GUINAN AFFORESTATION PROJECT

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

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Project Location	Guizhou Province, China.
Project Proponent(s)	Guizhou Baiheng Fertilizer Co., Ltd. Contact: Sheng Yuan Email: baiheng_manure@163.com Phone: +86 13765171789
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GHG Accounting/ Crediting Period	01-January-2016 ~ 31-December-2044; 29-year total period
Monitoring Period of this Report	01-January-2016 ~ 31-December-2019
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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact	Achievements during the Monitoring Period	Section Reference	Achievements during the Project Lifetime
1) Improve local production conditions and ecological environment, enhance the quality of life, create a good investment and development environment and play a leading and demonstration role.	A few cash crops were planted such as tea, oilseed rape, traditional Chinese medicinal materials, etc.	5.2	With enlarged forest areas, increased rainfall and improved soil brought more types of crops and faster growth than ever.
2) Provide experience of forest planting and management in Karst region.	Because of the serious soil erosion in the karst landscape, it was impossible to plant any kinds of tree. Now, the soil is stabilized and improved by planting China fir Masson pine and Pinus yunnanensis.	5.2	Large areas to improve climate, rainfall, temperature regulation, prevention of extreme natural disasters.
3) Raise the status of women	During the implementation of the project, the total number of local farmers involved in planting was approximately 34,500, of which 60% were women.	2.3	The number of women to be employed as a result of project activities expressed as the number of full-time employees.

1.2 Standardized Benefit Metrics

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
GHG emission reductions & removals	Net estimated emission removals in the project area, measured against the without-project scenario	848,109 tCO_2e	3.2.4	848,109 tCO_2e
	Net estimated emission reductions in the project area, measured against the without-project scenario	N/A	N/A	N/A
Forest[1] cover	For REDD[2] projects: Number of hectares of reduced forest loss in the project area measured against the without-project scenario	N/A	N/A	N/A
	For ARR[3] projects: Number of hectares of forest cover increased in the project area measured against the without-project scenario	46,000Ha	2.1	46,000Ha
Improved land management	Number of hectares of existing production forest land in which IFM[4] practices have occurred as a result of the project's activities, measured against the without-project scenario	N/A	N/A	N/A
	Number of hectares of non-forest land in which improved land management has occurred as a result of the project's activities, measured against the without-project scenario	N/A	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	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
Training	Total number of community members who have improved skills and/or knowledge resulting from training provided as a part of project activities	34,500	2.3	34,500
	Number of female community members who have improved skills and/or knowledge resulting from training provided as part of project activities of project activities	20,700	2.3	20,700
Employment	Total number of people employed in of project activities,[5] expressed as number of full time employees[6]	34,500	2.3	34,500
	Number of women employed in project activities, expressed as number of full time employees	20,700	2.3	20,700
Livelihoods	Total number of people with improved livelihoods[7] or income generated as a result of project activities	34,500	2.3	34,500
	Number of women with improved livelihoods or income generated as a result of project activities	20,700	2.3	20,700
Health	Total number of people for whom health services were improved as a result of project activities, measured against the without-project scenario	N/A	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 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	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	Number of women for whom health services were improved as a result of project activities, measured against the without-project scenario	N/A	N/A	N/A
Education	Total number of people for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario	N/A	N/A	N/A
	Number of women and girls for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario	N/A	N/A	N/A
Water	Total number of people who experienced 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	N/A
	Number of women who experienced 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	N/A
Well-being	Total number of community members whose well-being[8]was improved as a result of project activities	34,500	2.3	34,500
	Number of women whose well-being was improved as a result of project activities	20,700	2.3	20,700

[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, Health, Education, Water, etc.), but could also include other benefits such as empowerment of community groups, strengthened legal rights to resources, conservation of access to areas of cultural significance, etc.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
Biodiversity conservation	Change in the number of hectares significantly better managed by the project for biodiversity conservation,[9]measured against the without-project scenario	46,000	5.2	46,000
	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	3

[9]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.
[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 Description

2.1.1 Implementation Description

Until the end of this monitoring period (December 2019), the project has been implemented for five years. All the areas planted within the Project Area, for a total of 46,000 ha, and the trees are growing and healthy.

The local species China fir Masson pine and Pinus yunnanensis are selected for afforestation because of their prominent characters in rocky desertification areas due to their fast growth, shallow rooting and strong adaptability to poor soil conditions. These species are especially suitable for Afforestation in limestone mountainous areas of subtropical monsoon climate zone. Since planting trees, during the last 5 years there was no natural disaster. Because of good forestry practice, the percentage of forest coverage rate has increased in the project area, as well as mitigating the impacts of rocky desertification and climate change expanding habitat for flora and fauna in the project area. During this monitoring period, no events affecting emission reduction and monitoring occurred in the project area.

All risk factors have been monitored and managed (According to the registered PD, leakage is considered to be zero for this project. Thus, there is no need to manage the leakage.):
During the monitoring period, all the technicians are doing regular forest inspection for every month, especially strictly checked the stranger into the forest in order to stop deforestation; In the fire-prone season, they are doing forest inspection every day, preventing all sources of fire into forest. If there are any emergencies, they will inform the superior leadership and project contact person of Guizhou Baiheng at once and stay where the emergency happens until anyone come for help;
Strictly obeying the Forest Management Manual, technicians inspect the occurrence of diseases and insect pests in spring and autumn, and use insecticides and pesticides according to the national standards.
-There have not been any regular pests that have damaged the forest.

-There have not been any fires that have damaged the forest.

-There have not been any climatic disasters (floods, droughts, tornadoes, frosts, etc.) that have damaged the forest.

-There have not been any earthquakes.

The GHG emissions reduction generated are 848,109 tCO_2e from 01-January-2016 to 31-December-2019, with an average annual GHG emission reduction of 212,027 tCO_2e.

There are no changes in the Project Proponent, Project Owner, Land Owner and other entities.

2.1.2 Project Category and Activity 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.

2.1.3 Project Proponent (s)

Organization name	Guizhou Baiheng Fertiliser Co., Ltd
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2.1.4 Other Entities Involved in the Project

Organization name	Shanghai Libra Investment & Management Co., Ltd
Role in the project	Consultants
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2.1.5 Project Start Date (G1.9)

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-March-2015 when the planting started.

2.1.6 Project Crediting Period (G1.9)

The project crediting period is 29 years from 01-January-2016 to 31-December-2044, and the project lifetime is 30 years from 23-March-2015 to 22-March-2045.

This monitoring period is from 01-January-2016 to 31-December-2019.

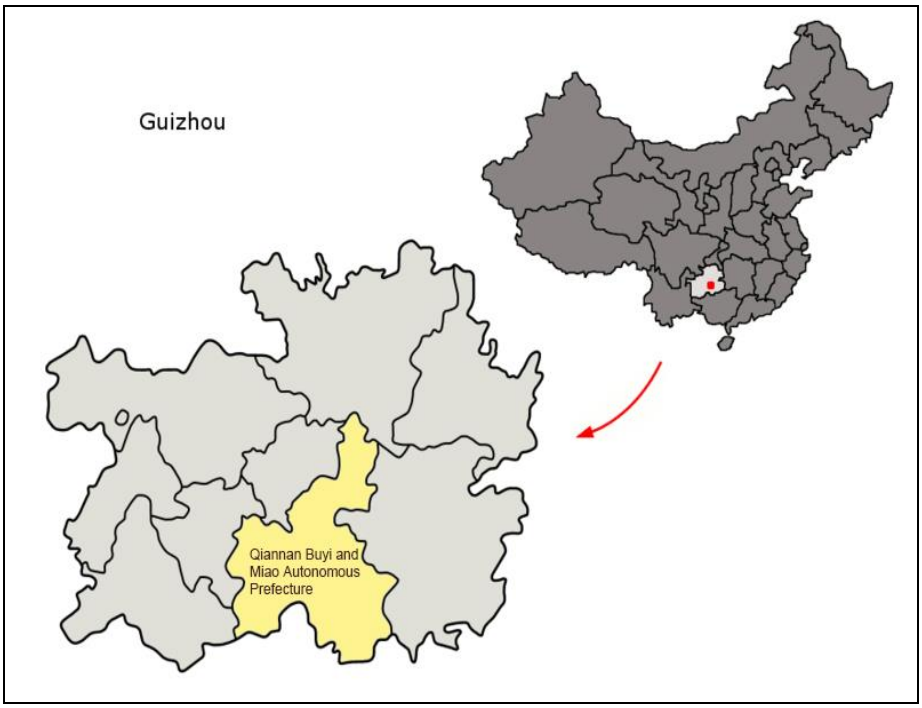
2.1.7 Project Location

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, Guizhou Province, China.

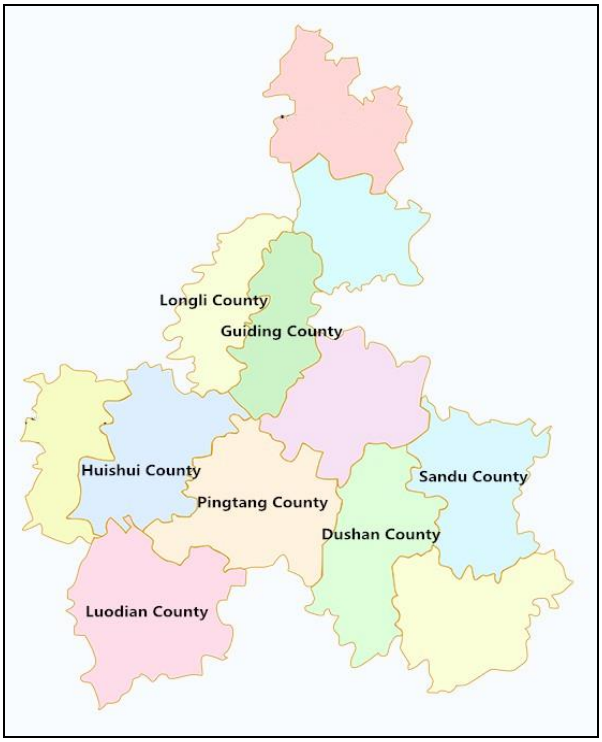
The location of the project zone in Guizhou Province is illustrated in map 01. Project zone Sandu county, Huishui county, Pingtang county, Luodian county, Longli county, Guiding county, and Dushan county in Qiannan Buyi and Miao Autonomous Prefecture are illustrated in map 02, and the location of the Project Zone (blue shadow) and Project Area illustrated in map 03. The geographical coordinates of the project zone are listed below.

Table 1 Geographical Coordinates of the Project Activity in Qiannan Buyi and Miao Autonomous Prefecture

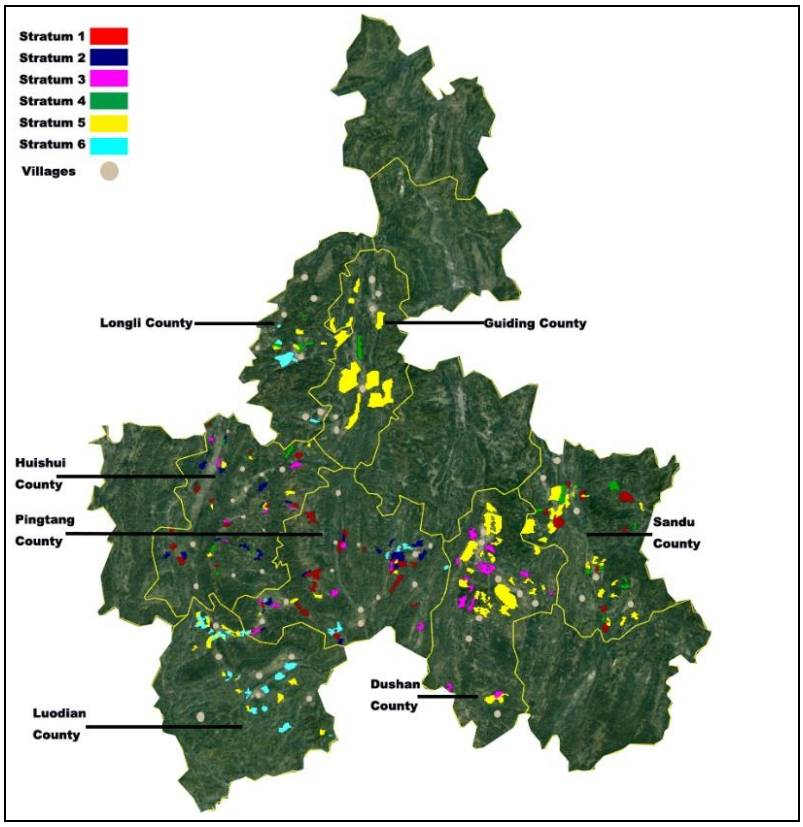
	East longtitude	North latitude
Qiannan Buyi and Miao Autonomous Prefecture	106°12'-108°18'	25°04'-27°29'
Sandu County	107°40'-108°14'	25°30'-26°10'
Huishui County	106°23'-107°05'	25°41'-26°17'
Pingtang County	106°40'-107°26'	25°29'-26°06'
Luodian County	106°23'-107°03'	25°04'-25°45'
Longli County	106°45'-107°15'	26°10'-26°49'
Guiding County	107°08'-107°15'	26°40'-26°47'
Dushan County	107°41'-107°55'	25°04'-25°31'



Map 01: Location of the Project Zone 'Qiannan Buyi and Miao Autonomous Prefecture,' in map of Guizhou Province, China.



Map02: Location of the Project zone, Sandu county, Huishui county, Pingtang county, Luodian county, Longli county, Guiding county, and Dushan county in Qiannan Buyi and Miao Autonomous Prefecture



Map 03: Project Zone and Project Area**.**

In Map 03, the red areas within the boundaries of Pingtang, Huishui and Sandu counties represent the 40 villages involved in the project. In this area, China fir is the main species planted in 2015 that is indicated the stratification of Pro-1.

The mazarine areas within the boundaries of Pingtang and Huishui counties represent the 25 villages involved in the project. In this area, China fir is the main species planted in 2016 that is indicated the stratification of Pro-2.

The pink areas within the boundaries of Pingtang, Huishui and Dushan counties represent the 27 villages involved in the project. In this area, Masson pine is the main species planted in 2015 that is indicated the stratification of Pro-3.

The green areas within the boundaries of Huishui, Sandu and Longli counties represent the 22 villages involved in the project. In this area, Masson pine is the main species planted in 2016 that is indicated the stratification of Pro-4.

The yellow areas within the boundaries of Pingtang, Huishui, Sandu, Dushan, Longli, Luodian and Guiding counties represent the 96 villages involved in the project. In this area, Pinus yunnanensis is the main species planted in 2015 that is indicated the stratification of Pro-5.

The blue areas within the boundaries of Pingtang, Longli and Luodian counties represent the 35 villages involved in the project. In this area, Pinus yunnanensis is the main species planted in 2016 that is indicated the stratification of Pro-6.

