GUINAN AFFORESTATION PROJECT PROVINCE

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

Project Title	Guinan Afforestation Project
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Project Location	Guizhou Province, China.
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GHG Accounting Period	23/03/2015~22/03/2045;30-year total period
History of CCB Status	N/A
Gold Level Criteria	N/A
Expected Verification Schedule	July 2020

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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) Create better ecological conditions and material welfare for ethnic minority people in the project area.	4
2) Provide experience of forest planting and management in the Karst region.	4
3) Mitigate the damage caused by rocky desertification to the soil.	5
4) Improve women's social status and promote equality between men and women.	4

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	18,770,585 tCO_2e	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	46,000 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	34,500	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	20,700	2.3
Employment	Total number of people expected to be employed in project activities,[5] expressed as number of full-time employees[6]	34,500	2.3
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	20,700	2.3
Livelihoods	Total number of people expected to have improved livelihoods[7] or income generated as a result of project activities	34,500	2.3
	Number of women expected to have improved livelihoods or income generated as a result of project activities	20,700	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	34,500	2.3
	Number of women whose well-being is expected to improve as a result of project activities	20,700	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	46,000	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	3	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)

Guinan Afforestation Project (hereafter refer to as "the project") is located in Qiannan Buyi and Miao Autonomous Prefecture, Guizhou Province of China, with the purpose of increasing carbon sequestration and contribution to local sustainable development by planting trees on the barren lands.

46,000 ha (690,000 Mu [12])of forest was planted on barren hill and degraded lands in Qiannan Autonomous Prefecture which is poor sustainable ecological environment and karst rocky desertification, including 7 counties: Sandu County, Huishui County, Pingtang County, Luodian County, Longli County, Guiding County and Dushan County. All the project sites were previously barren lands. There is no natural renewal and reforestation before the project.

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;
- Generate income and job opportunities for local communities.

There is no natural renewal and reforestation before the project, and all sites were covered by the barren hill and degraded lands. The main objective specie are China fir, Masson pine and Pinus yunnanensis which are native species according to the baseline survey.

The project is estimated to generate GHG emission removals of 18,770,585 tCO_2e in 30 years, with an average annual GHG emission removal of 625,686 tCO_2e.

2.1.2 Project Scale

Project Scale	
Project	
Large project	✓

[12] A Chinese metric unit of area, 1ha = 15 Mu.

2.1.3 Project Proponent (G1.1)

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2.1.4 Other Entities Involved in the Project

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2.1.5 Physical Parameters (G1.3)

The project is located in Qiannan Buyi and Miao Autonomous Prefecture, Guizhou Province, China. The geographical coordinates of the project are between 106°12' and 108°18' east longitude and between 25°04' and 27°29' north latitude.

According to CCB standard, the Qiannan Buyi and Miao Autonomous Prefecture is defined as the project zone, and the planting area in Qiannan Prefecture is defined as project area. The boundary of the project area and project zone are shown in Figue2-1 and Figue2-2, and the KML file has also been submitted.

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

Topography

Qiannan is located in the geomorphological slope zone from the Yunnan Guizhou Plateau to the karst hill and the karst isolated plain of Guangxi, the average altitude is 997 meters. The terrain is high in the northwest and low in the southeast. The landform types are diverse and complex, the mountains, hills,

basins and the river valleys are interlaced. High mountains, canyon and hills account for more than 97% of the total area of Qiannan, and the basins account for 2%. There are many canyons in Qiannan, especially in the lower reaches of the river, and the terrain is relatively broken. It has the only well-preserved karst forest landforms in the world at the same latitude.

Soils

The soil composition of Qiannan Prefecture is complex, with many types. The zonal soil and the non-zonal soil develop at the same time and they are interlaced. Among the zonal soils, the distribution of yellow soil is the largest, and the contiguous areas are concentrated. Among the non-zonal soils, limestone is the most widely distributed. The Soil of Qiannan can be divided into 9 great soil groups, 23 soil subgroups and more than 300 soil species. The 9 great soil groups are lateritic red soil, red loam, yellow soil, red lime soil, lime soil, purple soil, fluvo-aquic soil, meadow soil, paddy soil.

Climate

The Qiannan Prefecture is located in the East Asian monsoon region. It is the closest area to the sea in Guizhou Province and has the climate characteristics and changing laws of the plateau mountainous areas. The annual average temperature in the whole prefecture is 13.6 °C -19.6 °C, increasing from north to south and from west to east. In most areas, the sunshine intensity is about 30%, and Qiannan is one of the rainy areas in Guizhou Province, the annual precipitation is more than 1200 mm. .

Hydrology

The water system of Qiannan Prefecture belongs to the Yangtze River Basin and the Pearl River Basin. There are 117 medium and small rivers in the prefecture, flowing more than 5,000 kilometers. The density of the river network is 0.2 kilometers per square kilometer.

Types of vegetation

There are 170 families, 744 genera and 1384 species of plants in Qiannan Prefecture. Due to the geographical location of Qiannan, most of the areas have not been attacked by glaciers, and many ancient plants and relic plants have survived, such as ginkgo, Liriodendron, magnolia, schisandra, kiwi and so on. The wild plants in Qiannan are widely used, and can be divided into edible plants, medicinal plants, industrial plants, and beautiful scenery plants, which are closely related to people's lives.

