the monitoring plan is the main course for technicians. The monitoring plan and the monitoring manual are available in village committees and the local forestry bureaus.

The monitoring results and Chinese version summaries will be published on the village representatives and will be published on the villages' notice boards.

3.4 Optional Criterion: Climate Change Adaptation Benefits

3.4.1 Regional Climate Change Scenarios (GL1.1)

N/A..

3.4.2 Climate Change Impacts (GL1.2)

N/A.

3.4.3 Measures Needed and Designed for Adaptation (GL1.3)

N/A

4 COMMUNITY

4.1 Without-Project Community Scenario

4.1.1 Descriptions of Communities at Project Start (CM1.1)

The project zone covers Xixiu District and Guanling County in Anshun City. The total population of Xixiu District is about 778,500 from 34 townships of which 65.34% are rural population. Guanling County has a population of about 350,000 from 14 townships, of which 92.76% are rural residents.

The 2 counties where the project is located are all under jurisdiction of Anshun city, which is the famous historical and cultural city in Guizhou Province. It is located in the watershed area of the Yangtze River Wujiang River Basin and the Pearl River North Panjiang River Basin. It is a typical karst landform concentration area in the world.

The population of the Xixiu District and Guanling County is about 1.13 million, which has multicultural characteristics. Among them, 82% of Xixiu District belongs to the Han nationality, and 38.9% of Guanling County belongs to the Han nationality. The rest are ethnic minorities, including the Buyi, Miao, Hui, and Yi ethnic groups. The sex ratio of the population is about 52:48, of which 66.03% are between the ages of 15-64. The per capita disposable income of Xixiu District is about 18,670 yuan / year, and the per capita disposable income of Guanling County is about 13,055 yuan / year.

As of 2017, Xixiu District where the project is located, it is one of China's national impoverished county, and Guanling County is still the China's national impoverished county as of today. As of August 2017, there are 14 villages defined as deeply impoverished village in the project zone, all is in Guanling. Most villagers living there are uneducated at all. Due to poor medical condition, the birth rate is very low. The young and middle-aged in the family have to work in the economically developed provinces leaving behind the elder, children and women at home to make a living by farming.



This picture shows a villager's house with in the Project in Guanling County, 2013. At that time, the income of each household was very low.

4.1.2 Interactions between Communities and Community Groups (CM1.1)

The local village communities within the project zone consist of 323 villages. The villages are not far from each other in the project zone, but it is very difficult for villagers to visit and interact with the other villages due to very poor infrastructure (either to climb over mountains between villages or to take muddy paths).

Part of the revenue from the carbon credit sale will be used to improve local infrastructure such as the roads connecting villages within the project area. Without of the project, they may not gather up due to the bad country roads but now they can easily visit any villages. Recent years more and more minorities are joined their festivals.

4.1.3 High Conservation Values (CM1.2)

No HCVs are identified, which no negative affection by the project.

4.1.4 Without-Project Scenario: Community (CM1.3)

Agriculture is the main income sources of the village communities. The communities have no necessary skills, knowledge and funds to make use of the barren land for any land use. Thus, continuing the “non-use” of the barren land would have no effect on the livelihood and well-being conditions of the villages under the without-project land use scenario.

Without the project, villagers only rely on planting corn and potatoes to make a living. Only a small amount of cash crops can change for little money. Villagers' average income would remain lower than the local minimum standard in Anshun. Continuous land erosion would lead to unstable harvest and in some years, there were no harvest at all. Desertification would also result in mudslides threatening the villages in the area. All above would post great risks to the local population and the next generation, for instance life risk, persistent poverty and low level of education.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

Community Group	Local villagers (the number is 132,897 in total)
Impact(s)	Improve living conditions and secure safety from being forced to move out of their homelands due to desertification
Type of Benefit/Cost/Risk	Predicted indirect benefits
Change in Well-being	Improve living conditions and environment

Community Group	Migrant rural workers(19,090 within local villagers)
Impact(s)	The job positions offered by the project will give some migrant rural workers more opportunities who may choose to work in their living villages instead of to go outside.
Type of Benefit/Cost/Risk	Predicted indirect benefits
Change in Well-being	Increase local job opportunities

The impacts on female rural workers are not only including improving living conditions, increasing local job opportunities that are impact to local villagers and migrant rural workers but also describe as following:

Community Group	Female rural workers (13,363 within migrant rural workers)
Impact(s)	Get more job opportunities and trainings from the project and will have more chance to participate local activities,
Type of Benefit/Cost/Risk	Actual direct benefits
Change in Well-being	Increase household income and living level, and improve local women's capability and well-being.