2.1.8 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)
- Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities (Version 01.0)
- Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2).

2.1.9 Other Programs (G5.9)

The project was not involved in other emission trading programs or any other mechanism that includes GHG allowance trading. The project has not sought or received another form of GHG-related environmental credit. The project was not registered under any other GHG programs.

2.1.10 Sustainable Development

The Project provides many benefits that will help achieve China's Sustainable Development Goals, a set of 17 universal goals covering the thematic areas of environmental, economic and social development (Figure 1).

Figure 1: The 17 Sustainable Development Goals

One of the Sustainable Development Goals (SDGs) is to take urgent measures to combat climate change and provide sustainable security for life in the future.

Guizhou province, where the project is located, holds the 'ECO Forum Global Guiyang' every year. As one of the best Green-Cities in China, Guiyang (capital of Guizhou) is rich in natural resources.

Environmental protection drew more attention under the principle of sustainable development. By holding 'ECO Forum Global Guiyang', the Chinese government is exploring the development of its sustainable development concept – 'ECO Civilization'. It aims to integrate the concept and practice of sustainable development into the whole range of economic development. The climate, community and biodiversity benefits provided by the Project, all contribute to achieving the global and national sustainable development goals. These contributing benefits are monitored through the Project's CCB Monitoring Plans. The Project contributes to develop some of China's Sustainable Development Goals:

---- Achieve gender equality and empower all women and girls (Goal 5); (See section 4.1.1 community impact on female rural workers)

---- Decent work and economic growth (Goal 8); (See section 4.3.1 variable monitored on household income)

---- Action to combat climate change and its impacts (Goal 13); (See section 3 for details)

---- Sustainably manage forests and halt biodiversity loss (Goal 15); (See section5 for details)

2.2 Project Implementation Status

2.2.1 Implementation Schedule (G1.9)

Date	Milestone(s) in the project's development and implementation
15-September-2014	The baseline survey was started
06-January-2015	The Project Design for Afforestation Operation in 2015 was finished.
16-January-2015	The afforestation project design in 2015 was approved by Qiannan Forest Bureau.
12-February-2015	Biodiversity survey report of the project was completed.
26-February-2015	Participatory Rural Appraisal (PRA) report of the project was completed.
23-March-2015	Planting trees was started.
01-January-2016	The project crediting period started.
02-January-2016	The Project Design for Afforestation Operation in 2016 was finished.
09-January-2016	The afforestation project design in 2016 was approved by Qiannan Forest Bureau.
01-January-2017	Collect and record the 2016 tree measurement data and biodiversity provided by monitoring technician.
13-February-2017	Planting was completed.
01-January-2018	Collect and record the 2017 tree measurement data and biodiversity provided by monitoring technician.

01-January-2019	Collect and record the 2018 tree measurement data and biodiversity provided by monitoring technician.
29-October-2019	Stakeholders' meeting at the forestry bureau of Guiding County, in order to prepare for the project verification and collect the views of stakeholders before the project verification.
01-January-2020	Collect and record the 2019 tree measurement data and biodiversity provided by monitoring technician.
01- January -2020 to 31- January -2020	Field survey and results was finished
06-April-2020	Completed registration as a VCS–CCB project
13- April -2020	Draft MR was expected to be finished
04-May-2020 to 03-June-2020	MR GSC
14-June-2020 to 17-June-2020	On-site verification

2.2.2 Methodology Deviations

N/A.

2.2.3 Minor Changes to Project Description (*Rules* 3.5.6)

N/A.

2.2.4 Project Description Deviations (*Rules* 3.5.7 – 3.5.10)

The Community Group monitored in Section 4.1.1 of the Monitoring Report is inconsistent with the groups identified in Section 4.2.1 of the project description, but it is consistent with the stakeholders group identified in Section 2.1.8 of the project description, which accords with the requirements of VERRA for this part. This project will be monitored in accordance with the group identified in the Monitoring Report and PD section 2.1.8 and 2.1.9 and related monitored impacts to each of the community group in section 4.4.1 of the MR is corresponding to the identified groups in 4.1.1 of the MR. Although this is a description deviation, the identified group and monitoring impacts are more completed than the registered PD and no impact to the application of the methodology, additionality and the appropriateness of the baseline scenario for the project.

2.2.5 Grouped Projects

This is not a grouped project.

2.2.6 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	After the trees grow to a certain age (about 30 years), the risk of fire may increase, and the project owner adopts the necessary measures for fire preventing. There is no fire outbreak happened during this monitoring period.	The forest fire prevention propaganda and education work were strengthened during this monitoring period, which also raised the awareness of forest fire prevention of the whole society. We have actively carried out educational activities with the forest law and regulations on forest fire prevention as the main contents to popularize basic knowledge of fire control.
Diseases and Insects	No diseases or insects occurred during the monitoring period.	During this monitoring period, the supervision of serious insect pests has been strengthened. If any insect pests occur, chemical pesticides can only be used in accordance with the national pesticide policy in serious cases.
Pesticide	This monitoring period was not applicable.	Monitoring pesticides in the interim is strictly managed by trained personnel. In addition, environmental friendly measures such as mixed species arrangements and seed and seedling quarantine have been adopted. In particular, biological measures have been taken to control pests and diseases. As a result, the use of pesticides has been limited.

2.2.7 Benefit Permanence (G1.11)

Project area is a relatively severe rocky desertification area. The implementation of the project will effectively control rocky desertification in this area and significantly improve the ecological environment. First of all, even after the end of the project's life cycle is over, the local government and forestry bureau will continue to supervise and manage according to the PRC Forest Law[12] and the PRC Forest Law Implementing Regulations[13]. It is illegal to cut down trees planted by this project, so the trees will continue to be protected. At the same time, the local government and forestry bureau shall continuously supervise and patrol the plants and animals in the project area according to the Law of the People's Republic of

[12] http://www.gov.cn/xinwen/2019-12/28/content_5464831.htm
[13] http://www.gov.cn/gongbao/content/2016/content_5139476.htm

China on the Protection of Wild Animals[14] and the Measures for the Protection of Terrestrial Wild Animals of Guizhou Province[15], so the local plant and animal population will continue to maintain or increase. Besides, during the 30 years of the project implementation process, the project proponent regular management measures, such as training, patrol, publicity, etc., will further enhance the ecological protection consciousness of residents. So after the project, they can still protect the forest and animals.

Secondly, during the 30 years of the project life period, the project proponent will provide annual training for the technicians hired to ensure that they can acquire rich professional experience and the ecological protection consciousness. After the end of the project, a part of them will continue to implement the supervision and management work, the others will be paid by the relevant forestry bureau even beyond the project lifetime because they will train other staff by the knowledge and experience mastered.

Finally, the women involved in this project activity not only increase the family income but also learn extra skills during the project implementation period, which equip them well ecological environment protection consciousness and improve their social status. After the 30 years of the project lifetime, they still have relevant professional ability to play a role in forestry, such as working for the forestry bureau, or choosing to work in forestry companies, seeding companies and other social organizations, so as to continue to reflect the value of women in society.

The measures implemented to maintain the climate, community, and biodiversity benefits beyond the Project lifetime are:

- All the planted areas were fertilized, pruned and ‘cared’ to obtain the maximum growth and carbon sequestration and to improve soil fertility.

-In the Project Zone, any kind of hunting is strictly forbidden.

-The Animal population is growing.

-All the workers and their families are provided with the best living conditions, fair wages and social welfare.

-All the technicians are trained every year, with priority given to the following training topics:

•Silviculture in general.

•Pruning and Fertilization.

[14] http://www.gov.cn/xinwen/2016-07/03/content_5087722.htm
[15] https://wenku.baidu.com/view/6bcfb353fe00bed5b9f3f90f76c66137ee064f0c.html

•Pests control and prevention of fires.

•First aid and dangerous animals.

•Use and maintenance of equipment.

•Writing words.

All these measures will maintain climate, community, and biodiversity benefits beyond the Project lifetime.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

The full project documentation has been published on VCS and CCB website (https://www.vcsprojectdatabase.org/#/ccb-pipeline), as well as the project summary in Chinese version, the local communities and other stakeholders can easily download from the website (Figure 2). No public comments received during the public comment period from 04-May-2020 to 03-June-2020. The project periodic development has been published on the notice board of 245 villages involved in the project, including PD, monitoring manual and monitoring plan, at the same time, the contact persons' information was also announced. If there is any negative feedback, a meeting will be immediately held in the village.

Guinan Afforestation Project
ID: 2070
Program(s): VCS and CCB Programs
Location: Guizhou Province, China
Project Proponent: Guizhou Baiheng Fertilizer Co., Ltd.
Benefits achieved during monitoring period:

- Reduction in soil erosion due to planting activities has increased crop yields
- Project demonstrates the equality of women by awarding half of the technical positions, which traditionally would have gone to men, to women.

Submit comments from 04 May – 03 June 2020

Figure 2 Published on VCS and CCB website

The Chinese version Monitoring Report shall be available in village committees and the local forestry bureaus after the Monitoring Report completion.

Due to the epidemic situation of the novel coronavirus, the on-site visit was in the form of door-to-door visits. During 14-June-2020 to 17-June-2020, the auditor respectively visited Forestry Bureau and government relevant personnel, project technicians, tree planting workers, and the villagers around the project site from 7 Counties. At that time, questionnaires were sent to them to understand the situation during the project verification. The questionnaires were handed out for their opinion and suggestions, at the same time explained the content of monitoring and provided monitoring documents.

2.3.2 Dissemination of Summary Project Documents (G3.1)

With the implementation of the project, the project verification documentation has been published on the VCS and CCB websites since 04 May 2020 for all stakeholders to obtain detailed project information and verify the progress. In addition, the Chinese version of monitoring reports, summaries, monitoring manuals and other relevant documents have been posted on the village bulletin board by the contact person of each village committee since 10 May so that villagers can keep abreast of the project.

2.3.3 Informational Meetings with Stakeholders (G3.1)

Before the project began, the socio-economic and environmental conditions around the project area were obtained through PRA surveys conducted by the Guizhou Academy of Social Sciences. On 29- October-2019, 35 villagers, village committee, forest bureau and government representatives from 25 villages were organized by the project proponent and the forestry bureau of Qiannan Buyi and Miao Autonomous Prefecture to attend the stakeholders' meeting at the forestry bureau of Guiding County, in order to prepare for the project verification and collect the views of stakeholders before the project verification. The meeting introduced the registration of the project, the plan of the verification work and how to collect and summarize the data. The villagers agreed to continue to support the project and to cooperate fully with the verification efforts.

Besides, in order to better understand the impact of the project on stakeholders after the implementation, the project sponsor conducted a questionnaire survey in 30 villages involved in the project from November to December in 2019. A total of 100 questionnaires were issued and collected (shown in Figure 3). In order to understand villagers' environment, life and socio-economic improvement, the questionnaire includes 'After the implementation of the project, what changes do you think the project has made to the surrounding environment?' 'Has it improved your standard of life?' 'Did you get job opportunities?' and other relevant questions.

Due to the epidemic situation of the novel coronavirus, the on-site visit was in the form of door-to-door visits. During 14-June-2020 to 17-June-2020, the auditor respectively visited Forestry Bureau, government and Village Committee relevant personnel, project technicians, tree planting workers, and the villagers around the project site from 7 Counties. At that time, questionnaires were sent to them to understand the situation during the project verification.

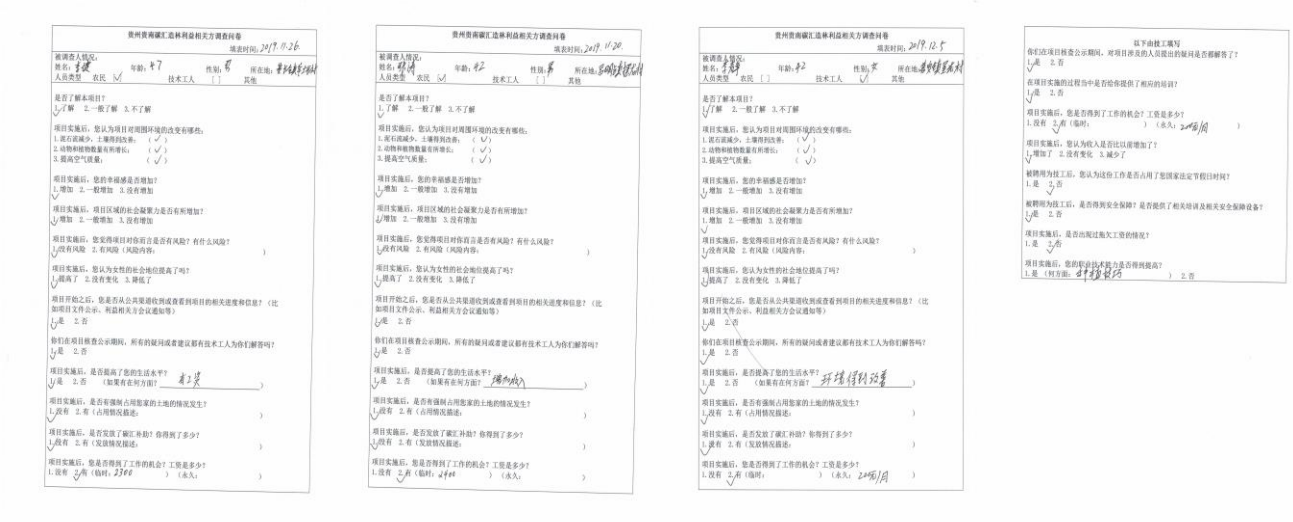


Figure 3 Questionnaires distributed to stakeholders

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

During the PRA survey before the project start，project proponent once explained the potential costs, risks, and benefits to relevant villagers and stakeholders. At that time the project proponent explained the potential costs, risks, and benefits as follows:

Costs: massive manpower needed for planting and occupy the roads during the planting;

Risks: nature disaster

Benefits: soil improvement, rocky desertification control.

During this verification period, through the daily visits of project technicians, the potential costs, risks and benefits of this project were conveyed and explained to relevant villagers and stakeholders again for further feedback. Besides, in stakeholders' meeting held on 29 October-2019, project proponent explained the potential costs, risks, and benefits to relevant villagers and stakeholders if they agreed to do the verification, and asked for feedback. The following is the potential costs, risks, and benefits to relevant villages and stakeholders:

Potential Costs	1. Reduce the land available for grazing. 2. Because logging is prohibited, more natural gas must be purchased for cooking.
Potential risks	1. The nature disaster when doing trees survey, such as landslide or debris flow.

	2. The emergency when doing trees survey, for example, fall accidentally or get bitten by a poisonous snake. 3. lower productivity
Benefits	1. Carbon credit revenue 2. Since villagers can increase their income without having to work away from their hometowns, their sense of well-being increases.