2.1.6 Social Parameters (G1.3)

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

Main settlements

Qiannan Buyi and Miao Autonomous Prefecture is one of the 30 minority autonomous prefectures in China. It was found in August 1956, located in southwestern China and south-central Guizhou. The total land area of the whole prefecture is 26,200 square kilometers. There are 12 counties (cities) and a provincial economic development zone.

Land use and economic activities

Lying to the north of the Guangxi Zhuang Autonomous Region and in the Southern part of Guizhou Province, Qiannan, which is abundant in natural and social resources, once was an important passageway for the Silk Road in the South. The main land use is agricultural land, and the economic activity is agriculture, including planting and breeding industry.

Most of the project areas are barren lands.

Relevant historic conditions

The Qiannan Buyi and Miao Autonomous Prefecture is a multi-ethnic settlement, it is known as the important passage of the famous “South Silk Route” in history, called the “South Gate” of Guizhou’s culture and tourism. There are 4 state-level cultural relics protection units in Qiannan.

Socio-cultural information

There are 4.2 million people in Qiannan Prefecture, of which 58% are ethnic minorities, including 43 ethnic groups, such as Han, Buyi, Miao, Shui, Maonan and Yao, The male population accounted for 51.53%, and the female population accounted for 48.47%. In 2018, the state's total GDP was 131.346 billion yuan, and the per capita disposable income of urban and rural residents was 31,136 yuan and 10,721 yuan respectively.

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

The project is located in Qiannan Buyi and Miao Autonomous Prefecture, including 7 counties: Sandu County, Huishui County, Pingtang County, Luodian County, Longli County, Guiding County, and Dushan County. The geographical coordinates of the project are between 106°12′and 108°18′east longitudes and between 25°04′ and 27°29′ north latitude.

The location of the project activity in Guizhou Province is illustrated in Figure2-1. According to CCB standard, the 7 counties of Qiannan Prefecture are defined as the project zone, and the planting area in Qiannan Prefecture is defined as project area. The boundaries of project area and project zone are shown in Figure 2-2, and the KML file has also been submitted.

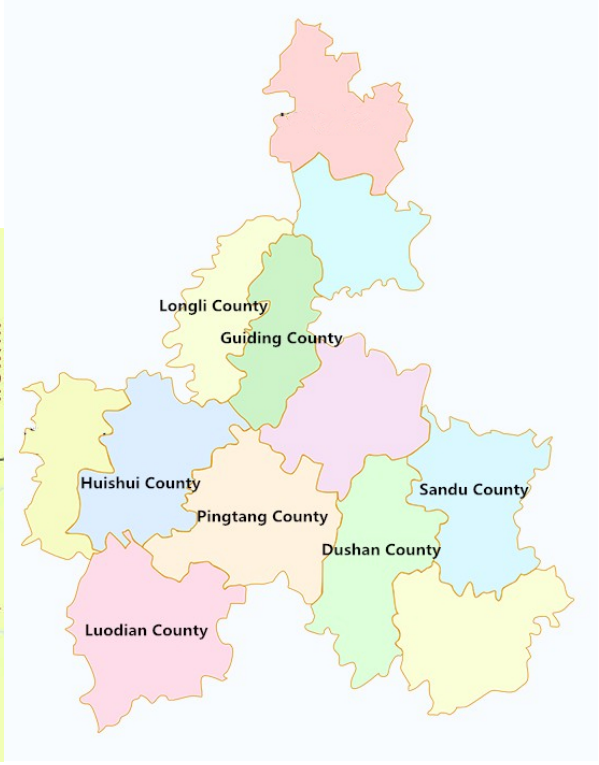

Figure 2-1 The project location

Figure2-2 The project zone and project area

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.

1) Village Communities in 7 counties:

The proposed project involved planting Masson pine and Pinus yunnanensis in 7 counties in Qiannan.

In these counties, villagers have been directly affected by the activities of the project. 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.

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, 34,500 villagers were hired to plant trees, of whom 20,700 were women, accounting for 70 percent.

The total 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.

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 recognized to be stakeholders in the project.

2) Forestry bureaus of 7 counties:

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 7 counties

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
Residents in Sandu County, Huishui County, Pingtang County, Luodian County, Longli County, Guiding County, and Dushan County.	Local residents who own the using right of the project land through the village communities, some of them participated in the implementation of the project by working on site such as clearing, digging, planting, watering and follow-up management. They are directly affected by the project.
Forest Bureaus of Sandu County, Huishui County, Pingtang County, Luodian County, Longli County, Guiding County, and Dushan County.	The local administration is in charge of the official approval and management of the forest projects.

Governments of Sandu County, Huishui County, Pingtang County, Luodian County, Longli County, Guiding County, and Dushan County.	The local administration is responsible for the local social and environmental management.

2.1.10 Sectoral Scope and Project Type

The project is 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)

The project is aimed to increase carbon sequestration and contribute to local sustainable development by planting trees on the barren hill and degraded land. 46,000 ha (690,000 Mu) of forest were planted by direct planting on degraded lands in Qiannan Prefecture, including 7 counties: Sandu County, Huishui County, Pingtang County, Luodian County, Longli County, Guiding County, and Dushan County. According to Biodiversity Survey Report of the project, all the project areas were previously barren land without agricultural activities. There is no natural renewal and reforestation before the project, and some sites were covered by sparse shrub. Therefore, the project does not include activities that convert native ecosystems to generate GHG credits, the eligibility criteria of VCS AFOLU projects are fulfilled.