4.2.2 Negative Community Impact Mitigation (CM2.2)

Based on the description of section 4.2.1, no HCVs was identified related to community well-being in the project zone. And there is no negative well-being impacts on community groups and the normal life of community based on above 4.1.4 and 4.2.1 assessment.

4.2.3 Net Positive Community Well-Being (CM2.3, GL1.4)

The main source of income for the local village communities is farming in project area. Their production methods are backward, affected by remote location, and low agricultural productivity. The project will benefit both Xixiu District and Guanling County economically and socially.

1) Income improvement: During the project period, the net income generated by the project includes employment and labor income as well as carbon trading income by Guizhou Baiheng (60RMB per villager per day for tree-planting and 200RMB per technician per month for monitoring).

This project has significantly alleviated the mudslides and improved the soil quality in the recent years since the trees were planted. As a result, the cash crops and crop yields have raised so that villagers can not only meet their daily dietary needs, but also can benefit from selling the majority to the market to increase their income.



This is a village in Xixiu district within the project area in 2017. The project has improved the soil condition and increased villagers' incomes. For example, as the economic crops are increased so villagers can

afford the house renovation. Their living condition has improved significantly with less drought and flooding.

2) Job creation: The project will provide permanent and temporary employment opportunities, including soil preparation, planting and management. Most of opportunities go to local villagers living in the project zone. Presently, a local household earns about 6,500RMB on average a year and this project can provide 2,400 yuan per technician per year, which is a very effective and direct way for local villagers to improve their living standards.

3) Enhance social cohesion: The project provides people not only increased income but also a joyful life style. Afforestation will form a close interaction between individuals, which will strengthen communication between village communities and local governments, communities and communities. For instance, the villagers can often gather up for meetings and trainings becoming more bonded.



This picture shows a traditional festival of Miao minority, called “Si Yue Ba or 8th April” in Huangla Town, Xixiu district, 2018.

“Si Yue Ba” is the most important traditional festival in the project area. But due to the muddy and rugged mountain roads, many villagers especially the elder and children could not join and celebrate it before the implementation of the project. In recent years, tree planting activities have brought more communication opportunities between villages and villages, women and women. With the crop harvests and increased incomes, the instructions have been improved and villagers can enjoy this Festival more than ever, which lead to increased cohesion and happiness to the local village communities.

4) Technical training and demonstration: The village communities generally lack seed technologies and high-quality seedlings, fire prevention, forest pest control, which is also a challenge to forest management. The project is jointly organized by the local forestry bureaus which help villagers understand and solve problems during the implementation of the project, such as seedling selection, seedling management, land preparation model, pest control.

Baiheng has strong expertise in the application and research of new agricultural technologies and forest efficient seedling breeding. During the implementation of this project, Baiheng organized many trainings for villagers on how to improve crop yields, how to properly use pesticides and fertilizers and how to do the soil management to speed up the growth of crops. These knowledge and skills are new but very useful to villagers.

5) Before implementation of the project, heavy water and soil erosion caused low yield of the crops on neighbouring farm land which is the main income of the villagers. The project creates the ecological benefits and change them into the benefits of the people's livelihood, and provides a useful pilot for the national financial transfer payment and regional coordinated development, and provides policy support for the new ways of economic development and improvement of people's livelihood in multi-ethnic areas.



These pictures above show the main local cash crops in the project area, cherry and peach. After 5 year since the commencement of this project, the soil condition has been greatly improved. Soil on the karst landform which used to be very thin becomes thickening now through the planting of Cypress and China fir, which significantly contributes the production increase of the economic crops.