Meanwhile during the on-site visit (specified in section 2.3.6), the project proponent also explained the above potential costs, risks and benefits if doing the verification and asked for their opinion. All the attendees expressed their understanding for the risks and costs. They all agreed the verification implementation.

2.3.5 Information to Stakeholder on Verification Process (G3.3)

The status and process of the project for CCB and VCS verification has been published through routine villager assembly and posted on every 245 village notice boards before 14-June-2020 when the on-site verification began. On the other hand when project proponent and Shanghai libra have known the on-site visit time, the technicians would begin notice the villagers from door to door. The mobile phone number of contact person of the project was published on the meeting notice so the villagers can directly make a call in case they have any problem about the project.

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

The auditor surveyed the site plots and forests of the project from 14-June-2020 to 17-June-2020. The project proponent arranged the home visits with the auditor, technicians, tree planting workers, local villagers, representatives of forestry bureau, county government, Village Committee and project leaders of Shanghai Libra Investment & Management Co., Ltd and Guizhou Baiheng Fertilizer Co., Ltd. to verify the project status. During the visits, everyone spoke freely. Each of the participants represented their feelings and experience to the auditor about the project. Auditor also asked the villagers whether the implementation of the project had a significant impact on their lives and whether they had any complaints. The villagers paid more attention to about how to quantify the amount of emission reduction produced by trees. They raised relevant questions about how the emission reduction was calculated and how the height and diameter of trees were measured. Project proponent and auditor provided detailed answers to stakeholders representatives for all the questions. The auditor interviewed each participant separately and asked for their opinions and suggestions. The villagers have all expressed a willingness to continue to participate in the project, not only because of the lasting employment opportunities that have been

created for local rural communities, but also have increased their incomes and improved living conditions. Officials made clear their support for the project implementation.

2.3.7 Stakeholder Consultation (G3.4)

Stakeholder consultations include questionnaires survey and stakeholder meetings, requiring stakeholders to present their opinions on the project and their willingness to participate.

Before the project began, stakeholder consultations were conducted through PRA surveys. On 29 October 2019, 35 villagers, village committee, forest bureau and government representatives from 25 villages were organized by the project proponent and the forestry bureau of Qiannan Buyi and Miao Autonomous Prefecture to attend the stakeholders' meeting at the forestry bureau of Guiding County, in order to prepare for the project verification and collect the views of stakeholders before the project verification. Besides, in order to better understand the impact of the project on stakeholders after the implementation, Guizhou Baiheng conducted a questionnaire survey in 30 villages involved in the project from November to December in 2019. A total of 100 questionnaires were issued and collected. In order to understand villagers' environment, life and socio-economic improvement, the questionnaire includes 'After the implementation of the project, what changes do you think the project has made to the surrounding environment?' 'Has it improved your standard of life?' 'Did you get job opportunities?' and other relevant questions.

The collection results are as follows -

- Most of the local villagers have enjoyed the benefits of afforestation. It prevents soil erosion, purifies the air, protects land and reduces natural disasters. At the same time, they have gradually increased their awareness of the protection of local flora and fauna.

- Since then, most local villagers have been trained in carbon trading, venture capital or carbon credits. Now they are looking forward to carbon trading in this monitoring period.

- Local villagers believe that the project can 1) have created stable employment opportunities;2) hope to gain more revenue by selling carbon credits in this monitoring period;3) it has improved the local environment, protected arable land and reduced natural disasters;4) the social status of the women involved in planting trees at the beginning of the project has been improved.

Stakeholders have no negative views on project implementation.

Due to the epidemic situation of the novel coronavirus, the on-site visit was in the form of door-to-door visits. During 14-June-2020 to 17-June-2020, the auditor respectively visited Forestry Bureau, government and village committee relevant personnel, project technicians, tree planting workers, and the

villagers around the project site from 7 Counties. At that time, questionnaires were sent to them to understand the situation during the project verification.

During the Stakeholder Consultation, the project proponent would sort out the potential problems in the project according to the opinions of stakeholders then improve them in time. During this verification period, the project design is not affected by stakeholder input.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

At the beginning of the project, the project proponent has identified a fixed contact person, which is referred to as a technician in this project. A technician is responsible for the communication of 2 to 3 villages, collecting all the suggestions and problems from the villagers. The task of these technicians is not only to feedback the villagers' suggestions and problems directly to the project manager of Guizhou Baiheng, but also to enable the project manager of Guizhou Baiheng to communicate the progress of the project to all the villagers through the technicians, and timely post and distribute project materials. When the technicians passed the problems from villagers to the project proponent, project proponent positively responded and solved them. For example, during the planting process, when some villagers reported that their farming tools were old, the project proponent decided timely replaced them with new tools. At the same time, there is a Suggestion Book published on the notice board in each of the 245 villages throughout the lifetime of the project. Stakeholders can write their comments or suggestions in the book anytime anonymously if they wish in order to feel free when expressing their disagreements. The project proponent will check the book regularly and collect all the comments received.

On the other hand, 95 technicians have been working on forest management and tree and CCB monitoring. Since the start of this project, the technicians have been trained annually in forest management and monitoring, and have been kept in touch with the project proponent. When the project needs to measure the monitoring data, they can complete the measurement work in a timely and accurate manner. The technicians pass the information on tree growth, diseases, pests and weather conditions to the proponent. In turn, the proponent regularly imparts knowledge and skills of tree management to the technicians.

The technicians as the project monitoring executor have surveyed the project area. The distance from one village to another is so short that villagers can talk directly to the technicians even the local forestry bureaus if the locals have any opinions. Meanwhile, technicians will also do a regular visit to the villages and collect comments if any.

Before the project began, Guizhou Baiheng and Libra company developed a perfect Adaptive Management plan, which specifically involved how to determine the contact person of each village, how to contact the project manager of Baiheng, daily routine communication matters, problem solving

measures, etc. So far, the design and implementation of the project have not been modified, as comment received do not affected the design of the project.

2.3.9 Stakeholder Consultation Channels (G3.5)

During this monitoring period, firstly, stakeholders were informed of the status and progress of the project through the bulletin board updated monthly by the village committee, and their comments were recorded in the village committee's complaint book. This information is fed back to the project proponent by the contact person in each village for a timely response. Secondly, the villagers can also make suggestions on the project during the technicians' monthly visits. Finally, stakeholders can communicate and give feedback to the project proponent at any time through the published phone number of contact person.

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

In the project planning phase, the farmers were fully involved in the land selection, planting pattern selection, through villagers meeting and PRA methods.

All the critical information regarding decision-making was already published to local stakeholders and the decision should be revised according to further discussion in case there is any feedback from stakeholders. During the monitoring period, the opinions and suggestions of stakeholders were obtained through questionnaires and stakeholders' meeting, and they were involved in decision-making.

On 29 October 2019, 35 villagers, village committee, forest bureau and government representatives from 25 villages were organized by the project proponent and the forestry bureau of Qiannan Buyi and Miao Autonomous Prefecture to attend the stakeholders' meeting at the forestry bureau of Guiding County, In order to prepare for the project verification and collect the views of stakeholders before the project verification. The meeting notices were already published on the notice board outside of each village committee offices together with the contact numbers so that those who missed the meetings can also share their opinions. The meeting introduced the registration of the project, the plan of the verification work and how to collect and summarize the data. The villagers agreed to continue to support the project and to cooperate fully with the verification efforts.

After the meeting mentioned above, the project proponent conducted a questionnaire survey in 30 randomly selected villages from November to December in 2019 in order to consult stakeholders more widely. A total of 100 questionnaires were issued and collected. In this way, the villagers participate in the implementation of the project.

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

In this monitoring period, 70% of village meeting attendees were women and all the project jobs were prior for women. As a result, this project is welcomed by women very much.

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 have signed up voluntarily regardless of gender, race, religion or any other basis. In case any discrimination proved to be true, the person who is responsible for the discrimination shall be fired immediately and the project proponent will find someone else to take over his/her job. During the current monitoring period, 46 women were employed as technicians.

2.3.12 Grievances (G3.8)

As set out in registered PD, the project owner nominated a specific staff in charge of recording and collecting conflicts and grievances of local communities and individual farmers. Forest patrollers in each project site play an important role in treating with ordinary conflicts and grievances and report to the forest stations or bureau. Firstly, once getting the reports, project owner and local forest agency shall contact and discuss with relevant community or other stakeholders within 3 days. Secondly, the specific staff of project proponent should propose a solution and mediation within a week based on all collected information from relevant parties. Finally, the complications or grievances shall be dealt within 30 days.

No grievances received during this monitoring period.

2.3.13 Worker Training (G3.9)

Totally 4 years of training for 95 technicians were held on every October during this monitoring period from January 2016 to December 2019. The training was divided into two sessions in order to facilitate the technicians to participate and ensure the attendance of all the technicians. One session was held within the county forestry bureau while the other one was held in the conference room of the village, where the project is located. For the training held in the conference room of the village, the villagers could also take part in if they are interested in. In addition to the Baiheng project manager, the experts from the local forestry bureau were also invited to participate in teaching for each training session. These 95 technicians which were consist of 26 technicians conducting field measurement and 69 technicians conducting community surveys were the core of the entire monitoring team in the project. In this monitoring period, the field measurement work was mainly conducted by 26 people while 52 people cooperated with them. The principle of ‘old people brings new ones’ was adopted, which means one technician familiar with the work process should lead a young technician, and then an auxiliary technician is assigned to keep records. These 95 technicians should attend the training every year and new technicians could have the opportunity to attend the training together so that local capacity lost will not be generated because of the replacement of new and old. The training is mainly in the aspects of physical safety, health and

monitoring technology, such as to measure tree height and DBH, etc. The training is to provide orientation and training for the project's technicians. These technicians are all from the villages where the project is located. They are very familiar with the local villagers and the natural environment, and also have the ability to learn the knowledge of forest monitoring, so they represent local capacity. Priority is given to the following training topics:

-Forest land inspection

Firstly, fire is the most concerning. Forest inspections shall be conducted regularly to strictly check the purpose of strangers entering the forest and to prevent the phenomenon of cutting and logging furtively. Patrol shall be reinforced in the fire-prone season, inter alia, before and after the tomb-sweeping day. At the same time, the civilized sacrifice activities shall be encouraged, so as to eliminate all kinds of fire and fire hazards for preventing fire occurrence. Also, pesticides should be used following the national standards, although the occurrence of pests and diseases should be strictly controlled in the spring and autumn. In addition, the survival rate of forest land should be ensured to meet the national requirements by observing and reporting constantly if the saplings use nutrition bags. If there are endangered plants, protective action should be taken in time, such as hanging warning signs, pulling warning lines, and then the circumstance should be reported to relevant departments by taking photos, videos and recordings. The wild animals in the forest must be protected and recorded by taking photos and photographing as far as possible, which can strengthen publicity and raise the villagers' awareness of animal protection. With respect to the growth and situation of plants and animals in the forest lands, reporting and keeping in touch with the contact person of Guizhou Baiheng should be timely and constantly. When necessary, guarding in the forest and waiting for the contact person of Guizhou Baiheng to protect the forest lands together.

-The use of monitoring and measuring instruments

Monitoring and measuring instruments were used during the inspection. The height of the tree can be measured by altimeter while the circumference of the tree can be measured by tape measure. For precisely locating the fixed monitoring sample, the GPS measuring instrument shall be used. Records information including the geographic location of the site, latitude and longitude, the site number, the carbon layer, the height of each tree and the perimeter of the 1.3-meter site, survival rate, shrub growth, and the presence or absence of animals.

-Data records

During the training each year, the technicians were taught monitoring methods and rules in the form of physical demonstrations, especially the equipment use, data recording, unit conversion, etc. The score data measurement team consists of 26 technicians who should prepare all the instruments and materials

for monitoring within a week after the monitoring period was determined. They conducted the measurement of tree height and diameter separately and all the measurements and data recording were completed in 1 months. In the end, the data summary statistics was submitted to Guizhou Baiheng for verification.

-Safety measures

Technicians are required to wear protective tools such as hard hats and gloves.

2.3.14 Community Employment Opportunities (G3.10)

The Project mobilized the participation of the entire community, including women, minorities and the poor. The working conditions provided 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 of which 60% were women. In addition, approximately 95 locals were employed for project management as technicians for both project management and monitoring survey, with 50% of women and they were regularly trained in relevant skills.

All the planting opportunities are provided to the locals preferentially on one condition that must be an adult without any disease. However, in Guizhou, large parts of adult male are working in the developed provinces for a higher salary. The females are more welcomed in planting. After the planting, they get paid 60 CNY per person per day for the number of trees they planted.

For the selection of planting workers, the village committee and project proponent had a principle to find qualified and reliable staff without any discrimination of age, sex, marital status, ethnicity, social status or religious convictions, political ideas and/or sexual orientation.

As mentioned previously, there are 95 technicians for project management. These 95 technicians are hired by local forestry bureau rangers who are familiar with local villagers and forestry-related situations, therefore, Guizhou Baiheng, after communication with the forestry bureau, decided to pay 200 CNY per person per month for hiring them as technicians of this project on a long-term, part-time basis. They are responsible for project-related management and monitoring, and the villagers' daily communication, field survey, the formation of feedback mechanism with Guizhou Baiheng, etc.

2.3.15 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, Labor contract and no forced labor is allowed, and they are free to establish and join any labor organizations as they wish. In addition, by posting the labor law propaganda materials in the village, the villagers are aware of their right to participate in the work. There was regular new-employee training provided to

workers before they started the job, which clearly indicates their rights and mechanism for grievance appeal, and the worker's rights are guaranteed in the labor contracts for each worker. The new employee training was in accordance with the *Labor Law of People's Republic of China* which guarantees the protection of employee's rights and benefits.

2.3.16 Occupational Safety Assessment (G3.12)

The project owner 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 plan is made available for workers and implemented by the village committee.

The annual technicians' training introduces cases for the participating technicians to explain in detail how to complete the construction or monitoring work under the premise of ensuring safety. Besides, in order to reduce security risks to the lowest ratings, the project manager of Guizhou Baiheng reminded the importance of safe operation repeatedly in daily communication with technicians. The technicians were told that they should contact and inform the Guizhou Baiheng if special circumstances happened. Guizhou Baiheng, as the project proponent, would take measures for technicians timely, for example, to replace the old farming tools, to help them arrange another patrol to make up for the routine patrols that are suspended during extreme weather or when they were ill.

2.4 Management Capacity

2.4.1 Required Technical Skills (G4.2)

The following skills are required for the development of the project:

- Ability to interact with different actors：If there is any intense dispute, the one shall have the ability to deal with it as soon as possible. Moreover, the organizing and coordination ability is essential for the stakeholders' meetings and relevant surveys.