The ecological forest species planted in the karst area are more commonly Pine, Fir, Cypress, Toona sinersis, Populus adenopoda, Dodonaea viscosa and so on. Among these species Pine, Fir and Cypress are the main forest species in the karst rocky desertification control in Guizhou because of their strong adaptability . Pine and Chinese fir are more prominent in rocky desertification areas due to their fast growth, shallow rooting and strong adaptability to soil. Both are suitable for afforestation species in limestone mountainous areas of subtropical monsoon climate zone.

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 residents by providing their relevant technical skills and training, and increase local biodiversity as a result of establishing a forest of native trees (China fir, Masson pine and Pinus yunnanensis).

The project is estimated to generate GHG emission removals of 18,770,585tCO_2e in 30 years, with an average annual GHG emission removal of 625,686tCO_2e.

Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Plant native	Establish a forest,	Improve the local	Generate GHG	Climate

species of trees, including preparing land for planting	create job opportunities	environment	emission removals	
Offer permanent and temporary job opportunities related to forest planting and management	Increase household incomes of local residents	Improve living level of local villages	Improve well-being of local residents	Community
Provide technical skills and training of forest planting and management	Improve motivation of community groups	Enhance capabilities of local residents	Enhance social cohesion	Community
Conduct continuous management and protection of the forest	Improve local ecological environment	Provide better habitat for wild lives	Increase local biodiversity	Biodiversity

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 which is critical for wildlife;
- Improve the quality and quantity of the vegetation;
- Improve soil and water conservation in the Karst region;
- Mitigate the damage caused by rocky desertification to the soil.
- Generate income and job opportunities for local communities.

2.1.13 Implementation Schedule (G1.9)

Date	Milestone(s) in the project's development and implementation
15-09-2014	Started the baseline survey.
06-01-2015	The Project Design for Afforestation Operation was finished.
16-01-2015	The afforestation project design was approved by Qiannan Forest Bureau.
12-02-2015	Biodiversity survey report of the project was completed.
26-02-2015	Participatory Rural Appraisal (PRA) report of the project was completed.
23-03-2015	Started planting trees (start date of crediting period)
20-10-2016	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 23-03-2015 when the planting started.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

Planting started: 23-03-2015, the date on which the native community started its activities and led to greenhouse gas removal.

The project crediting period is from 23-03-2015 to 22-03-2045, and the project lifetime is 30 years from 23-03-2015 to 22-03-2045.

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

The project's 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_2e)
23/03/2015-22/03/2016	43307
23/03/2016-22/03/2017	86118
23/03/2017-22/03/2018	142950
23/03/2018-22/03/2019	219097
23/03/2019-22/03/2020	304970
23/03/2020-22/03/2021	395567
23/03/2021-22/03/2022	486067
23/03/2022-22/03/2023	572253
23/03/2023-22/03/2024	650820
23/03/2024-22/03/2025	719427
23/03/2025-22/03/2026	776671
23/03/2026-22/03/2027	821969
23/03/2027-22/03/2028	855383
23/03/2028-22/03/2029	877472
23/03/2029-22/03/2030	889118
23/03/2030-22/03/2031	891420
23/03/2031-22/03/2032	885572

23/03/2032-22/03/2033	872790
23/03/2033-22/03/2034	854251
23/03/2034-22/03/2035	831062
23/03/2035-22/03/2036	804230
23/03/2036-22/03/2037	774653
23/03/2037-22/03/2038	743117
23/03/2038-22/03/2039	710305
23/03/2039-22/03/2040	676780
23/03/2040-22/03/2041	643026
23/03/2041-22/03/2042	609436
23/03/2042-22/03/2043	576325
23/03/2043-22/03/2044	543943
23/03/2044-22/03/2045	512486
Total estimated ERs	18,770,585
Total number of crediting years	30
Average annual ERs	625,686

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 applications 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.

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 through and beyond the project lifetime. This project is an ecological afforestation project activity. In addition, according to Forest Management Manual, the primary purpose of this afforestation project is to improve the ecological environment of local rocky desertification by establishing forest of native trees, commercial logging will be forbidden and human interference will be minimized.

The project proponent will be responsible for the implementation and management of the project during the project lifetime, and the local government will take over the responsibility beyond the project lifetime.

2.1.20 Financial Sustainability (G1.12)

The project lands are all collective-owned by local villages. Due to the land are all barren for a long time, the villages are lack of money to plant trees. Moreover, in China the subsidy is just for Grain for Green Project. So it is so hard for landowners to plant even manage after planting, after serious consideration of carbon revenue, local village committees agreed to authorize Guizhou Baiheng to be the project proponent to apply the project to be a carbon credit project.

According to the reported barren hills area data, the forestry departments at all levels counted and approved the afforestation area, and allocated part of funds.

Stakeholder seriously considered the carbon revenue and thought the revenue could help to mitigate the economic barrier. Then Guizhou Baiheng Fertilizer Co., Ltd (hereinafter referred to as “Guizhou Baiheng”) signed the Consulting Agreement with Shanghai Libra Investment & Management Co., Ltd. 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)

The community and biodiversity addtionality is demonstrated by using "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" (Version 01), please refer to section 3.1.5 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 farmers in the project areas to acquire the local farmers/communities' 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. Since the beginning of the project, there is no feedback has

been received.