6) After the project is implemented, it can increase the area of green space and beautify the environment, which will not lead to deforestation and obstruction projects. In summary, the relevance of the project area does not have a negative impact on the high value of protection.



These photos were taken by Baiheng in Shangzhai Village and Moshi Village, Gangwu Town, Guanling County, 2019. They clearly shows that Cypress trees and China fir have very strong adaptability and have a very direct effect on controlling soil erosion in the typical karst area.

4.2.4 High Conservation Values Protected (CM2.4)

No HCVs was identified related to community well-being in the project zone thus none of the HCVs related to community well-being will be negatively affected by the project.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

No potential negative offsite stakeholder impacts have been identified. In contract the project will bring benefits to the offsite communities, like providing additional employment opportunity, improving local environment, as well as mitigating the impacts of climate change on the project zone.

4.3.2 Mitigation of Negative Impacts on Other Stakeholders (CM3.2)

There is no negative well-being impact on other stakeholders.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

Project will have no negative impacts within and beyond the project zones. Besides, it will increase the income of the local village communities and bring positive environmental benefits. Therefore, this project will not create negative impacts on the other stakeholder groups.

4.4 Community Impact Monitoring

4.4.1 Community Monitoring Plan (CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

To assess the actual changes in well-being resulting from the project activities for community groups, the project proponent will conduct a stakeholder meeting for each community groups affected by the project and collect all the relevant information through questionnaires. Also any feedback or suggestions from them will also be collected and addressed immediately to initiate an adaptive management plan if necessary.

once every five years after initial monitoring, as described below.

Procedures:

- a) Establishing PRA team: The teams will be set up to conduct the PRA process, which consists of social experts, project officers, local government officials and technical staff with various background (forestry, sociology and ecology)
- b) Developing SOPs for the field PRA process;
- c) Training: A training workshop will be held for discussing and training of PRA teams in order to ensure all PRA members fully understand the purposes, contents, procedures and specific methods of the PRA field survey;
- d) Preparation: Developing detail PRA field survey plan including responsibility of each member of PRA team; and contacting with relevant project counties, forestry farms, towns/townships and informing them PRA plan.
- e) PRA survey: conducting PRA survey following SOPs.

Methods:

- a) Village meeting: A meeting of farmer representatives will hold in villages sampled. The general agenda are:
 - (i) Introducing PRA team members and the purpose, procedures, methods and time schedules of the PRA process;
 - (ii) Explaining the way of villagers' participation;
 - (iii) Collecting information regarding the project progress, social-economic and environmental benefits shared from the projects, existing problems/difficulties encountered by local communities during the project implementation, as well as comments and suggestions on improvement of the project.
- b) Semi-structured interviews: This includes VIP interview, farmer household interview and group interview

(i) Interviewing of VIP: including villager leaders, distinguished villagers, elder villagers and head of ethnic minority.

(ii) Interviewing of household: Some farmer households will be selected for the interview. The interviewed households shall cover rich household, poor household, new inhabitant household, etc.

(iii) Group interview: Villagers are grouped based on gender, age classes or land use types. The group interviews were conducted together with village meeting.

c) Questionnaire: Questionnaire forms will be developed and distributed among different stakeholders, including farmer households, village committees, forest farms, township governments and forest bureau.

The following key variables will be monitored during each verification of the project:

Variable	Household income
monitoring methods to be applied	Questionnaire and interview
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local rural workers, surplus rural labors, female rural workers
Purpose of monitoring	Evaluate the change of living level due to the implementation of the project

Variable	Capability of technical skills
monitoring methods to be applied	Questionnaire and interview
Frequency of monitoring/recording	Before every verification event
Affected community groups	Rural cooperatives
Purpose of monitoring	Evaluate the technical improvement resulting from the project

Variable	Level of social activities
monitoring methods to be applied	Questionnaire and interview
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local rural workers
Purpose of monitoring	Evaluate the improvement of social activities resulting from the project.