- Development of projects with rural populations: the rural project is a project with large number project owners so that the developer should have the ability for getting the authorization that require abundant employee and times

-Skills on afforestation: what kinds of trees is suit for the land? How many trees should be planted? How to manage the forest and so on

- Skills on the development of carbon projects and environmental services: how to draft PD, what evidence collected, how to hold the stakeholders meeting, how to conduct the monitoring plan, how to calculate GHG sink and so on.

- Skills on the evaluation and monitoring of biodiversity: how to do CCB monitoring is the main skill for the developer such as whether the animal increased, their living range enlarged, the number of plants and species increased.

2.4.2 Management Team Experience (G4.2)

Local Forestry Bureaus and Shanghai Libra Investment & Management Co., Ltd. acted as the expert group (Management team) who is in charge of guiding and coordinating the project's overall implementation and decision-making.

Local Forestry Bureau already set up an expert pool on the land, soil, vegetation, animals and other natural resources affected by forests. Besides, forestry bureaus fed massive data to the biodiversity report and the experts from that pool provided assistance and share experience during the biodiversity monitoring. The project proponent has rich experience in forest management in Guizhou Province, including artificial afforestation, forest protection and management, forest damage control and technical training.

Shanghai Libra Investment & Management Co., Ltd. is experienced in carbon measurement and monitoring. In the past, Shanghai Libra Investment & Management Co., Ltd. has successfully developed many different kinds of carbon projects in China, including validation and verification under GS, VCS and CDM standards. These experiences have been applied to the implementation and management of the Project.

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

The management team of the project experienced in forest project management and carbon project development. Also, local Forestry Bureau provided instruction of reforestation and forest management, conducted the specific supervision of the implementation, and collected specific activity data at a routine basis. During this monitoring period, the measurement of data and the monitoring of biodiversity are mainly undertaken by 95 technicians employed by Guizhou Baiheng. The local Forestry Bureau and local government provided technical support for community engagement and biodiversity assessment. The project manager of Guizhou Baiheng was responsible for on-site verification, continuously guiding the tasks and specifications of these technicians, and the final data collection and inspection.

Therefore, the project management team and monitoring team has sufficient experience and skills required by the project.

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

All the project participators are legally registered company in China, and according to the public information listed in National Enterprise Credit Information Publicity System, none of them were involved in nor complicit in any form of corruption such as bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion.

2.4.5 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. During this monitoring period, any interest issues of the project have been made public and transparent, and any information and documents could be obtained from public channels. For preventing the occurrence of corruption, in stakeholder meetings, technical training meetings, villagers' opinion survey, and other personnel gathering occasions, project proponent and village committee leaders have repeatedly reiterated the serious consequences of corruption and immoral behavior, so that project participants have been awakened and paid attention to this. In addition, project proponent set up a mechanism for villagers to report violations if they are found. The contact between stakeholders is two-way feedback, and project information can be shared at all levels of platforms, so there is no corruption in any form.

2.4.6 Commercially Sensitive Information (*Rules* 3.5.13 – 3.5.14)

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

2.5 Legal Status and Property Rights

2.5.1 Recognition of Property Rights (G5.1)

The ownership of the forest land of the Project belongs to the village collective, Local villagers have the right to use the land within the project boundary. The land is a barren hill suitable for planting trees. The number of the land owners is so big that they authorized Guizhou Baineng 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 Project is applied for the VCS project or not, the land is owned by the village collective. The local government is responsible for all local villagers if there is anything relating to the encroachment of the locals' rights to the land.

Village committee also have right to authorize Guizhou Baineng as a representative of project owner and Guizhou Baiheng only has right related to carbon sink project including decide to develop the Project under which standard, who to sell, selling price, etc[16].

[16]Source: carbon sink project cooperation agreement signed between village committee and Guizhou Baineng

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

Prior to the project initiation, all the project lands are collective-owned by local villagers. In February 2015, the project participant and local 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. 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. The agreement also provides that farmers or collectives who have title to the wasteland on which the project is located will receive the benefits specified in the agreement when the project generates revenue. So, the project will not encroach on private property, community property or government property. Furthermore, all lands are wastelands and no occupation is involved so no compensation or return would happen.

The project documents on the 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 the native language to villagers.

2.5.3 Property Right 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 have 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.

2.5.4 Identification of Illegal Activity (G5.4)

Under the current law of China, any illegal logging activities will be fined or sentenced to punishment. Currently, all project lands are defined for forestry purposes by the local government. Deforestation must be carried on under the approval of the local Forestry Bureau, and the forests are nursed by project staff regularly as a result of the implementation of the project, so there will not be illegal deforestation. 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.

2.5.5 Ongoing Disputes (G5.5)

Because the project proponent signed a carbon sink cooperation agreement with the village committees, the forest land was developed reasonably and legally. So, there are neither on-going or unresolved conflicts or disputes over rights to lands, territories and resources nor any disputes that were resolved and recorded during the last thirty years.

2.5.6 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;

-The 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 the construction period and will be under regular inspection by local government during the implementation period to ensure continuous compliance.

3 CLIMATE

3.1 Monitoring GHG Emission Reductions and Removals

3.1.1 Data and Parameters Available at Validation

Data / Parameter	Ai
Data unit:	ha
Description:	Area of stratai
Source of data:	Field measurement
Value applied:	The difference among planting category is sapling size of Fir and Cypress. Tree plantation within each category is the same. The area of each category (A_i) is listed below.

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; Huishui county	3100	2016	5500
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

The total area is 46,000ha.

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 4-1 for details
Justification of choice of	National authority data

data or description of measurement methods and procedures applied	
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 4-1 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 4-1 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 4-1 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	t_{VAL} (for calculation of n)
Data unit	Dimensionless
Description	Two-sided Students t-value, at infinite degrees of freedom for the required confidence level
Source of data	Students t-distribution table in the tool '*Calculation of the number of sample plots for measurements within A/R CDM project activities*' (Version 02.1.0)
Value applied	1.645
Justification of choice of data or description of measurement methods and procedures applied	Use the 90% confidence level for determination of biomass stock in A/R CDM project activities
Purpose of data	The parameter is used to calculate number of sample plots for measurements
Comments	This parameter was not included in the registered PD since it is only applicable for calculating number of sample plots during verification

3.1.2 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	The ex-post estimation during this monitoring period has used allometric equations of each tree species to calculate the stem volume.

applied	
Frequency of monitoring/recording	Before every verification event
Value applied:	

Project Stratifications number	Category of tree	$V_{TREE,l,p,j,i}$(m^3)	sample plot ID
Proj -1	China fir	0.98904	ID1
		1.05683	ID3
		0.98907	ID5
		1.08545	ID12
		1.13340	ID14
		0.93847	ID16
Proj -2	China fir	1.02496	ID19
		0.85780	ID21
		1.06260	ID39-12
Proj -3	Masson pine	0.91898	ID23
		0.98167	ID29
		0.91505	ID40-6
		0.98962	ID39-2
		1.02792	ID39-11
Proj -4	Masson pine	0.78036	ID10-9
		0.73185	ID36-2
		0.77866	ID39-34
Proj -5	Pinus yunnanensis	0.93043	ID33
		0.87183	ID39
		0.93054	ID25
		1.01193	ID36
		1.04362	ID30
		0.94864	ID10-4
Proj -6	Pinus yunnanensis	0.99020	ID9
		0.98938	ID11
		1.07499	ID42

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. China fir : $V_{TREE,j}=0.000088296\times D^{(1.94097-0.0044583\times(D+H))}\times H^{(0.76012+0.0056841\times(D+H))}$ Masson pine: $V_{TREE,j}=0.000094602\times D^{(1.88156-0.0030651\times(D+H))}\times H^{(0.76840+0.0046574\times(D+H))}$ Pinus yunnanensis: $V_{TREE,j}=0.00010729\times D^{(1.95029-0.0047643\times(D+H))}\times H^{(0.63241+0.0075891\times(D+H))}$
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 the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	

Project Stratifications number	Category of tree	Average DBH(cm)	Average H(m)
Proj -1	China fir	5.49	5.62
Proj -2	China fir	5.29	5.43

		Proj -3	Masson pine	5.30	5.46
		Proj -4	Masson pine	5.04	5.22
		Proj -5	Pinus yunnanensis	5.35	5.52
		Proj -6	Pinus yunnanensis	5.15	5.15

Monitoring equipment	$DBH_{l,p,j,i}$: Vinyl tape, wooden stake $H_{l,p,j,i}$: Hypsometer metric tape The equipment mentioned above has a state-recognized certificate of qualification and no need to be calibrated.
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 IPCC GPG LULUCF 2003 may be applied. The measure is in line with LY/T 2253-2014 <Guidelines on carbon accounting and monitoring for afforestation project> issued by National Forest Bureau[17]& HJ 710.1-2014 '*Technical guidelines for biodiversity monitoring—terrestrial vascular plants*' [18] issued by Ministry of environmental protection.
Purpose of data	The parameter is used to calculate actual net GHG removals.
Calculation method	These two parameters are two trees dimensions used as entry data into the volume equations for the calculation of stem volume of trees.
Comments	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 above ground 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*

[17]https://www.renrendoc.com/p-20779950.html
[18]http://www.doc88.com/p-4512190031524.html

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 the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	A_i:

Project Stratifications number	Category of tree	Area (ha)
Proj -1	China fir	10000
Proj -2	China fir	5500
Proj -3	Masson pine	7000
Proj -4	Masson pine	2500
Proj -5	Pinus yunnanensis	15000
Proj -6	Pinus yunnanensis	6000

$A_{PLOT,i}$:0.07(ha)

Monitoring equipment	GPS measuring equipment
QA/QC procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. The measure is in line with LY/T 2253-2014 <Guidelines on carbon accounting and monitoring for afforestation project>[19]
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*

[19]https://www.renrendoc.com/p-20779950.html

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:	Please refer to ER calculation sheet for details
Monitoring equipment	Counter
QA/QC procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. The measure is in line with LY/T 2253-2014 <Guidelines on carbon accounting and monitoring for afforestation project>
Purpose of Data	The parameter is used to calculate actual net GHG removals
Calculation method	N/A
Comments	N/A

Data / Parameter	n
Data unit	Dimensionless
Description	The number of sample plots
Source of data	Calculation
Description of measurement methods and procedures to be applied	This value is estimated based on a pre-sampling developed in the Project Area before monitoring.
Frequency of monitoring/recording	Before first verification.
Value applied:	24
Monitoring equipment	/
QA/QC procedures to be applied	$n = \left(\frac{t_{VAL}}{E}\right)^2 \times \left(\sum_i w_i \times s_i\right)^2$
Purpose of Data	The parameter is used to calculate actual net GHG removals
Calculation method	See § 3.1.3 - Number of sample plots

Comments	/

Data / Parameter	n_i
Data unit	Dimensionless
Description	Number of sample plots allocated to strata i
Source of data	Calculation
Description of measurement methods and procedures to be applied	This value is estimated based on a pre-sampling developed in the ProjectArea before monitoring.
Frequency of monitoring/recording	Before first verification
Value applied:	

Project Stratifications	Category of tree	n_i	number of sampling plots
PROJ-1	China fir	6	6
PROJ-2	China fir	3	3
PROJ-3	Masson pine	5	5
PROJ-4	Masson pine	2	3
PROJ-5	Pinus yunnanensis	6	6
PROJ-6	Pinus yunnanensis	2	3

Monitoring equipment	/
QA/QC procedures to be applied	$n_i = n \times \frac{w_i \times s_i}{\sum_i w_i \times s_i}$
Purpose of Data	The parameter is used to calculate actual net GHG removals
Calculation method	See § 3.1.3 - Number of sample plots
Comments	/

Data / Parameter	W_i
Data unit	Dimensionless

Description	Relative weight of the area of stratum *i*; dimensionless
Source of data	Calculation
Description of measurement methods and procedures to be applied	The relative weight of the area of a stratum *i* is equal to the area of the stratum *i* divided by the project area.
Frequency of monitoring/recording	Before first verification.
Value applied:	

Project Stratifications	Category of tree	W_i
PROJ-1	China fir	0.217
PROJ-2	China fir	0.120
PROJ-3	Masson pine	0.152
PROJ-4	Masson pine	0.054
PROJ-5	Pinus yunnanensis	0.326
PROJ-6	Pinus yunnanensis	0.130

Monitoring equipment	/
QA/QC procedures to be applied	The relative weight of the area of stratum i is equal to the area of the stratum i divided by the project area
Purpose of Data	The parameter is used to calculate number of sample plots
Calculation method	See § 3.1.3 - Number of sample plots
Comments	/

Data / Parameter	S_i
Data unit	Dimensionless
Description	Estimated standard deviation of biomass stock per unit area in strata*i*
Source of data	Calculation

Description of measurement methods and procedures to be applied	Accordance with the tool, known from existing data related to the project area or existing data related to a similar area. According to the evidence issued by Qiannan forestry bureau, the standard deviation of forestry survey and sampling in this area requires a commonly used coefficient of variation C, which is 30% in Qiannan.[20]
Frequency of monitoring/recording	Before first verification.
Value applied:	

Project Stratifications	Category of tree	S_i
PROJ-1	China fir	38.996
PROJ-2	China fir	37.945
PROJ-3	Masson pine	40.638
PROJ-4	Masson pine	39.772
PROJ-5	Pinus yunnanensis	26.570
PROJ-6	Pinus yunnanensis	25.778

Monitoring equipment	/
QA/QC procedures to be applied	The variable coefficient times biomass carbon reserves at the end of Period（t.d.m•ha-1）
Purpose of Data	The parameter is used to calculate number of sample plots
Calculation method	See § 3.1.3 - Number of sample plots
Comments	/

Data / Parameter	E
Data unit	t d.m. ha^{-1}
Description	Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary
Source of data	A default value equal to 10% of the mean biomass stock within the project boundary was used, and the mean biomass stock within the project boundary was estimated from the preliminary sample plots.
Description of measurement methods and procedures to be	The project monitoring team set 3 preliminary sample plots for each strata and calculated the mean value of the biomass stock in each strata, and the mean value of biomass stock within the project

[20]Evidence on variable coefficient data provided by Qiannan forestry bureau.

applied	boundary was the weighted average of all strata.
Frequency of monitoring/recording	Before every verification event
Value applied	Please see Table 2 for details
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	The parameter is used to calculate number of sample plots for measurements
Calculation method	N/A
Comments	This parameter was not included in the registered PD since it is only applicable for calculating number of sample plots during verification

Data / Parameter	u_c
Data unit	Dimensionless
Description	Uncertainty in carbon change ΔC_{TREE}
Source of data	Calculated
Description of measurement methods and procedures to be applied	Calculated as described in Section 3.1.3
Frequency of monitoring/recording	Before every verification event
Value applied	2.44%
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	The parameter is used to determine the uncertainty discount. The uncertainty is 2.44%, less than 10%, therefore no discount of the mean biomass should be applied according to the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”

Calculation method	$u_C = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^{M} w_i^2 \times \frac{s_i^2}{n_i}}}{b_{TREE}}$
Comments	This parameter was not included in the registered PD since it is only applicable for calculating uncertainty discount

Data / Parameter	b_{TREE}
Data unit	t d.m.ha^{-1}
Description	Mean change in tree biomass per hectare within the biomass estimation strata
Source of data	Calculated
Description of measurement methods and procedures to be applied	Calculated based on sample plots
Frequency of monitoring/recording	Before every verification event
Value applied	10.53401
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	The parameter is used to calculate uncertainty in carbon stock
Calculation method	*N/A*
Comments	This parameter was not included in the registered PD since it is only applicable for calculating uncertainty in carbon stock

Data / Parameter	t_{VAL} (for calculation of u_C)
Data unit	Dimensionless
Description	Two-sided Students 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
Source of data	Students t-distribution table in the tool '*Calculation of the number of sample plots for measurements within A/R CDM project activities*'(Version 02.1.0)
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	Before every verification event
Value applied	1.725[21]
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	The parameter is used to calculate uncertainty in carbon stock
Calculation method	N/A
Comments	This parameter was not included in the registered PD since it is only applicable for calculating uncertainty in carbon stock

3.1.3 Monitoring Plan

Monitoring team

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

[21]During this monitoring period, n=26, M=6, therefore n-M=20, so t_{VAL} is the two-sided Students t-value for a confidence level of 90 per cent and degrees of freedom of 20 which is 1.725 according to the t-distribution Table.