This GSP version Project Description will be available in village committees and the local forestry bureaus once it is published on VCS and CCB website.

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 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)

To ensure the continued effectiveness of the participation mechanisms, investigation team conducted a Participatory Rural Appraisal (PRA) in the counties where project located prior to project initiation, in order to obtain basic information, data and information of socio-economic situation on the project area and the surrounding, understand the major socio-economic and environmental issues from the stakeholders, collect the willingness to participate and take advantage of the demands of the proposed project activity and analysis the potential socio-economic and environmental impacts of the proposed project activity.

In September 2014, during the PRA survey, the project proponent also held a stakeholder meeting at Longli County to gather their opinions and suggestions, and distributed questionnaires to the participants to collect their feedback. The land owners, representative of forestry bureaus, government officers expressed their opinions about the project activities. The land owners are willing to participate 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.

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

In September 2014, during the PRA surveys and stakeholder meetings, 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

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

After the PD is published on the VCS website, a stakeholder meeting will be held meantime the DOE on site visiting. The meeting notice will be been published on the notice board of each village including the contact person's telephone number.

The status and process of the project for CCB and VCS validation and verification would be published 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 notice on the DOE site visit information will be published on the village board along with the stakeholder meeting information. While the meeting they can talk to auditor freely. The detail information of the meeting will be completed after site visit.

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 Qiannan Forestry bureau, conducted a Participatory Rural Appraisal and CCB survey to meet the requirements of carbon sink project. Guizhou Academy of Social Sciences(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.-The feedback collected is summarized below.:

- Most local villagers are well aware of the benefits of afforestation. They understand that forestry can reduce soil erosion, clean the air, protect the land, and reduce natural disasters. And they also have a strong sense of protection for 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.

- 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 20,700 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..

- The local forestry bureau is very clear about the benefits of afforestation, and also understands that carbon trading can make projects more sustainable and sustainable.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

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

On the other hand 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 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, community 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 between local communities and individual farmers. 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 community 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 communities and other actors use to resolve their conflicts, which will be available to all interested parties, the community and other actors; said information will be available from the consultations.

2.3.14 Worker Training (G3.9)

In the proposed project activity, together with the local forestry bureau, the project proponent had organized the training for local 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 livelihoods, resulting in a worse economy. The training for employees is held on every October, starting from 2014, 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.

2.3.15 Community Employment Opportunities (G3.10)

The project mobilized the participation of the entire community, 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 farmers involved in planting was approximately 34,500, and of which 60% were women. In addition, approximately 95 locals are employed for project management and are provided related skill training regularly.

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

The local people would be 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 farmers are aware of their right to participate in labor.

2.3.17 Occupational Safety Assessment (G3.12)

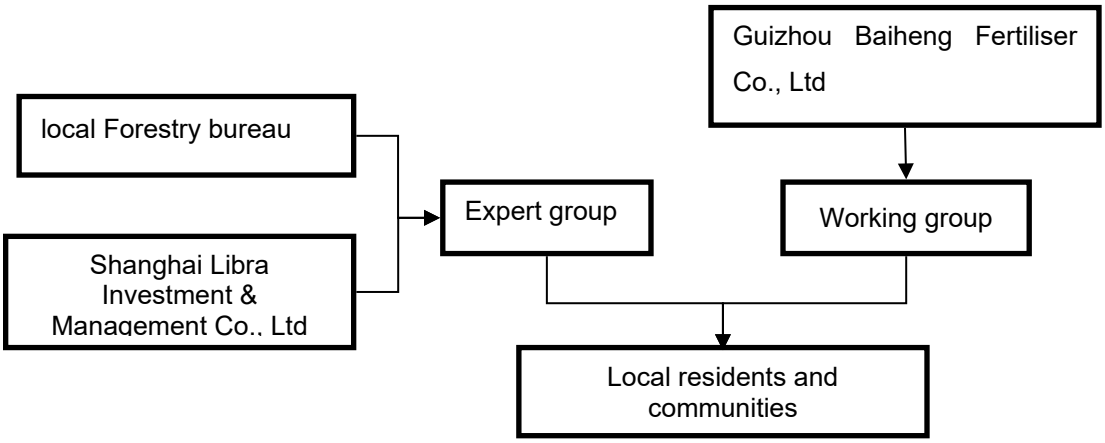
The project proponent has referenced Safety and Healthy in Forestry Work published by ILO and Labor Law of the People's Republic of China and adapted them to meet the local conditions to ensure workers' health and safety. The workers' health and safety policy, including items covering the health insurance 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.

2.4.3 Management Team Experience (G4.2)

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

The project proponent Guizhou Baiheng Fertiliser Co., Ltd. is in 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, Shanghai Libra Investment & Management Co., Ltd. has successfully developed over 100 carbon projects in China, including validation and verification under GS, VCS and CDM standard. This experience will help project proponent to ramp up the capability of project implementing and management.

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

The management team of the project does well in forest project management and carbon project development, including local Forestry Bureau who will provide instruction of afforestation and forest management, conduct the specific supervision of the implementation. The local Forestry Bureau and local government will provide technical support for forest management.

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

The project participators are legally registered companies 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.