4.4.2 Monitoring Plan Dissemination (CM4.3)

The monitoring plan and results of every verification will be published on VCS and CCB website which can be easily download by stakeholders and the local stakeholders will be noticed through the routine villager assembly. Also, a contact person with phone numbers will be published in case any stakeholders want to directly contact the project proponent and raise opinions. The monitoring plan and the monitoring manual will be available in village committees and the local forestry bureaus.

4.5 Optional Criterion: Exceptional Community Benefits

N/A

4.5.1 Exceptional Community Criteria (GL2.1)

N/A.

4.5.2 Short-term and Long-term Community Benefits (GL2.2)

N/A.

4.5.3 Community Participation Risks (GL2.3)

N/A.

4.5.4 Marginalized and/or Vulnerable Community Groups (GL2.4)

N/A.

4.5.5 Net Impacts on Women (GL2.5)

N/A.

4.5.6 Benefit Sharing Mechanisms (GL2.6)

N/A.

4.5.7 Benefits, Costs, and Risks Communication (GL2.7)

N/A.

4.5.8 Governance and Implementation Structures (GL2.8)

N/A.

4.5.9 Smallholders/Community Members Capacity Development (GL2.9)

N/A.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

The Xixiu District and Guanling County where the project located due to long-term farming, the ecological structure of most project sites is relatively homogenous, with low biodiversity in recent years. Most of the project site are wasteland that are mainly Karst rocky desertification area. The Karst rocky desertification is caused by over exploitation of soil resources because of human activities. It is caused by land degradation ultimately leading to poor biodiversity in the karst areas of south-western China where project located. To make matters worse, the sustainable development of this region is restricted by the limited resources and environment. Although in recent years, the government worked hard to attempt to solve this problem and some scientific and technological methods on the comprehensive control of rocky desertification have been successfully applied, the increasing trend of rocky desertification has not been restrained. The reconstruction of the green ecosystem has become the key issues on the sustainable development of economy and society in south-western China. The comprehensive control of rocky desertification still needs to be solved urgently. The increasing trend of rocky desertification would lead to a restraint of the sustainable development of this region and making it poorer than ever. The rocky desertification in karst mountainous areas of south-western China where project located, a specific phenomenon of land degradation, is one of the most serious environmental problems need to be resolved urgently.

5.1.2 High Conservation Values (B1.2)

No HCVs was identified related to biodiversity in the project zone.

5.1.3 Without-project Scenario: Biodiversity (B1.3)

As mentioned above, the without-project land use scenario is continuing the “non-use” of the current land which will have no effect on the biodiversity conditions

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

Biodiversity Element	Species of plants
Estimated Change	Increase

Justification of Change	Afforestation of this project will use china fir and cypress, both of which have great vitality and adaptation to Karst area, implement afforestation activity through scientific and reasonable configuration method with no burning and slash. When planted trees gradually grow up to forest, project sites will gradually become ecological community with the domain species of tall trees, which will improve the biodiversity. Moreover the reconstruction of the Karst desertification ecosystem is the key issues in deciding the sustainable development of economy and society in project area. With enlarged forest area, increased rainfall and improved soil bring more type of crop and fast grown than ever such as Cherry, Rose Rochburghii, Plum, Loqua, Arachniodes exilis (shown below) 
Biodiversity Element	Number of animals
Estimated Change	Increase
Justification of Change	Scientific and rational afforestation projects can improve Karst rocky desertification; adjust the hydrological cycle, reduce drought and flood risk; promote soil nutrient cycle, improve local micro-climate and other ecological environment. Therefore the species of animals could be increased due to the better environment of habitat. The increase in animal number includes Macaca mulatta, Lepus sinensis (photo below), Aix galericulata. 

5.2.2 Mitigation Measures (B2.3)

Afforestation in this project will use china fir and cypress with great vitality and adaptation to Karst area, implement afforestation activity through scientific and reasonable method with no burning and slash, and protect the existing vegetation as much as possible based on the management experience stated in section 2.4.2. Therefore, implementation of this project will not decrease biodiversity of project sites.