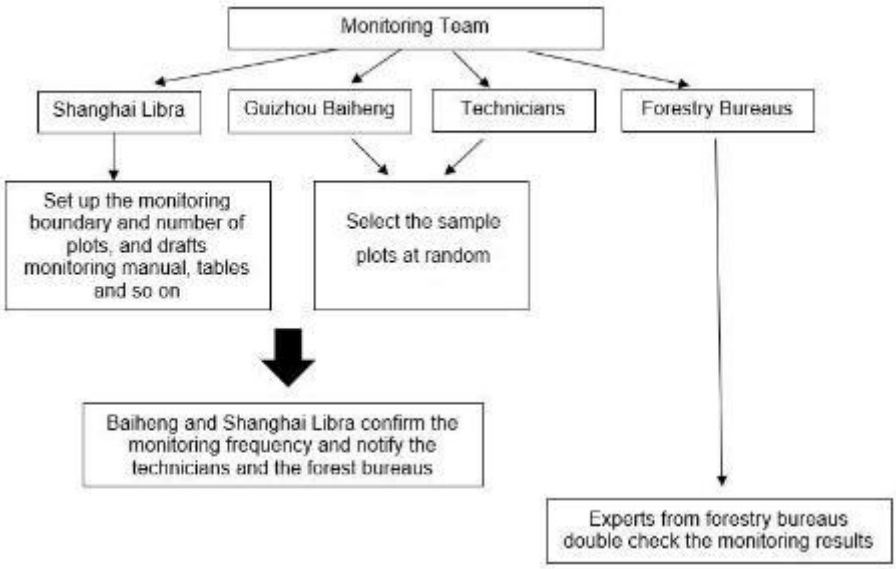


Figure 4 The figure of the monitoring team

Drafted by Shanghai Libra, Monitoring Manual has been provided to each member of the monitoring team with a specific explanation to make sure they fully understand all the monitoring processes and issues concerned.

For this monitoring period, the monitoring task was assigned in November 2015, and the monitoring team started the field measurement and recording work from 01-January to 30-January every year from 2016 to 2020.

Monitoring process

i) <u>Monitor the applicability conditions listed in methodology and tools have been met</u>

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

a) The land subject to the project activity does not fall in the wetland category.

b) Soil disturbance attributable to the project activity does not cover more than 10 percent of the area in each of the following types of land when these lands are included within the project boundary:

i. Land containing organic soils.

ii. the 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.

To monitor the applicability conditions, the following steps have been taken:

Step 1 Monitoring of boundary

During this monitoring period, technicians are strictly following the monitoring plan in PD, which stipulates the measurement and management of project boundary coordinates. Boundary information such as original records has been retained and backed up by electronic and paper documents until the end of this monitoring period.

The monitoring team used GPS or other methods to verify project boundaries and determine afforestation boundaries. The actual boundary does not exceed the design boundary after verification.

Step 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 the wetland category.

b) Soil disturbance attributable to the project activity does not cover more than 10 percent of the 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 1,620 plant/Ha, soil disturbance area ratio was 2.59%[22], less than 10%, and there was no repeated disturbance.

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

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

Therefore, AR-ACM0003 (Version 2.0.0) is applicable to 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.

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

b) The tool does not apply to small-scale afforestation and reforestation project activities.

[22]Proportion of soil disturbed area:0.16 ㎡*1620/10000 ㎡=2.59%, among them, 0.16 ㎡ was derived from the surface area calculated from the specification of artificial afforestation cavities in the Project Design (40cm*40cm)

The proposed project is a large-scale afforestation project.

Therefore, the 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.

ii) 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.

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

During this monitoring period, the area and boundary of the project have not changed, and the carbon layer is consistent with the carbon layer in the project description, so the number of sample plots has not changed.

Step 1 Calculation of the number of sample plots

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. The calculation process is as follows:

$$n = \left(\frac{t_{VAL}}{E}\right)^2 * \left(\sum_i w_i * s_i\right)^2 \quad (1)$$

$$n_i = n \cdot \frac{w_i \cdot s_i}{\sum_i w_i \cdot s_i} \quad (2)$$

Where:

n Number of sample plots required for estimation of biomass stocks within the project boundary, dimensionless

niNumber of sample plots allocated to stratum i for estimation of biomass stocks within the project boundary, dimensionless

t_{VAL} Two-sided Student's t-value, at infinite degrees of freedom, for the required confidence level; dimensionless

N Total number of possible sample plots within the project boundary (i.e. the sampling space or the population); dimensionless

Wi Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless

Si Estimated standard deviation of biomass stock in stratum i; t d.m. ha-1

E Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary; t d.m. ha-1

The standard deviation of biomass stock for each stratum (si) was conservatively determined as 30%. This was determined based on the 90% confidence level. A default value equal to 10% of the mean biomass stock was used as the acceptable margin of error. The mean biomass stock is the expected biomass at the time of monitoring.

The calculated results of the above monitoring parameters are shown in the following table：

Table 2 Number of sample plots

Category of tree	W_i	S_i	t_{VAL}	E	n	n_i	Number of sample plots
China fir	0.217	38.996	1.645	11.129	24	6	6
China fir	0.120	37.945				3	3
Masson pine	0.152	40.638				5	5
Masson pine	0.054	39.772				2	3
Pinus yunnanensis	0.326	26.570				6	6
Pinus yunnanensis	0.130	25.778				2	3

Step 2 Setting sample plots

There are 245 plots in this project, and 26 of the 245 plots with 6 carbon layers should be randomly selected as the sample plots. Random sampling was to list 245 plots containing ID Numbers of 6 carbon layers in the Excel table, and then set a random number formula in the table for random calculation. According to the number of sample plots of each carbon layer, the sample plots of each carbon layer were randomly calculated and selected. Finally, 26 sample plots were obtained, including the ID Numbers of the sample plots.

The monitoring agency 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 center point of the plot. The location of the 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 the distribution of fixed sample plots is uniform. Fixed plots measuring

methods and procedures must be in strict accordance with the technical details of Forest Resources Planning and Design Technical Regulations.

Table 3 The Sample plots table

Sample plots ID	Project Stratifications	Latitude and longitude	Category of tree	Year
ID1	PROJ-1	N 25°56'59" E106°30'00"	China fir	2015
ID3	PROJ-1	N 25°53'46" E106°30'01"	China fir	2015
ID5	PROJ-1	N 25°51'12" E106°31'35"	China fir	2015
ID12	PROJ-1	N 25°40'14" E106°55'44"	China fir	2015
ID14	PROJ-1	N 25°46'36" E106°59'00"	China fir	2015
ID16	PROJ-1	N 25°51'10" E107° 8'38"	China fir	2015
ID19	PROJ-2	N 25°49'29" E107°15'21"	China fir	2016
ID21	PROJ-2	N 25°49'01" E107°20'21"	China fir	2016
ID39-12	PROJ-2	N 26° 03'40" E106°48'56"	China fir	2016
ID23	PROJ-3	N 25°47'25" E107°27'32"	Masson pine	2015
ID29	PROJ-3	N 25°44'29" E107°41'01"	Masson pine	2015
ID40-6	PROJ-3	N 25°37'22" E106°45'45"	Masson pine	2015
ID39-2	PROJ-3	N 26°13'05" E106°39'13"	Masson pine	2015
ID39-11	PROJ-3	N 26° 07'18" E106°55'52"	Masson pine	2015
ID10-9	PROJ-4	N 26°29'23" E107°00'05"	Masson pine	2016
ID36-2	PROJ-4	N 25°57'36" E107°49'37"	Masson pine	2016
ID39-34	PROJ-4	N 25°52'50" E106°38'00"	Masson pine	2016
ID33	PROJ-5	N 25°52'44" E107°42'34"	Pinus yunnanensis	2015
ID39	PROJ-5	N 26°21'26" E107° 7'33"	Pinus yunnanensis	2015
ID25	PROJ-5	N 25°53'26" E107°36'23"	Pinus yunnanensis	2015
ID36	PROJ-5	N 25°58'21" E107°48'00"	Pinus yunnanensis	2015
ID30	PROJ-5	N 25°48'25" E107°43'44"	Pinus yunnanensis	2015
ID10-4	PROJ-5	N 26°34'23" E106°59'42"	Pinus yunnanensis	2015
ID9	PROJ-6	N 25°30'41" E106°51'46"	Pinus yunnanensis	2016
ID11	PROJ-6	N 25°30'43" E106°52'53"	Pinus yunnanensis	2016
ID42	PROJ-6	N 26°26'46" E106°55'41"	Pinus yunnanensis	2016

Step 3 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.

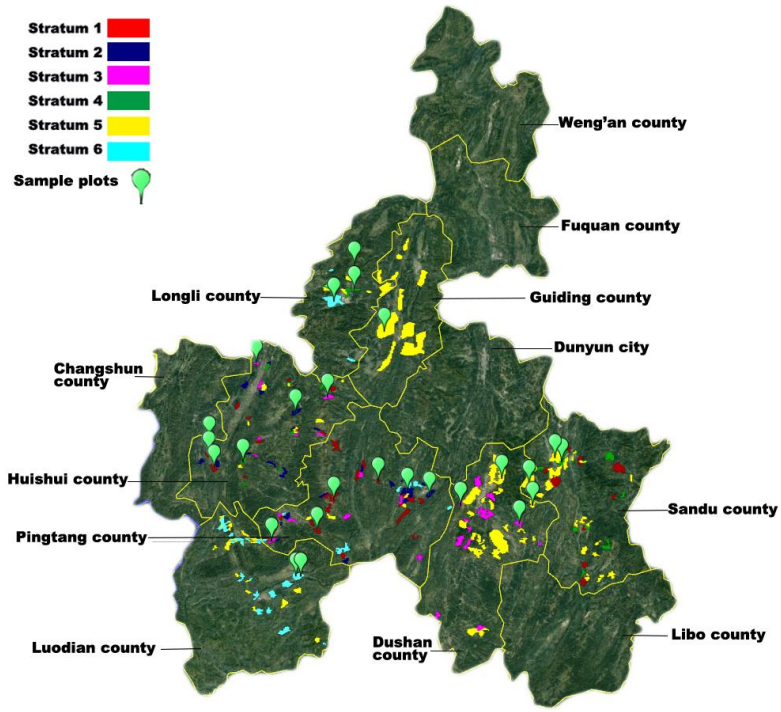


Figure 5 The Sample plots location with flags

iii) Method for estimation of the change in carbon stock

The actual net GHG removals by sinks are calculated by the equation (3):

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

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), this method (b) is estimated change in carbon stock in trees between two points of time in Section 6 of the tool has applied for the monitoring during the following verification.

Mean carbon stock in trees within the tree biomass estimation strata and the associated uncertainty are estimated as follows (all time-dependent quantities relate to the time of measurement):

$$C_{TREE} = \frac{44}{12} \times CF_{TREE} \times B_{TREE} \quad (4)$$

$$B_{TREE} = A \times b_{TREE} \quad (5)$$

$$b_{TREE} = \sum_{i=1}^{M} w_i \times b_{TREE,i} \quad (6)$$

$$u_C = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^{M} w_i^2 \times \frac{s_i^2}{n_i}}}{|b_{TREE}|} \quad (7)$$

Where:

C_{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.

B_{TREE}= Change in biomass within the biomass estimation strata; t d.m.

A = Sum of the area of the biomass estimation strata; ha

b_{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

b_{TREE}= Mean change in tree biomass per hectare in strata i; t d.m./ha

u_C= Uncertainty inΔC_{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_i^2= Variance of mean change in tree biomass per hectare in stratum i; (t d.m. ha-1)2

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

Mean tree biomass per hectare in a stratum and the associated variance are estimated as follows:

$$b_{TREE,i} = \frac{\sum_{p=1}^{n_i} b_{TREE,p,i}}{n_i} \quad (8)$$

$$s_i^2 = \frac{n_i \times \sum_{p=1}^{n_i} b_{TREE,p,i}^2 - \left(\sum_{p=1}^{n_i} b_{TREE,p,i}\right)^2}{n_i \times (n_i - 1)} \quad (9)$$

Where:

$b_{TREE,i}$ = Mean change in tree biomass per hectare in strata i; t d.m./ha

$b_{TREE,p,i}$ = Change in tree biomass per hectare in plot p in stratum i; t d.m. ha-1

s_i^2 = Variance of mean change in tree biomass per hectare in stratum i; (t d.m. ha-1)2

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

Mean tree biomass per hectare within the project boundary and its variance were estimated as follows (Equation (14) in methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2):

$$b_{TREE} = \sum_{i=1}^{M} w_i \times b_{TREE,i} \quad (10)$$

$$s_{b_{TREE}}^2 = \sum_{i=1}^{M} w_i^2 * \frac{s_i^2}{n_i} \quad (11)$$

Where:

$b_{TREE,t}$ Mean tree biomass per hectare within the project boundary at a given point of time in year t; t d. m. ha^{-1}

w_i Ratio of the area of stratum i to the sum of areas of biomass estimation strata; dimensionless

$b_{TREE,i,t}$ Mean tree biomass per hectare in stratum i at a given point of time in year t; t d. m. ha^{-1}

$s_{b_{TREE}}^2$ Variance of mean tree biomass per hectare within the project boundary at a given point of time in year t; (t d. m. $ha^{-1})^2$

s_i^2 Variance of tree biomass per hectare in stratum i at a given point of time in year t; (t d. m. $ha^{-1})^2$

n_i Number of sample plots in stratum i

M Number of tree biomass estimation strata within the project boundary

Uncertainty of the mean tree biomass per hectare within the project boundary was estimated as (Equation (15) in methodological tool '*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*' (Version 04.2):

$$u_C = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^{M} w_i^2 \times \frac{s_i^2}{n_i}}}{b_{TREE}} \qquad (12)$$

Where:

U_C Margin of error of the mean tree biomass per hectare within the project boundary; t d. m. ha^{-1}

t_{VAL} Two-sided Student's t-value for: (i) Degrees of freedom equal to n – M, where n is total number of sample plots within the project boundary, and M is the total number of tree biomass estimation strata; and (ii) The confidence level required by the methodology applying this tool (e.g. 90% or 95%); dimensionless.