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 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 farmers 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 farmers, which has been confirmed by local government and Forestry Bureau. 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 etc.

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 2014, the project participant and both 7 counties' 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, farmers voluntarily use these lands to plant trees, therefore the project activities will not lead to involuntary removal or relocation of property rights holders from their lands or territories, and does not force rights holder to relocate activities important to their culture or livelihood.

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 Labour 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;

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 Qiannan approved the operational design of the afforestation project on 16-01-2015.

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 farmers 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 have 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/C9QS5G3CS8FW04MYYXDFOQDPXWM4OE

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 percent 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%[13], less than 10%, and there was no repeated disturbance.

   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.

[13] Proportion of soil disturbed area: 0.16 ㎡*3100/10000 ㎡=4.96%,0.16 ㎡ was derived from the surface area calculated from the specification of artificial afforestation cavities in the Project Design (40cm*40cm)

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 a project.

Therefore, a 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_2O	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

Source		Gas	Included?	Justification/Explanation
		CH_4	No	Not included in carbon pool
		N_2O	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_2O	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_2O	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_2O	No	Not included in carbon pool
	Burning of woody biomass	CO_2	No	CO2 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_2O	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 23/03/2015, when the activities that lead to the generation of GHG emission removals were first implemented. The planting activity was conducted from March 2015 to September 2016.

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 as 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 the 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 a possible baseline scenario.

The afforestation activity location is legally defined as forestry land. Farming and grazing are 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, scenarios 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

Since the project is not commercial afforestation and is afforestation of barren hills and wasteland which is prohibited from logging, so the trees in the project cannot be felled and used for commercial sales.

In addition, according to the Qiannan government work report in 2019, the per capita income of rural residents is 10,721 yuan/year[14], and the average income of farmers in the project area is 9,252 yuan/year [15], that is lower than the average level of local towns and villages.

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

2. Technological barriers

The project is located in Sandu County, Huishui County, Pingtang County, Luodain County, Longli County, Guiding County, and Dushan County etc, where boasts the widest Karst area, as well as one of the districts that suffer serious Karst Rocky Desertification with karsts accounting for 77.5% of the land area. Although the forest companies and organizations are project proponents, local farmers are actually the project participants who planted trees due to the planting area is quite large and scattered among the local villages.

Local farmers 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 in karst regions, 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 afforestation and forest management technology in karst regions; 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 farmers, and lead to the failure of the project.

Because it is hard for the local farmers to register their afforestation projects and apply for financial support individually. Under the advice of Guizhou Baiheng, local forest bureaus called the villagers to discuss whether to apply for VCS for these forestry projects. The locals agreed to register the project as a VCS project and apply for additional carbon fund, they agreed Guizhou Baiheng to be their representatives. Then Guizhou Baiheng works with the local Forest Bureaus and Shanghai Libra Investment & Management Co., Ltd to work out a better implementation plan for the project, and help local farmers to conduct the planting activity better. Without applying for VCS, local farmers 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.

[14] http://dy.163.com/v2/article/detail/EA61R0HL05149B5L.html
[15] http://www.qiannan.gov.cn/

Scenario 2 faces the investment and technical barriers.

In sum, Scenario 2 is not feasible. Scenario 1, the 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 land[16].

There has been 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 has been limited. In Guizhou Province, the afforestation was mainly established several years ago by a small number of relatively wealthy communities and farmers at a time when there were not many alternative investment opportunities[17]. 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 farmers 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 labour, have greatly reduced the expected economic return.

All the above reasons explain that it is very difficult to conduct non-profit afforestation activity in project zone. At present there is one Afforestation project registered as VCS&CCB in Guizhou province, but the tree species in this project is China Fir and Cypress different from our project. Furthermore, the registered VCS&CCB project is located in southwest of the Guizhou province where has different climate, soil type, rainfall, vegetation, etc. comparing with this project area.

Thus, the proposed project is not a common practice.

3.1.5 Additionality

Additionality has been fully analysed 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.

[16] http://www.gywb.cn/content/2014-12/10/content_2003257.htm
[17] http://gzrb.gog.cn/system/2015/02/15/014118852.shtml

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 farmers. All the plots in 7 Counties 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. For this project, because the project is on the barren lands suitable for afforestation, forest floor only bushes and scattered raw wood, to protect diversity, at the time of afforestation retained the original shrubs and bulk raw wood, based on the principle of cost-effectiveness, the baseline scenario $\Delta C_{TREE_BSL,t}$, $\Delta C_{SHRUB_BSL,t}$ is zero.

Therefore, set the project baseline carbon variation of zero, $\Delta C_{BSL,t}$=0.

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-CO_2 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 CO_2-e
$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e
$GHG_{E,t}$	=	Increase in non-CO_2 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-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; t CO_2-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-CO_2 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:

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

$$u_{\Delta c} = \frac{\sqrt{(u_1 \times C_{TREE,t_1})^2 + (u_2 \times C_{TREE,t_2})^2}}{|\Delta C_{TREE}|} \quad (6)$$

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

Review on the Growth Equations of Pinus Massoniana, China Fir and Pinus elliottii in China [Journal of Northwest Forestry University]. Study on biomass growth rule and forest biomass change of main vegetation types in early stage of Banqiao river small watershed management [Guizhou forestry science and technology, 1991]. Analysis of Growth Process Pinus yunnanensis Natural Secondary Forests in Yongren County of Yunnan Province[Journal of West China Forestry Science]

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, *Masson pine and Pinus yunnanensis*. Local growth curves are used to estimate the average merchantable volume of one tree ($V_{TREE,j}$)

China fir[18]	$V=0.1962(1-e^{-0.08A})^{3.9012}$
Masson pine [19]	$V=0.19073(1-e^{-0.11A})^{6.06248}$
Pinus yunnanensis[20]	$V=0.103743(1-e^{-0.067959A})^{3.3420}$

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 Masson pine and Pinus yunnanensis are listed in the below.