5.2.3 Net Positive Biodiversity Impacts (B2.2, GL1.4)

First, due to long-term farming, ecological structure of most project sites is relatively homogenous, with low biodiversity. The other small part is wasteland, mainly covered with grass and scattered shrubs. Afforestation activities of this project will use cypress and china fir which has great vitality and adaptation to Karst area; afforestation activities were also implemented with scientific and reasonable configuration method, with no burning and slash. Before the planting of trees, applying 'cave-like' holes for soil preparation will protect the existing vegetation as much as possible. Therefore, the implementation of this project will not decrease biodiversity of project sites. When planted trees gradually grow up to forest, project sites will gradually become ecological community with the domain species of tall trees, which will improve biodiversity.

Second, scientific and rational afforestation projects can adjust the hydrological cycle, reduce drought and flood risk; promote soil nutrient cycle, improve local micro-climate and other ecological environment. In addition, as the project site is located in Anshun City in Guizhou Province, the surrounding area is concentrated of wildlife. Therefore revegetation of project sites will facilitate biodiversity protection of the whole project zone.

Third, scientific and rational afforestation projects can adjust the hydrological cycle, reduce drought and flood risk, promote soil nutrient cycle, improve local micro-climate and other ecological environment. Therefore the species of animals could be increased due to the better environment of habitat. In the meantime, the original wild animals living in the Karst rocky desertification area around the project area will not be threaten since the can provide sufficient space for this animals. The increase in animal number includes Macaca mulatta, Lepus sinensis (photo below), Aix galericulata.

According to "Study on Rare and Endangered Plant Species Resources in Guizhou", there 13 rare and endangered plants in the project are shown in the following table, and IUCN who will benefit from reduced threats as a result of the project activities.

National key plants	Common Name	IUCN
Magnolia wilsoni	Xikang orchid	Near Threatened
Ophioglossum thermale	Adder's Tongue Ferns	

The key seeds		
Ormosia henryi	Ormosia	
Ormosia hosiei	Ormosia	Near Threatened
Polygonum cymosum	buckwheat	
Emmenopterys henryi	Chinese Emmenopterys	
Dysosma versipellis	Dysosma	Vulnerable
Gastrodia elata	Cheon Ma	Vulnerable
Key protected species		
Cephalotaxus fortunei	Fortune's Yew Plum	Least Concern
Phoebe sheareri	Phoebe	Least Concern
Sassafras tzumu	Sassafras	
Pistacia weinmanniifolia	Pistachio Tree	Data Deficient
National key Animals		
Macaca mulatta	Rhesus Monkey	Least Concern
Neofelis nebulosa	Clouded Leopard	Vulnerable
Viverra zibetha	Large Indian Civet	Least Concern
Aix galericulata	Mandarin Duck	Least Concern
Lepus sinensis	Chinese Hare	Least Concern

Cephalotaxus fortune (Chinese Plum-Yew): This is an evergreen tree; a subtropical endemic plant common in the south-westerns, and can be found in places as high as 2,700 – 3,000 meters altitude.

Gastrodia elata (Tian Ma Herb): This is one of the most valuable Chinese herbal medicines. It can be used to treat dizziness, numbness, convulsions, etc. This is an important herbal plant where plant alkaloids can be extracted from the plant that have a certain effect on cancer treatments. In addition, its wood is solid yet flexible which has many uses. The seed oil can also be used to make soap and paint. The fruit can be used to moisturize the lungs and relieve cough.

Macaca mulatta (Rhesus Monkey): The main feature is a short tail with a cheek pouch. The body is thick and has an average body length of about 50 cm. Their forelimbs are about the same length as the hind legs. The thumb can be opposite to the other four fingers. The grip is flexible, the forehead is low, and there is a raised rib. Wide range of habitats, grasslands, swamps and various forests. They are in groups, there are more than ten or even hundreds of large groups. Feed on leaves, twigs, wild vegetables, etc., and prey on other small animals. When they are in contact with each other, they will make a variety of voices or gestures, and combing each other is also an important social activity.

None of them is globally endangered species according to IUCN.

5.2.4 High Conservation Values Protected (B2.4)

This area does not involve national or local conservation of High Conservation Values organisms.

5.2.5 Species Used (B2.5)

The project will use native species for the productive activities to be implemented as part of the strategy.