E.g. Two-sided Student's t-value for a probability value of 10% (which implies a 90% confidence level) and. 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. According to the Two-sided Student's t-value, n is 26 and M is 6 while n-m is 20 with the corresponding t_{VAL} value of 1.725.

iv) 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, 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):

$$b_{TREE,p,i} = \frac{B_{TREE,p,i}}{A_{PLOT,i}} \qquad (13)$$

$$B_{TREE,p,i} = \sum_j B_{TREE,j,p,i} \qquad (14)$$

$$B_{TREE,j,p,i} = \sum_l B_{TREE,l,j,p,i} \qquad (15)$$

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:

$$B_{TREE,l,j,p,i} = V_{TREE,l,p,j,i} \times D_j \times BEF_j \times (1 + R_j) \quad (16)$$

Where:

$B_{TREE,l,p,j,i}$	=	Biomass of tree l of species j in sample plot p of stratum i; t d.m.
$V_{TREE,l,p,j,i}$	=	Stem volume of tree l of species j in sample plot p of stratum i, estimated from the tree dimension(s) as entry data into a volume table or volume equation; m3
D_j	=	Density of tree species j; t d.m/m3
BEF_j	=	Biomass expansion factor for conversion of tree stem biomass to above-ground tree biomass, for tree species j; dimensionless
R_j	=	Root-shoot ratio for tree species j; dimensionless

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 ($DBH_{l,p,j,i}$).

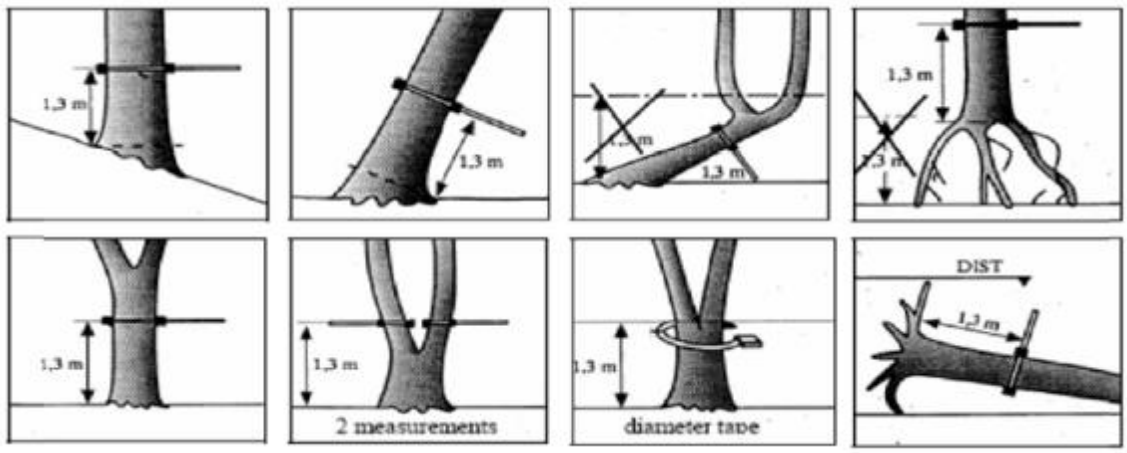


Figure 6 Tree measurements

The minimum diameter at breast height (DBH) measured is 2.0 cm. The DBH of many young trees especially those planted with delay have not reached the threshold. If over 2/3 of trees in a sampling plot have DBH less than 2.0 cm, then the plot was not measured and its carbon stock in living biomass was assumed to be zero.

DBH and height of each tree with DBH equal or over 2.0 cm in all sample plots were measured. DBH was measured at 1.3 m above the ground in the manner as shown in the figure below. After measuring the DBH of trees, their respective height measurements were conducted. The measured DBH and height were recorded on the field form (Figure-3).

Some preventive measures were taken into account:

▪ Measurement tape was kept in a position that perpendicularly cut the tree axe at 1.3 m;

▪ On inclined terrain, DBH measurement at 1.3 m is taken from an uphill position

▪For fork trees, according to the point where the fork divides the stem, was used the following methodology. If the fork began (the point where the core is divided) below 1.3 m height, each stem having the diameter required (⩾10 cm) was considered as a tree and was measured. Diameter measurement of each stem was taken at 1.3 m height. If the fork began at 1.3 m or a little higher, the tree was counted as a single tree. The diameter measurement was thus carried out below the fork intersection point, just below the bugle that could influence the DBH.

Data management

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

Statistical table of tree monitoring records of sample land

Category of tree:

No	High (m)	The perimeter (cm)	No	High (m)	The perimeter (cm)	No	High (m)	The perimeter (cm)
1			44			87		
2			45			88		
3			46			89		
4			47			90		
5			48			91		
6			49			92		
7			50			93		
8			51			94		
9			52			95		
10			53			96		
11			54			97		
12			55			98		
13			56			99		
14			57			100		
15			58			101		
16			59			102		
17			60			103		
18			61			104		
19			62			105		
20			63			106		
21			64			107		
22			65			108		
23			66			109		
24			67			110		
25			68			111		
26			69			112		
27			70			113		
28			71			114		
29			72			115		
30			73			116		
31			74			117		
32			75			118		
33			76			119		
34			77			120		
35			78			121		
36			79			122		
37			80			123		
38			81			124		
39			82			125		
40			83			126		
41			84			127		
42			85			128		
43			86			129		

Monitoring supervisor (signature): Reviewer (signature) : Monitoring period:

Figure 7 Plot of tree monitoring table

QA/QC

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

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

Monitoring plan, manual and the Chinese version MR summary have been posted on bulletin boards in 245 villages and on the VERRA website which can be easily download by stakeholders. The technicians also communicated effectively with the local villagers at any time, and the technician also explained how the project was monitored, how to collect data, and how to record the patrol inspection.

For each verification, the monitoring team will summarize all the comments received from stakeholders and corresponding responses regarding the monitoring plan and results, which will be published on VCS and CCB website along with the monitoring report for each monitoring period.

During this monitoring period, no comments on the monitoring plan and the results received.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

Baseline net GHG removals by sinks

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:

$$\Delta C_{BSL,t} = \Delta C_{TREE_BSL,t} + \Delta C_{SHRUB_BSL,t} + \Delta C_{DW_BSL,t} + \Delta C_{LI_BSL,t} \quad (17)$$

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 two cities have 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 the purpose of 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:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t} \quad (18)$$

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*; tCO_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:

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t} + \Delta C_{SHRUB_PROJ,t} + \Delta C_{DW_PROJ,t} + \Delta C_{LI_PROJ,t} + \Delta SOC_{AL,t} \quad (19)$$

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 inn tree biomass of project will be considered. Therefore, the above equation can be simplified as:

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t} \quad (20)$$

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) The 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) has been used in this monitoring period.

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

$$\Delta C_{TREE} = C_{TREE,t1} - C_{TREE,t2} \quad (21)$$

$$u_{\Delta C} = \frac{\sqrt{(u_1 \times C_{TREE,t1})^2 + (u_2 \times C_{TREE,t2})^2}}{|\Delta C_{TREE}|} \quad (22)$$

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

Because it is the first verification over this monitoring period, $C_{TREE,t1}$=0.

Hence, ΔC_{TREE}=$C_{TREE,t2}$

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 this monitoring period, Method (a) is used for the ex-post estimation during the monitoring period.

According to the Tool, under this method, random sample plots are installed in the strata (e.g. systematic sampling with a random start) and measured.

This method is more efficient when the sample plots are optimally allocated to the strata keeping in view the expected mean tree biomass per hectare and its variability in the strata. The number of sample plots and their allocation to strata may be estimated by using the A/R methodological tool '*Calculation of the number of sample plots for measurements within A/R CDM project activities*'.

The carbon stock in trees in the tree biomass estimation strata is estimated as follows:

$$C_{TREE,i,j} = \sum_{i,j} A_i \times N_{i,j} \times \frac{44}{12} \times CF_{TREE,j} \times B_{TREE,j} \quad (23)$$

$$B_{TREE,j} = V_{TREE,j} \times D_j \times BEF_j \times (1 + R_j) \quad (24)$$

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 stembiomass to above-ground tree biomass, for tree species *j*; dimensionless
R_j	=	Root-shoot ratio for tree species *j*; dimensionless

selection of allometric equations is based on the tool "Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities", In this tool, a species-specific or group-of-species-specific allometric equation derived from trees growing in edapho-climatic conditions similar to those in the project area is considered appropriate, and hence can be used for ex post estimation of tree biomass, if at least one of the following conditions is satisfied:

(a) The equation is used in the national forest inventory, or the national GHG inventory, of the host Party;

(b) The equation has been used in commercial forestry sector of the host Party for ten years or more;

(c) The equation was derived from a data set of at least 30 sample trees, and the value of coefficient of determination (R2) obtained was not less than 0.85.

The calculation formulas of this monitoring period are the allometric equations from DB52/T 702_2011 < The binary standing tree volume table of Chinese Fir>, DB52/T 703_2011 < The binary standing tree volume table of Pinus Massoniana plantation > and DB52/T 763_2012 < The binary standing tree volume table of Pinus yunnanensis > . These three formulas are the local standards of Guizhou Province where the project is located. Since the criteria are used for national forest inventory in the host country, meeting the option (a) in the above criteria, which is in line with the requirement of the tool.

Referring to the equation in the Tool, the mean carbon stock in trees within the tree biomass estimation strata is estimated as follows:

$$C_{TREE,i,j} = \sum_{i,j} A_i \times N_{i,j} \times \frac{44}{12} \times CF_{TREE,j} \times B_{TREE,j} \quad (25)$$

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

$$B_{TREE,j} = V_{TREE,j} \times D_j \times BEF_j \times (1 + R_j) \quad (26)$$

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. Allometric equation are used to estimate the average merchantable volume of one tree ($V_{TREE,j}$)

China fir[23]	$V_{TREE,j} = 0.000088296 \times D^{(1.94097-0.0044583\times(D+H))} \times H^{(0.76012+0.0056841\times(D+H))}$
Masson pine [24]	$V_{TREE,j} = 0.000094602 \times D^{(1.88156-0.0030651\times(D+H))} \times H^{(0.76840+0.0046574\times(D+H))}$
Pinus yunnanensis[25]	$V_{TREE,j} = 0.00010729 \times D^{(1.95029-0.0047643\times(D+H))} \times H^{(0.63241+0.0075891\times(D+H))}$

Where, $V_{TREE,j}$ = Stem volume of one tree of tree species j; m^3

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 4-1 Wood density, BEF, Root-shoot ratio and carbon fraction used in the proposed project activity

	China fir		Masson pine		Pinus yunnanensis	
Parameter	**factor**	**Source**	**factor**	**Source**	**factor**	**Source**
Wood density (D_j) (tonnes d.m.m-3)	0.307	The tree species involved in the proposed project can be obtained from the table using the values in the second national bulletin on climate change of the People's Republic of China "list of land-use change and forest greenhouse gases"	0.380	The tree species involved in the proposed project can be obtained from the table using the values in the second national bulletin on climate change of the People's Republic of China "list of land-use change and forest greenhouse gases"	0.483	The tree species involved in the proposed project can be obtained from the table using the values in the second national bulletin on climate change of the People's Republic of China "list of land-use change and forest greenhouse gases"
$BEF_{2,j}$	1.634		1.472		1.619	
Root-shoot ratio (R_j)	0.246		0.187		0.146	
CF_{TREE}	0.5		0.5		0.5	

According to the growing years of the description of the project activity, the aboveground biomass can be categorized into four Project Stratifications.

Table 4-2Tree biomass per hectare in sample plots

Sample ID	$b_{tree,p,i}$	Sample ID	$b_{tree,p,i}$	Sample ID	$b_{tree,p,i}$	Sample ID	$b_{tree,p,i}$	Sample ID	$b_{tree,p,i}$
Proj-1-01	8.83	Proj-2-01	9.15	Proj-3-01	8.72	Proj-4-01	7.40	Proj-5-04	12.95
Proj-1-02	9.44	Proj-2-02	7.66	Proj-3-02	9.31	Proj-4-02	6.94	Proj-5-05	13.36
Proj-1-03	8.83	Proj-2-03	9.49	Proj-3-03	8.68	Proj-4-03	7.39	Proj-5-06	12.14

[23] DB52/T 702_2011 <The binary standing tree volume table of Chinese Fir>.

[24] DB52/T 703_2011 < The binary standing tree volume table of Pinus Massoniana plantation >

[25] DB52/T 763_2012 < The binary standing tree volume table of Pinus yunnanensis >

Proj-1-04	9.69			Proj-3-04	9.39	Proj-5-01	11.91	Proj-6-01	12.68
Proj-1-05	10.12			Proj-3-05	9.75	Proj-5-02	11.16	Proj-6-02	12.67
Proj-1-06	8.38					Proj-5-03	11.91	Proj-6-03	13.76

According to the '*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*', all trees in a sample plot above a minimum dimension are measured and the biomass of each tree is estimated. According to the HJ 710.1-2014 '*Technical guidelines for biodiversity monitoring—terrestrial vascular plants*', the minimum dimension is 2cm. So if the dimension of tree in the sample plot is not above 2cm, V_{TREE}, t of the tree is equal to 0. The dimension of the sample trees in this project is all over 2cm.