Table 3-1 Parameters used for different tree species

Tree species	**D_j**	**BEF_j**	**R_j**	**CF_j**
China Fir	0.307	1.634	0.246	0.520
Masson pine	0.380	1.472	0.187	0.460
Pinus yunnanensis	0.483	1.619	0.146	0.511
source	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"			

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 China fir, Masson pine and Pinus yunnanensis

Project Stratifications number	**Category of tree**	**Plant site**	**Tree number per ha in category**	**Year to plant**	**Area (ha)**
Proj -1	**China fir**	Pingtang County; Huishui County; Sandu County	3100	2015	10000
Proj -2	**China fir**	Pingtang County;	3100	2016	5500

[18] Review on the Growth Equations of Pinus Massoniana, China Fir and Pinus elliottii in China [Journal of Northwest Forestry University].
[19] Study on biomass growth rule and forest biomass change of main vegetation types in early stage of Banqiao river small watershed management [Guizhou forestry science and technology, 1991].
[20] Analysis of Growth Process Pinus yunnanensis Natural Secondary Forests in Yongren County of Yunnan Province[Journal of West China Forestry Science]

		Huishui County			
Proj -3	**Masson pine**	Dushan County; Pingtang County; Huishui County	3100	2015	7000
Proj -4	**Masson pine**	Huishui County; Sandu County; Longli County	3100	2016	2500
Proj -5	**Pinus yunnanensis**	Dushan County; Pingtang County; Luodian County; Huishui County; Sandu County; Longli County; Guiding County	3100	2015	15000
Proj -6	**Pinus yunnanensis**	Pingtang County; Luodian County; Longli County	3100	2016	6000

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

Time	Proj-1	Proj-2	Proj-3	Proj-4	Proj-5	Proj-6
year	No. of trees	No. of trees	No. of trees	No. of trees	No. of trees	No. of trees
23/03/2015-22/03/2016	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2016-22/03/2017	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2017-22/03/2018	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2018-22/03/2019	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2019-22/03/2020	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2020-22/03/2021	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2021-22/03/2022	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2022-22/03/2023	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2023-22/03/2024	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2024-22/03/2025	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2025-22/03/2026	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2026-22/03/2027	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2027-22/03/2028	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2028-22/03/2029	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2029-22/03/2030	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2030-22/03/2031	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2031-22/03/2032	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2032-22/03/2033	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2033-22/03/2034	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2034-22/03/2035	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2035-22/03/2036	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2036-22/03/2037	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000

23/03/2037-22/03/2038	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2038-22/03/2039	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2039-22/03/2040	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2040-22/03/2041	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2041-22/03/2042	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2042-22/03/2043	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2043-22/03/2044	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000
23/03/2044-22/03/2045	31,000,000	17,050,000	21,700,000	7,750,000	46,500,000	18,600,000

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_2e)	Estimated annual project removals of Proj-2 (tCO_2e)	Estimated annual project removals of Proj-3 (tCO_2e)	Estimated annual project removals of Proj-4 (tCO_2e)	Estimated annual project removals of Proj-5 (tCO_2e)	Estimated annual project removals of Proj-6 (tCO_2e)	Estimated total annual project removals (tCO_2e)
23/03/2015-22/03/2016	15751	0	1900	0	25656	0	43307
23/03/2016-22/03/2017	25947	8663	6056	678	34512	10262	86118
23/03/2017-22/03/2018	44296	14271	14706	2163	53709	13805	142950
23/03/2018-22/03/2019	65555	24362	28041	5252	74404	21483	219097
23/03/2019-22/03/2020	88225	36056	45503	10015	95409	29762	304970
23/03/2020-22/03/2021	110983	48523	65846	16251	115800	38164	395567
23/03/2021-22/03/2022	132762	61041	87523	23517	134904	46320	486067
23/03/2022-22/03/2023	152771	73019	108989	31257	152256	53961	572253
23/03/2023-22/03/2024	170468	84024	128935	38925	167565	60903	650820
23/03/2024-22/03/2025	185537	93758	146373	46049	180684	67026	719427
23/03/2025-22/03/2026	197837	102045	160676	52276	191564	72273	776671
23/03/2026-22/03/2027	207365	108810	171540	57384	200244	76626	821969
23/03/2027-22/03/2028	214224	114051	178932	61264	206815	80097	855383
23/03/2028-22/03/2029	218587	117823	183018	63904	211413	82727	877472
23/03/2029-22/03/2030	220671	120223	184102	65364	214193	84565	889118
23/03/2030-22/03/2031	220724	121369	182569	65751	215330	85677	891420
23/03/2031-22/03/2032	218997	121398	178840	65203	215002	86132	885572