5.2.6 Invasive Species (B2.5)

No invasive and GMO species are applied in the project.

5.2.7 Impacts of Non-native Species (B2.6)

N/A.

5.2.8 GMO Exclusion (B2.7)

N/A.

5.2.9 Inputs Justification (B2.8)

Name	Chemical pesticides
Justification of Use	The chemical pesticides are allowed to be used only if there is a serious disease problem erupted in the project area, and the pesticides will be used in accordance with the National Pesticides Policy.
Potential Adverse Effect	Improper pesticide application would be harmful to natural environment, including polluting soil, water and air conditions, as well as the habitat of the wildlife. But for this project, pesticide will be strictly managed by well trained staff to minimize the potential effect. Also, the environmental friendly measures will be adapted such as mixed species arrangement, seed and seedling quarantine. Especially the biological measures to control pests and diseases will be adopted. Therefore, the pesticide application will be limited.

Name	Biological control agents
Justification of Use	Upon routine overseeing, the pest will be treated by biological control once occurred according to local Pest Control and Prevention Policy.
Potential Adverse Effect	The biological control agents are natural enemy of pest which are native species and have no adverse effect on local environment and communities.

5.2.10 Waste Products (B2.9)

The waste products resulting from the project activities may include:

- (1) Rubbish

The villagers will regularly clean up plastic, metal, paper and other waste products in the project area. Local forest technicians will also conduct frequent visits to ensure that waste and waste products are well identified and cleaned.

- (2) Human waste

There may be some waste of people, because there is no toilet on site, the amount will be very small and can be naturally degraded, so no special treatment is required and there is no impact.

5.3 Offsite Biodiversity Impacts

5.3.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Measures (B3.2)

As the project activities will increase the area of the habitat, as well as improve the habitats' quality, only positive biodiversity impacts can be identified. Therefore, there are no potential negative offsite impacts on biodiversity.

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

Since there are no potential negative offsite impacts on biodiversity, the net offsite biodiversity benefits are positive.

5.4 Biodiversity Impact Monitoring

5.4.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

As mentioned in Section 2.1.11, according to Theory of Change, the main objective of the project is to establish forest cover on barren land, by planting a variety of species of native trees. And based on the analysis in Section 2.1.18, the risks of fire, diseases and insects, pesticide and frost might threat the aim of the project and need to be intervened.

To monitor the net impacts to biodiversity of the project, three types of monitoring indicators will be chosen, including Pressure, State, and Response (PSR). And considering the cost efficiency, the indicators that can be monitored with relative ease and reflect local conditions should be chosen.

The detailed monitoring plan for biodiversity is listed in the following table:

Table 5-2 Monitoring indicators for biodiversity

Indicator type	Description	Monitoring indicator	Indicator unit	Monitoring method	Monitoring frequency
State variables	The quantity and quality of forest in the project area	Forest cover	ha	Measure sample spots set during monitoring of Climate as described in Section 3.3	Before every verification
		Species of vegetation	/	Measure sample spots set during monitoring of Climate as described in Section 3.3	Before every verification
		Animal population associated with forest (birds)	/	Monitor the observed numbers of the birds occurred around the monitoring points during a whole day, while the monitoring points will be set randomly and no less than 3.	Before every verification
Pressure variables	The frequency or intensity of anthropogenic impacts that are directly harmful to biodiversity in the project zone	Number of fires occurred	/	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Effected forest area suffered insects and disease	ha	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
Response variables	The frequency or intensity of project interventions relevant to biodiversity	Forest area under prevention control from fires	ha	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Forest area under prevention control from insects and diseases	ha	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Forest area recovered from fire, insects or diseases		Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Number of trees re-planted	/	Recorded by forest rangers and confirmed by local	Once every year

				Forest Bureau	
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5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

The monitoring plan and results of every verification will be published on VCS and CCB website which can be easily download by stakeholders and the local stakeholders will be noticed through the routine villager assembly. Also, a contact person with phone numbers will be published in case any stakeholders want to directly contact the project proponent and raise opinions. The monitoring plan and the monitoring manual will be available in village committees and the local forestry bureaus.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

N/A

5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

N/A