Table 4-3 Tree biomass per hectare in stratum

Sample ID	Tree species	Area (ha)	$b_{tree,I}$(t d.m. ha-1)	Wi	Si^2	$Wi*b_{tree,I,t}$	Number of Plots n_i	S^2_{bTREE}
Proj-1	China fir	10000	9.22	0.21739	0.41779	2.00434	6	0.00329
Proj-2	China fir	5500	8.77	0.11957	0.94743	1.04863	3	0.00452
Proj-3	Masson pine	7000	9.17	0.15217	0.21175	1.39540	5	0.00098
Proj-4	Masson pine	2500	7.24	0.05435	0.06903	0.39349	3	0.00007
Proj-5	Pinus yunnanensis	15000	12.24	0.32609	0.63054	3.99134	6	0.01117
Proj-6	Pinus yunnanensis	6000	13.04	0.13043	0.39243	1.70081	3	0.00223

Uncertainty of the mean tree biomass per hectare within the project boundary was estimated as (Equation (15) in methodological tool '*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*' (Version 04.2):

$$b_{TREE} = \sum_{i=1}^{M} w_i \times b_{TREE,i}$$

=10.53401

$S_{b_{TREE}}$ =0.1492

$$u_C = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^{M} w_i^2 \times \frac{s_i^2}{n_i}}}{b_{TREE}}$$ =0.0244

Table 4-4 Statistical parameters from monitoring

Item	Unit	Value
		Total
B_{TREE} (Tree biomass of the project)	t d.m.	484,564.46
C_{TREE} (Carbon stock in trees of the project)	t CO_2e	848,109
$\Delta C_{,p,t}$ (Change in the carbon stocks in project)	t CO_2e	848,109
U_C (Uncertainty in C_{TREE})	%	2.44%

According to the Appendix 2 of the tool, the uncertainty in the estimated mean value of a parameter is more than 10 per cent, the estimated mean value is either increased or decreased by a percentage of the uncertainty. The table provides the uncertainty discount factors to be applied for different ranges of uncertainty.

Uncertainty discount factors

Uncertainty	Discount (% of U)
U ≤ 10%	0%
10 < U ≤ 15	25%
15 < U ≤ 20	52%
20 < U ≤ 30	75%
U > 30	100%

Due to the calculation result of U_c is less than 10%, thus discount for this monitoring period is zero.

3.2.3 Leakage

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

$$LK_t = LK_{AGRIC,t} \quad (27)$$

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.

$$LK_{AGRIC,t} = \frac{44}{12} \times (\Delta C_{BIOMASS,t} + \Delta SOC_{LUC,t})^{26} \quad (28)$$

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 a decrease in carbon stock in the carbon pools of the land and a 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, the leakage emission is accounted as zero in this monitoring period.

[26]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)

3.2.4 Net GHG Emission Reductions and Removals

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

$$\Delta C_{AR,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t \quad (29)$$

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 sinks are summarized below.

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
01-January-2016 to 31-December-2016	0	90,861	0	90,861
01-Janurary-2017 to 31-December-2017	0	184,313	0	184,313
01-Janurary-2018 to 31-December-2018	0	216,947	0	216,947
01-Janurary-2019 to 31-December-2019	0	355,988	0	355,988
Total	0	848,109	0	848,109

Year	Change in GHG benefit (tCO2e)	Buffer 10% (tCO2e)	VCUs	VCUs available
01-January-2016 to 31-December-2016	90,861	9,086	81,775	81,775
01-Janurary-2017 to 31-December-2017	184,313	18,431	165,882	165,882
01-Janurary-2018 to 31-December-2018	216,947	21,695	195,252	195,252

01-Janurary-2019 to 31-December-2019	355,988	35,599	320,389	320,389
Total	848,109	84,811	763,298	763,298

Buffer calculating: buffer credits are determined by the non-permanence risk rating (as determined in the AFOLU Non-Permanence Risk Report).

The non-permanence risk rating of the Project is derived from the risk report calculation and corresponds to 10%. This value was specifically calculated during this Monitoring Period and coincides with the calculated value presented in the PDD.

The number of GHG credits issued to the Project during this Monitoring period, considering the buffer credits, is 763,298 VCUs.

The total VCUs that must be deposited in the AFOLU pooled buffer account are 84,811 VCUs.

3.3 Optional Criterion: Climate Change Adaptation Benefits

N/A

3.3.1 Activities and/or processes implemented for Adaptation (GL1.3)

N/A.

4 COMMUNITY

4.1 Net Positive Community Impacts

4.1.1 Community Impacts (CM2.1)

During this monitoring period, all the project-affected groups expressed their true feelings which were collected by the method of village meeting, questionnaire survey sent out by the technicians, household survey, field interview, etc. The influence raised by the project including the increase of income, the enhancement of the cohesion between the community through labor, the obvious improvement of the natural environment, etc. The project proponent also formed the Community Impacts of the project by aggregating everyone's statement, which is showed as the following table:

Community Group	Villagers living in the involved 245 villages from 7 counties in Qiannan Buyi and Miao Autonomous Prefecture
Impact(s)	Improved the living environment, increase household income and living level

Type of Benefit/Cost/Risk	1. Increased household income 2. Housing environment has improved 3. Reduced natural disasters and improved living environment
Change in Well-being	Through the implementation of the project, villagers have obtained more job opportunities, and their income has also increased, avoiding the previous situation of being separated from work and unable to take care of the elderly and children in the family. At the same time, the increase in income also gives them the opportunity to renovate the house, thereby improving the living environment and enhancing happiness. The improvement of environmental quality is beneficial to all villagers. Through soil and water conservation, the harvest of crops will be greatly improved, and the natural environment will be improved. The benefits will not only increase income, but also reduce the possibility of natural disasters.

Community Group	Village committees in project area
Impact(s)	It has increased the collective cohesion of the village, improved the working methods of the villagers, and increased income without going out to work. At the same time, women's job opportunities, income and social status have increased.
Type of Benefit/Cost/Risk	1. Increased the collective cohesion of the village. 2. Help villagers increase job opportunities and get paid 3. Enjoying benefit brought by environmental improvement 4. Help women improve job skills and income 5. Time is required for training and work
Change in Well-being	Through the implementation of this project, the village committee concentrated training and organized villagers to carry out the implementation project together, which strengthened the cohesion of the village collective. The village committee helps villagers with skills, including female villagers, to become project technicians, so that they can earn more money without working outside. This improves their quality of life and standard of living, thereby improving the health and well-being of local people. At the same time, the income of working women has increased, which has not only improved the status of the family, but also improved their personal working ability.

Community Group	Forestry Bureaus of 7 counties in Qiannan Buyi and Miao Autonomous Prefecture

Impact(s)	Achieve goals in afforestation and promote forest management and protection
Type of Benefit/Cost/Risk	1.Time is required for training and work 2.Accomplish work goals and increase forest cover 3. Improved forest management techniques
Change in Well-being	Through the project, the afforestation area increased, the public's awareness of forest protection was enhanced, and knowledge of forestry-related laws and regulations, planting techniques, and insect and pest prevention was more effectively popularized.

Community Group	Governments of 7 counties in Qiannan Buyi and Miao Autonomous Prefecture
Impact(s)	Improve the local ecological environment and improve people's living level
Type of Benefit/Cost/Risk	1. Enjoying benefit brought by environmental improvement 2. Promote the increase of villagers' income and rural construction, and ease financial pressure
Change in Well-being	Through the project, the local ecological environment has been improved, people's living level, happiness and economy have been improved, which has also promoted local infrastructure construction to a certain extent.

4.1.2 Negative Community Impact Mitigation (CM2.2)

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

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

The main source of income for communities associated with the farming project zone. Their production methods are backward, affected by disasters such as floods, and agricultural production is also low. The project benefited the economy and society of two areas during the monitoring period.

1) Income improvement: During the project period, the net income generated by the project includes employment and labor income by Guizhou Baiheng (200RMB per technician per month for monitoring, total of 95 technicians) as well as carbon credit sale income.

This project has significantly alleviated the mudslides and improved the soil quality in the recent years since the trees were planted. As a result, the cash crops and crop yields have raised so that farmers can

not only meet their daily dietary need, but also can benefit from selling the majority to the market to increase their income.

The project has improved the soil condition and increased villagers' incomes. For example, as the economic crops are increased so villagers can afford the house renovation. Their living condition is improved obviously with less draught and flood.

2) Job creation: The project was provided permanent and temporary employment opportunities, including soil preparation, planting and care. Most of the opportunities are belong to residents living in the project zone. A local present household earns about 5,000RMB [27] on average a year and this project can provide 2,400 yuan per technician per year, which is a very effective and direct way for local residents to improve their living standards.

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

In recent years, tree planting activities have brought more communication opportunities between villages and villages, women and women. With the crop harvests and increased incomes, the instructions have been improved and villagers can enjoy this Festival more than ever, which lead to increased cohesion and happiness to the local communities.

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

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

5) Before implementation of the project, heavy water and soil erosion caused low yield of the crops on their farm land which is the main income of the farmers. The project creates the ecological benefits and changes them into the benefits of the people's livelihood, and provides a useful pilot for the national

[27]Reference PD.

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.

After 5 year since the commencement of this project, the soil condition has been greatly improved. Soil on the hill landform which used to be thin becomes thickening now through the planting of China fir, Masson pine and Pinus yunnanensis, which significantly contributes the production increase of the economic crops.

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

Figure 8 China fir

Figure 9 Masson pine

Figure 10 Pinus yunnanensis

It clearly shows that China fir, Masson pine and Pinus yunnanensis have very strong adaptability and have a very direct effect on controlling soil erosion in the typical karst area.

7) Gender equality improvement: women technician accounts 50% of the total technician. Through regular training their capability has been obviously improved even better than men, that not only improve the women's confidence, also reflected the principle of equality between men and women in the work.

4.1.4 Protection of High Conservation Values (CM2.4)

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

4.2 Other Stakeholder Impacts

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

There is no negative well-being impact on other stakeholders during this monitoring period.

4.2.2 Net Impacts on Other Stakeholders (CM3.3)

Project was not to negative impacts within and beyond the project zone. Besides, it was increased the income of the local communities and bring positive environmental benefits. Therefore, this project was not created negative impacts on the other stakeholder groups.

4.3 Community Impact Monitoring

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

During this monitoring period, the project community was evaluated by means of questionnaires. The contents of the questionnaires including 'what are the changes to the surrounding environment after the implementation of the project' 'does happiness increase' 'what has happened to women's social status' 'has it improved your standard of living' 'are you getting jobs and training' 'Whether the awareness of environmental protection and related laws and regulations have been raised', etc. A total of 100 questionnaires were issued and collected during the project (mentioned in 2.3.3). After the questionnaires were collected, 98% of the representatives from groups of local villagers, migrant rural workers, female rural workers considered that there was an increase of household income due to the implementation of the project which provided more local job opportunities; 92% of the representatives from group of migrant rural workers considered that there was an improvement of their capability and technical skills due to the project; 95% of the representatives from group of local village committees, government and forestry bureaus considered that there was an improvement of the local ecological environment and people's living level resulting from the project. It is concluded that no feedback was received from stakeholders, such as comments and complaints.

The following key variables are monitored for this monitoring period:

Variable	Household income
monitoring methods to be applied	Questionnaire and interview with local villagers and technicians
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local villagers, Village committees
Result of monitoring	Technicians earn an extra 200CNY per month total 2,400CNY per year

Variable	Capability of technical skills
monitoring methods to be applied	Questionnaire and interview with technicians
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local villagers, forestry bureaus
Result of monitoring	During the monitoring period, Local Forest Bureau and Guizhou Baiheng held several trainings for technicians mainly in the aspects of physical safety and health and technology. The training content is related to the knowledge of forest field work, how to use measuring equipment. Furthermore, due to the project part of technicians were taught to use camera, monitoring equipment, writing, reading and a few technicians can use computers.

Variable	Level of social cohesion
monitoring methods to be applied	Questionnaire and interview with local villagers and technicians
Frequency of monitoring/recording	Before every verification event
Affected community groups	Local villagers and village committees
Result of monitoring	The project provided people not only increased revenue but also a joyful life style. Afforestation formed a close interaction between individuals, which strengthen communication between communities and local governments, communities and communities. The project forest mainly connects several villages so villagers have been connected by project forest. Because of the project, the villagers often gathered up for make decision, express opinion and training, they are becoming unity. Besides the project meeting, they can gather up for festivals themselves.

Variable	Awareness of forest protection and popularization of laws
monitoring methods to be applied	Questionnaire and interview with local villagers, village committees and technicians
Frequency of monitoring/recording	Before every verification event
Affected community groups	governments, forestry bureaus, local villagers
Result of monitoring	The project promotes forest management and protection, improves public awareness of forest protection, and more effectively popularizes forestry-related laws and regulations, planting techniques, and knowledge of pest control. Through the implementation of the project, the villagers have become more willing to protect the trees consciously, and the environmental protection awareness has been greatly improved, effectively improving the local ecological environment.

Variable	Eased the government's financial pressure
monitoring methods to be applied	Questionnaire survey and interviews with relevant personnel of the government and forestry bureau
Frequency of monitoring/recording	Before every verification event
Affected community groups	governments, forestry bureaus
Result of monitoring	Because of the implementation of this project, the local economy has been promoted to a certain extent, the people have worked hard, and solved part of the employment problems and are self-sufficient. Project income also helps to alleviate financial pressure.

4.3.2 Monitoring Plan Dissemination(CM4.3)

Monitoring plans and manuals for project monitoring periods have been posted on bulletin boards in villages. The monitoring report and summary have been published on the VERRA website, and the relevant villagers have understood the progress of the project. The project leader also communicated effectively with the local villagers during the publicity, and the technician also explained how the project was monitored, how to collect data, and how to record the patrol inspection.

Guinan Afforestation Project
ID: 2070
Program(s): VCS and CCB Programs
Location: Guizhou Province, China
Project Proponent: Guizhou Baiheng Fertilizer Co., Ltd.
Benefits achieved during monitoring period:

- Reduction in soil erosion due to planting activities has increased crop yields
- Project demonstrates the equality of women by awarding half of the technical positions, which traditionally would have gone to men, to women.

Submit comments from 04 May – 03 June 2020

Figure 11 In VERRA Publicity

For each verification, the monitoring team will summarize all the comments received from stakeholders and corresponding responses regarding the monitoring plan and results, which will be published on VCS and CCB website along with the monitoring report for each monitoring period.

During this monitoring period, no comments on the monitoring plan and results received.

4.4 Optional Criterion: Exceptional Community Benefits

N/A.

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

N/A.

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

N/A.

4.4.3 Net Impacts on Women (GL2.5)

N/A.

4.4.4 Benefit Sharing Mechanisms (GL2.6)

N/A.

4.4.5 Governance and Implementation Structures (GL2.8)

N/A.

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

N/A.

5 BIODIVERSITY

5.1 Net Positive Biodiversity Impacts

5.1.1 Biodiversity Changes (B2.1)

Change in Biodiversity	Species of plants
Monitored Change	Increased
Justification of Change	Afforestation of this project used local species, implemented afforestation activity through scientific and reasonable configuration method with no burning and slash. When planted trees gradually grow up to forest, project area is becoming ecological community with the domain species of tall trees, which will improve the biodiversity. With enlarged forest area, increased rainfall and improved soil bring more type of crop and fast grown than ever. According to be biodiversity survey report of the Academy of Social Sciences of Guizhou province, the statistical data of 26 sample plots obtained showed that there were no plants in the arborous layer while two species were found in the herbaceous layer, namely Xanthium sibiricum Patrin ex Widder and Urtica fissa E. Pritz. A total of 20 strains of Xanthium sibiricum Patrin ex Widder with coverage of 20% were found in 20 quadrats out of 10 sample plots. Another species, Urtica fissa E. Pritz, with a total number of 30 and coverage of 30%, was found in 30 quadrats out of 26 sample plots. In addition, a total of 5 Distylium racemosum Sieb.et Zucc. were found in 5 quadrats out of 5 sample plots, which is the only species found in shrub layer with the coverage of 20%.