23/03/2032-22/03/2033	215748	120449	173336	63871	213385	86001	872790
23/03/2033-22/03/2034	211219	118661	166459	61906	210652	85354	854251
23/03/2034-22/03/2035	205639	116171	158576	59450	206966	84260	831062
23/03/2035-22/03/2036	199219	113101	150008	56634	202481	82787	804230
23/03/2036-22/03/2037	192151	109571	141030	53574	197335	80992	774653
23/03/2037-22/03/2038	184600	105682	131875	50368	191658	78934	743117
23/03/2038-22/03/2039	176720	101531	122726	47098	185566	76664	710305
23/03/2039-22/03/2040	168635	97196	113733	43831	179159	74226	676780
23/03/2040-22/03/2041	160458	92749	105007	40619	172530	71663	643026
23/03/2041-22/03/2042	152278	88252	96631	37502	165760	69013	609436
23/03/2042-22/03/2043	144176	83753	88665	34512	158915	66304	576325
23/03/2043-22/03/2044	136213	79297	81144	31666	152057	63566	543943
23/03/2044-22/03/2045	128439	74917	74092	28980	145236	60822	512486

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; tCO_2-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"; tCO_2-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.

$$LK_{AGRIC,t} = \frac{44}{12} \times (\Delta C_{BIOMASS,t} + \Delta SOC_{LUC,t})^{21} \quad (12)$$

Where:

$LK_{AGRIC,t}$	=	Leakage due to the displacement of agricultural activities in year t; tCO_2-e
$\Delta C_{BIOMASS,t}$	=	Decrease in carbon stock in the carbon pools of the land receiving the activity displaced in year t; t d.m
$\Delta SOC_{LUC,t}$	=	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:

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

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_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
23/03/2015-	0	43307	0	43307

[21] 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)

22/03/2016				
23/03/2016-22/03/2017	0	86118	0	86118
23/03/2017-22/03/2018	0	142950	0	142950
23/03/2018-22/03/2019	0	219097	0	219097
23/03/2019-22/03/2020	0	304970	0	304970
23/03/2020-22/03/2021	0	395567	0	395567
23/03/2021-22/03/2022	0	486067	0	486067
23/03/2022-22/03/2023	0	572253	0	572253
23/03/2023-22/03/2024	0	650820	0	650820
23/03/2024-22/03/2025	0	719427	0	719427
23/03/2025-22/03/2026	0	776671	0	776671
23/03/2026-22/03/2027	0	821969	0	821969
23/03/2027-22/03/2028	0	855383	0	855383
23/03/2028-22/03/2029	0	877472	0	877472
23/03/2029-22/03/2030	0	889118	0	889118
23/03/2030-22/03/2031	0	891420	0	891420
23/03/2031-22/03/2032	0	885572	0	885572
23/03/2032-22/03/2033	0	872790	0	872790
23/03/2033-	0	854251	0	854251

22/03/2034				
23/03/2034-22/03/2035	0	831062	0	831062
23/03/2035-22/03/2036	0	804230	0	804230
23/03/2036-22/03/2037	0	774653	0	774653
23/03/2037-22/03/2038	0	743117	0	743117
23/03/2038-22/03/2039	0	710305	0	710305
23/03/2039-22/03/2040	0	676780	0	676780
23/03/2040-22/03/2041	0	643026	0	643026
23/03/2041-22/03/2042	0	609436	0	609436
23/03/2042-22/03/2043	0	576325	0	576325
23/03/2043-22/03/2044	0	543943	0	543943
23/03/2044-22/03/2045	0	512486	0	512486
Total	0	18,770,585	0	18,770,585

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 total area is 46,000 ha, please refer to Table 3-2 for details.
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

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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. 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	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	These two parameters are used for stem volume calculation of trees in volume equations.
Comments	For the ex-post caculation 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	N/A
QA/QC procedures to be applied	N/A
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	N/A
Purpose of Data	The parameter is used to calculate actual net GHG removals
Calculation method	N/A
Comments	N/A

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3.3.3 Monitoring Plan

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 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. wi=Ai/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
$s^2_{\Delta,i}$	=	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; 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

For the Stem volume of tree l of species j in sample plot p of stratum i $V_{TREE,l,p,j,i}$, the tree dimensions used as entry data into a volume equations are Height of tress ($H_{l,p,j,i}$) and Diameter at breast height of trees ($DBH_{l,p,j,i}$).

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 needs 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.

During the crediting period, the project area occurs deforestation, afforestation failure and instead other land use patterns, these plots will be transferred out of the project boundary, and no longer monitoring and verification. The area that has been transferred out of the project border will no longer be allowed into the project boundary. If the area that has been transferred out of the project border has been verified, the pre-carbon stocks still is valid, included in the calculation of carbon stocks.

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 stratums 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 due to measuring requirements at regular intervals. Plot size is set to be a circular area with a diameter of 30m. The plot needs to determine the location at the centre point of the plot. The location of fixed sample plot should be set systematically, but the starting fixed sample plot needs to be set randomly use GPS in field work. The location, administrative positions, number of carbon stratums and carbon sub-stratums of each plot should be documented to ensure that distribution of fixed sample plots is uniform.

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 a fire breaks out, another sample could be selected near the original sample.

Monitoring frequency

The monitoring of the project implementation will take place at least every five years 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 material has a physical copy for backup. And all data collected shall be archived at least two years after the end of the last crediting period of the project activity.

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)

According to the PRA community survey, the local villages' energy source is mainly electricity, and a small part of energy comes from purchased coal and the residual agricultural resource such as straw. The demand for firewood is low.

The project site covers 7 counties in Qiannan Buyi and Miao Autonomous Prefecture, which is one of the 30 minority autonomous prefectures in China. It was found in August 1956, located in southwestern China

and south central Guizhou. The total land area of the whole state is 26,200 square kilometers. There are 12 counties (cities) and a provincial economic development zone.

The history of the Qiannan Buyi and Miao Autonomous Prefecture has a long history. It is a multi-ethnic settlement, it is known as the important passage of the famous “South Silk Route” in history, called the “South Gate” of Guizhou’s culture and tourism. There are 4 state-level cultural relics protection units in Qiannan.

There are 4.2 million people in Qiannan Prefecture, of which 58% are ethnic minorities, including 43 ethnic groups, such as Han, Buyi, Miao, Shui, Maonan and Yao, The male population accounted for 51.53%, and the female population accounted for 48.47%. In 2018, the state's total GDP was 131.346 billion yuan, and the per capita disposable income of urban and rural residents was 31,136 yuan and 10,721 yuan respectively.

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

The local communities are mainly village collective, and due to low economic level, the community groups were barely active.

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 source of the communities. The communities have no habit to make use of the barren land for any land use. Thus continuing the “non-use” of the current land will have no effect on the livelihood and well-being conditions of the local communities and community groups under the without-project land use scenario.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

Community Group	Local villagers
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
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
Impact(s)	Get more job opportunities and training from the project and will have more chance to participate in 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)

No HCVs were identified related to community well-being in the project zone thus there is no negative well-being impacts on community groups.

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

The main source of income for communities is agricultural in project area. Their production methods are backward, affected by remote location, and low agricultural productivity. The project will benefit 7 counties on both economic and social aspects.

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.

2) Job creation: The project will provide permanent and temporary employment opportunities, including soil preparation, planting and management. Most of the work will belong to local farmers involved in the project, and over 60% of them are adult women.

3) Enhance social cohesion: Afforestation will form a close interaction between individuals, which will strengthen communication between communities and local governments, communities and communities.

4) Technical training and demonstration: The community generally lacks high-quality seed technology and high-quality seedlings, fire protection, forest pest control, which is also an important issue in local community forest management. The project is organized by the local forestry bureau to help farmers understand and evaluate problems in the implementation of the project, such as seedling selection, seedling management, land preparation model, pest control.

5) The project transforms the ecological benefits 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.

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 harm impact on the high value of protection.

4.2.4 High Conservation Values Protected (CM2.4)

No HCVs were 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 opportunities, 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 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 7 Counties where the project located due to long-term farming, ecological structure of most project sites is relatively homogenous, with low biodiversity in recent years. Most of the project sites are wastelands, that are mainly Karst rocky desertification area. The Karst rocky desertification is caused by irrational exploitation of soil resources because of human activities. It is a disaster caused by land degradation ultimately leading to poverty in the karst areas of southwestern China where project located. What's worse, the sustainable development of this region would be restricted by the resources and environment. Although during recent years the governments 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 in the sustainable development of economy and society in southwestern China. The comprehensive control of rocky desertification still remains urgently need to be solved. The increasing trend of rocky desertification would lead to a restraint of the sustainable development of this region and poorer than ever. The rocky desertification in karst mountainous areas of southwestern China where project located, a specific phenomenon of land degradation, is one of the most serious environmental problems that need to be resolved urgently.

5.1.2 High Conservation Values (B1.2)

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

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 affect 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 fir and pine, 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 communities with the domain species of tall trees, which will improve the biodiversity. Moreover the reconstruction of the Karst desertification ecosystem is the key issue in deciding the sustainable development of economy and society in project area.
Biodiversity Element	Species 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 environments. Therefore the species of animals could be increased due to the better environment of habitat.

5.2.2 Mitigation Measures (B2.3)

Afforestation in this project will use China fir, Masson pine and Pinus yunnanensis 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. 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 parts are wastelands, mainly covered with grass and scattered shrubs. Afforestation of this project will use fir and pine with great vitality and adaptation to Karst area, implement afforestation activity with scientific and reasonable configuration method, with no burning and slash. Before plantation applying cave-like 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 communities 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 Qiannan Prefecture in Guizhou Province, the surrounding area is concentrated of wildlife. Therefore revegetation of project sites will facilitate biodiversity protection of the whole project zone.

The 10 national protected species in the project zone are shown in the following table:

Animals	Plants
Manis pentadactyla	Craigia yunnanensis
Andrias davidianus	Keteleeria pubescens
Neofelis nebulosa	Eucommia ulmoides Oliver
Viverra zibetha	Rhoiptelea chiliantha Diels et Hand.-Mazz
Macaca mulatta	
Lophura nycthemera	

Manis pentadactyla, Andrias davidianus and Craigia yunnanensis are 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 planted native trees in barren land, including China fir, Masson pine and Pinus yunnanensis.

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)

No Non-native Species affected the project.

5.2.8 GMO Exclusion (B2.7)

No GMO species is applied in the project.

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 farmers 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	/	Monitor the observed numbers	Before every verification

		associated with forest (birds)		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.	
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 Forest Bureau	Once every year

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 downloaded 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