Change in Biodiversity	Species of animals
Monitored Change	Predicted increase
Justification of Change	According to the Guizhou province academy of social sciences biodiversity survey report, the 26 sample statistics gained presented that the three species, respectively, for the Ardea cinerea, Butastur indicus and Upupa epops during the monitoring period. During the monitoring period, a total of 7 animals were found, and 1 species was found in each of the three carbon layer plots. The traces of each species were different, and a total of 3 kinds of traces were found. Among them, the Ardea cinerea was the entity found and was photographed as evidence, one of which was found with a vertical distance of 13 meters from the sample line. Four Butastur indicus were discovered through its tweedle in the vertical distance of 20 meters of the line transect. Upupa epops were observed in the air at a vertical distance of 15 meters, and the number was 2. **Figure 12** Ardea cinerea, Photographed in Huishui County in October 2018

5.1.2 Mitigation Actions (B2.3)

Afforestation in this project was used local species, 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 does not decrease biodiversity of project area.

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

First, due to long-term farming, ecological structure of most project area is relatively homogenous, with low biodiversity. The other small part is wasteland, mainly covered with grass and scattered shrubs.

Afforestation of this project used local species, implement afforestation activity with scientific and reasonable configuration method, with no burning and slash. The use of point-like site preparation protected the existing vegetation as much as possible. Thus, the net with-project change of biodiversity is positive.

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 area is located within Qiannan Autonomous Prefecture in Guizhou Province, the surrounding area is concentrated of wildlife. Therefore, the afforestation project will facilitate biodiversity protection of the whole project zone.

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

National key animals	**Common name**	**IUCN**
Manispenta dactyla	Pangolin	Endangered
Andrias davidianus	Giant Salamander	Endangered
Neofelis nebulosa	Clouded Leopard	Vulnerable
Viverrazibetha	Large India Civert	Least Concern
Macacamulatta	Normal Rhesus Monkey	Least Concern
Lophuranycthemera	Silver Pheasant Meat	Least Concern
National key plants		
Craigia yunnanensis	Craigia	Endangered
Keteleeria davidiana	Tijian Yushan	Least Concern
Eucommia ulmoides	Eucommia Ulmoides	Vulnerable
Rhoipteleachiliantha Diels et Hand.-	Horsetail Tree	Vulnerable

Mazz		

Manispentadactyla, Andrias davidianus and Craigia yunnanensis are globally endangered species according to IUCN.

5.1.4 High Conservation Values Protected (B2.4)

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

5.1.5 Invasive Species (B2.5)

All the planted trees are native species and no invasive species have been introduced into any area affected by the project during this monitoring period.

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

No non-native species have been used in the project zone.

5.1.7 GMO Exclusion (B2.7)

No GMOs have been used to generate GHG emissions reductions or removals.

5.1.8 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.
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 technicians to minimize the potential effect. Especially the biological measures to control pests and diseases will be adopted. Therefore, the pesticide application will be limited. During monitoring period, no chemical pesticides, so there is no effect.

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.
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. During monitoring period, no biological control agents, so there

	is no effect.

5.2 Offsite Biodiversity Impacts

5.2.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Actions (B3.2)

As the project activities was increased 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.

5.2.2 Net Offsite Biodiversity Benefits (B3.3)

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

5.3 Biodiversity Impact Monitoring

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

Sample Plots

The sample plots for monitoring biodiversity are same as the sample plots for carbon monitoring. The scope of the biodiversity survey by Guizhou Academy of Social Sciences (GASS) was set as Sandu county, Huishui county, Pingtang county, Luodian county, Longli county, Guiding county, and Dushan county.

Table 5 Information table of the sample spots

the Number of Sample Plot	**Sample plots ID**	**Address**	**Carbon Layer**	**Latitude and longitude**
1	ID1	Hexin village, Lushan town, Huishui County	Carbon Layer1	N25°56'59" E106°30'00"
2	ID3	Yuwan village, Lushan town, Huishui County	Carbon Layer1	N25°53'46" E106°30'01"
3	ID5	Mangong village, Duanshan town, Huishui County	Carbon Layer1	N 25°51'12" E106°31'35"
4	ID12	Hanglong village, Kedu street, Pingtang County	Carbon Layer1	N 25°40'14" E106°55'44"
5	ID14	Wenggang village, Tongzhou town, Pingtang County	Carbon Layer1	N 25°46'36" E106°59'00"
6	ID16	Kaluo village, Yazhou town, Pingtang County	Carbon Layer1	N 25°51'10" E107° 8'38"
7	ID19	Modaoshi village, Pingzhou town, Pingtang County	Carbon Layer2	N 25°49'29" E107°15'21"
8	ID21	Huilong village, Pingzhou town, Pingtang County	Carbon Layer2	N 25°49'01" E107°20'21"
9	ID39-12	Bailong village, Baijin town,	Carbon Layer2	N26° 03'40" E106°48'56"

		Huishui County		
10	ID23	Yangfeng village, Baiquan town, Dushan County	Carbon Layer3	N 25°47'25" E107°27'32"
11	ID29	Qunjian village, Jichang town, Dushan County	Carbon Layer3	N 25°44'29" E107°41'01"
12	ID40-6	Yintian village,Biantang town, Pingtang County	Carbon Layer3	N 25°37'22" E106°45'45"
13	ID39-2	Chitu village, Gaozhen town, Huishui County	Carbon Layer3	N 26°13'05" E106°39'13"
14	ID39-11	Bailang village, Ningwang town, Huishui County	Carbon Layer3	N 26° 07'18" E106°55'52"
15	ID10-9	Pingdi village, Longshan town, Longli County	Carbon Layer4	N 26°29'23" E107°00'05"
16	ID36-2	Chenguang village, Dahe town, Sandu County	Carbon Layer4	N 25°57'36" E107°49'37"
17	ID39-34	Baiya village, Dima town, Huishui County	Carbon Layer4	N 25°52'50" E106°38'00"
18	ID33	Yixin village, Dahe town, Sandu County	Carbon Layer5	N 25°52'44" E107°42'34"
19	ID39	Changzhai village, Gonggu town, Guiding County	Carbon Layer5	N 26°21'26" E107° 7'33"
20	ID25	Lalin village, Mawan town, Dushan County	Carbon Layer5	N 25°53'26" E107°36'23"
21	ID36	Xingguang village, Puan town, Sandu County	Carbon Layer5	N 25°58'21" E107°48'00"
22	ID30	Jiangzhai village, Jichang town, Dushan County	Carbon Layer5	N 25°48'25" E107°43'44"
23	ID10-4	Guanyin village, Gujiao Street, Longli County	Carbon Layer5	N 26°34'23" E106°59'42"
24	ID9	Bailin village, Moyang town, Luodian County	Carbon Layer6	N 25°30'41" E106°51'46"
25	ID11	Fangli village, Moyang town, Luodian County	Carbon Layer6	N25°30'43" E106°52'53"
26	ID42	Lianhua village, Longshan town, Longli County	Carbon Layer6	N26°26'46" E106°55'41"

Survey Method

Animal Diversity Survey

（1） Survey Tool

The sample plot searching line map、GPS locator, telescope, pedometer, board clip, oily marker, etc.

（2） Survey Method

In the routine sample zone survey, the Guizhou province sampling zone method[28] is adopted in Qiannan Buyi and Miao Autonomous Prefecture for winter survey. The survey shall be started at finding and recording the starting point of the sample zone according to the sample plot searching line map. Then, at a speed of 2-3 km/h, starting point travels along the direction of northeast-southwest, and records the number of animal entities or traces found, the vertical distance from the centerline of the sample zone, the

[28]Refer to the animal survey method in *investigation report on wildlife resources in Guizhou province* and the literature link ishttps://www.docin.com/p-1749542610.html

habitat, altitude, and other relevant data and information. This survey includes Sandu county, Huishui county, Pingtang county, Luodian county, Longli county, Guiding county, and Dushan county in Qiannan Buyi and Miao Autonomous Prefecture. Before the survey, the survey community containing each route was demarcated on a 1:100,000 topographic map. The actual walking route was chosen according to the actual situation in the investigation area. All the fresh animal feces met should be sampled for molecular biological analysis. Also, the information of other animals (including entity, feces, footprints, food tracks, etc.) in the route passed should be recorded. Meanwhile, the vegetation distribution and relevant environmental information in the area should be investigated. The animal information confirmation can be conducted through household investigation.

The 26 plots in this survey area were sampled using the random sampling methodology referred to in the project design documents.

Plant survey

（1）Survey tool

The survey tools are tape measure, tape, scissors, specimen bag, specimen holder, the ropes with the length of 1 meter, 2 meters, 5 meters and 10 meters, oil-based marker, etc. Plant species survey: Several vertical and horizontal, throughout different habitats, sample lines were established in the survey area. Lines shall be set up by using a typical sampling method and the density shall be calculated on average 8km^2 controlled by a single line. A group containing 3 people observed and proceeded along the line during the survey to fill in the name, richness and altitude of each recognized plant and collect the plant specimens of each unacquainted plant (try to avoid collecting specimens in general).（2）Vegetation survey method: According to the characteristics of natural succession of vegetation in the karst rocky desertification area in central Guizhou, the method of typical sampling was used to investigate plant communities at each succession stage. The area of survey sample plots was divided into:

a. The arbor layer is selected to have a quadrat area of 30 meters in length and 30 meters in width, so as to determine the types and the number of arbors in the sample plot, number the identification tag, measure the height, diameter at breast height, canopy density of these arbors and judge their viability. All the measurement results were recorded.

b. The shrub layer is selected to have a quadrat area of 5 meters in length and 5 meters in width, so as to determine the types and the number of shrub in the sample plot, number the identification tag, measure the height, crown diameter, coverage degree of these shrubs and judge their viability. All the measurement results were recorded.

Survey results:

From the beginning of the project, the biodiversity monitoring was mainly completed by the 95 technicians who were hired by Guizhou Baiheng. All technicians have performed biodiversity monitoring during the monthly forestland inspection. They recorded the results according to the concrete scheme of monitoring plan and requirements and then summarized yearly to feedback to Guizhou Baiheng project manager.

The conclusion on biodiversity was obtained from a field survey conducted by the academy of social sciences of Guizhou province for one and a half months.

Animal diversity

As required by the survey methodology, the technicians feedback the monitoring results to the project manager of Guizhou Baiheng. Afterward, Guizhou province academy of social sciences completed the biodiversity survey report based on the survey data. The 26 sample plots were monitored and collected according to the direction of the sample diagram. The sample line covered 600 hectares of land with a minimum of 23 hectares for each sample plot and also for each sample line. Finally, a total of three kinds of species were found through statistics, which are Ardea cinerea、Butastur indicus and Upupa epops respectively. During the monitoring period, a total of 7 animals were found, and 1 species was found in each of the three carbon layer plots. The traces of each species were different, and a total of 3 kinds of traces were found. Among them, the Ardea cinerea was the entity found and was photographed as evidence, one of which was found with a vertical distance of 13 meters from the sample line. Four Butastur indicus were discovered through its tweedle in the vertical distance of 20 meters of the line transect. Upupa epops were observed in the air at a vertical distance of 15 meters, and the number was 2.

Plant diversity

As required by the survey methodology, the sample plots of three types of vegetation were collected. After collecting the data, the survey report was compiled by the academy of social sciences of Guizhou province. Finally, the statistical data of 26 sample plots obtained showed that there were no plants in the arborous layer while two species were found in the herbaceous layer, namely Xanthium sibiricum Patrin ex Widder and Urtica fissa E. Pritz. A total of 20 strains of Xanthium sibiricum Patrin ex Widder with coverage of 20% were found in 20 quadrats out of 10 sample plots. Another species, Urtica fissa E. Pritz, with a total number of 30 and coverage of 30%, was found in 30 quadrats out of 26 sample plots. In addition, a total of 5 Distylium racemosum Sieb.et Zucc. were found in 5 quadrats out of 5 sample plots, which is the only species found in shrub layer with the coverage of 20%. Since collecting samples would be avoided as much as possible during the investigation, all the species found were taken photos for evidence.

In summary, the data of biodiversity survey stated that since the afforestation project in Qiannan Buyi and Miao Autonomous Prefecture was implemented, the geographic characteristics of the rocky desertification barren hills have been improved to some extent. Plants and animals that had been supposed to grow in the region were found during the monitoring period, which never happened previously. It can be proven that the project management of rocky desertification has played a certain positive effect, the biodiversity in this area has started to be increased by the project. The statistical results are shown as the following table:

Table 6 Monitoring variables for biodiversity

Indicator type	Description	Monitoring indicator	Indicator unit	Survey results	Monitoring method	Monitoring frequency
State variables	The quantity and quality of forest in the project area	Forest cover	ha	46,000	By Measuring the sample spots.	Before every verification
		Species of vegetation	/	3 types of plant with a total number of 55.	According 26 sample spots set during monitoring, monitor by designating quadrats and then taking photos for recording.	Before every verification
		Animal population associated with forest (birds)	/	3 types of birds with a total number of 7.	According 26 sample spots set during monitoring, monitor the animal entity or trace by designating sample line and then taking photos or recording the sound.	Before every verification
Pressure variables	The frequency or intensity of anthropogenic impacts that are directly harmful to biodiversity in the project zone	Number of fires occurred	/	None	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Effected forest area suffered insects and disease	ha	0	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	46000	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Forest area under prevention control from insects and diseases	ha	46000	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Forest area recovered from fire, insects or diseases		0	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Number of trees re-planted	/	0	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year

5.3.2 Biodiversity Monitoring Plan Dissemination (B4.3)

Monitoring plan and manual, Chinese version MR summary have been posted on bulletin boards in 245 villages and on the VERRA website which can be easily download by stakeholders. The technicians also communicated effectively with the local villagers any time, and the technician also explained how the project was monitored, how to collect data, and how to record the patrol inspection.

For each verification, the monitoring team will summarize all the comments received from stakeholders and corresponding responses regarding the monitoring plan and results, which will be published on VCS and CCB website along with the monitoring report for each monitoring period.

During this monitoring period, no comments on the monitoring plan and results received.

5.4 Optional Criterion: Exceptional Biodiversity Benefits

N/A.

5.4.1 Trigger Species Population Trends (GL3.3)

N/A.

6 ADDITIONAL PROJECT IMPLEMENTATION INFORMATION

N/A.

7 ADDITONAL PROJECT IMPACT INFORMATION

N/A