

HECHU AFFORESTATION PROJECT IN ANHUI PROVINCE



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

Project Title	Hechu Afforestation Project in Anhui Province
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Report ID	/
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Project Location	Anhui Province, China.
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GHG Accounting/ Crediting Period	22-April-2014~21-April-2034; 20-year total period
Monitoring Period of this Report	22-April-2014~31-December-2018
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Gold Level Criteria	N/A

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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 honeysuckle, beet, etc.	5.2	With enlarged forest area, increased rainfall and improved soil bring more type of crop and fast grown than ever.
2) Provide experience of forest planting and management in hilly land.	Due to natural phenomena such as windstorm and floods in the hilly area, the soil layer is easily destroyed. However, after planting trees through the project, the soil is stabilized and improved.	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 22,543, of which 70% were women	2.3	Number of women to be employed as a result of project activities, expressed as 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	362,937 tCO ₂ e	3.2.4	362,937 tCO ₂ e
	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	30,057 Ha	2.1	30,057 Ha
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
Training	Total number of community members who have improved skills and/or	22,543	2.3	22,543

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
	knowledge resulting from training provided as part of project activities			
	Number of female community members who have improved skills and/or knowledge resulting from training provided as part of project activities of project activities	15,780	2.3	15,780
Employment	Total number of people employed in of project activities, ⁵ expressed as number of full time employees ⁶	22,543	2.3	22,543
	Number of women employed in project activities, expressed as number of full time employees	15,780	2.3	15,780
Livelihoods	Total number of people with improved livelihoods ⁷ or income generated as a result of project activities	22,543	2.3	22,543
	Number of women with improved livelihoods or income generated as a result of project activities	15,780	2.3	15,780
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
	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

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
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	22,543	2.3	22,543
	Number of women whose well-being was improved as a result of project activities	15,780	2.3	15,780
Biodiversity conservation	Change in the number of hectares significantly better managed by the project for biodiversity conservation, ⁹ measured against the without-project scenario	30,057	5.2	30,057

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.

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.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	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	1	5.2	1

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 2018), the Project has been implemented for four years eight months and nine days. On the total project area of 30,057 ha, the trees are growing healthy.

The local species *Koelreuteria paniculata*, *Quercus robur*, *Celtis sinensis* Pers and *Zelkova schneideriana* are selected for afforestation because they have outstanding application value in mountainous areas, which have characteristics of fast growth, shallow rooting and strong adaptability to poor soil. And they are especially suitable for Afforestation in hill areas of subtropical monsoon climate zone. During the last 5 years there was no natural disaster. Because of good forestry practice, the percentage of forest coverage rate has increased, while mitigating the impacts of climate change and 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 the project. Thus no need to manage the leakage):

During the monitoring period, all the technicians conduct regular forest inspection every month, in particular, people who attempt to destroy forests are strictly prevented from entering to prevent deforestation. In the fire prone season, they conducted forest inspection every day to prevent any sources of fire from entering the forest. If there was any emergencies, they would inform the superior leadership and project contact person of Heifei Zhuoya at once and stayed where the emergency happen until anyone come for help. The Forest Management Manual was required to obey strictly, while the technicians should 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 is 362,937 tCO₂e from 22-April-2014 to 31-December-2018, with an average annual GHG emission reduction of 72,587 tCO₂e.

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	Hefei Zhuoya Landscaping Engineering Co., Ltd
Contact person	Yaqing Zhang
Title	Project Manager
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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
Contact person	Shaohui Zhong
Title	Manager
Address	Room H, Floor 20, Aibang Mansion, No.585 Lingling Road, Xuhui District, Shanghai, China
Telephone	+86-21-64693022
Email	kvz@libracarbon.com

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 22-April-2014 when the planting started.

2.1.6 Project Crediting Period (G1.9)

The project crediting period is 20 years from 22-April-2014 to 21-April-2034, and the project lifetime is 30 years from 22-April-2014 to 21-April-2044.

This monitoring period is from 22-April-2014 to 31-December-2018.

2.1.7 Project Location

The project is located within Hefei City and Chuzhou City of Anhui Province, China.

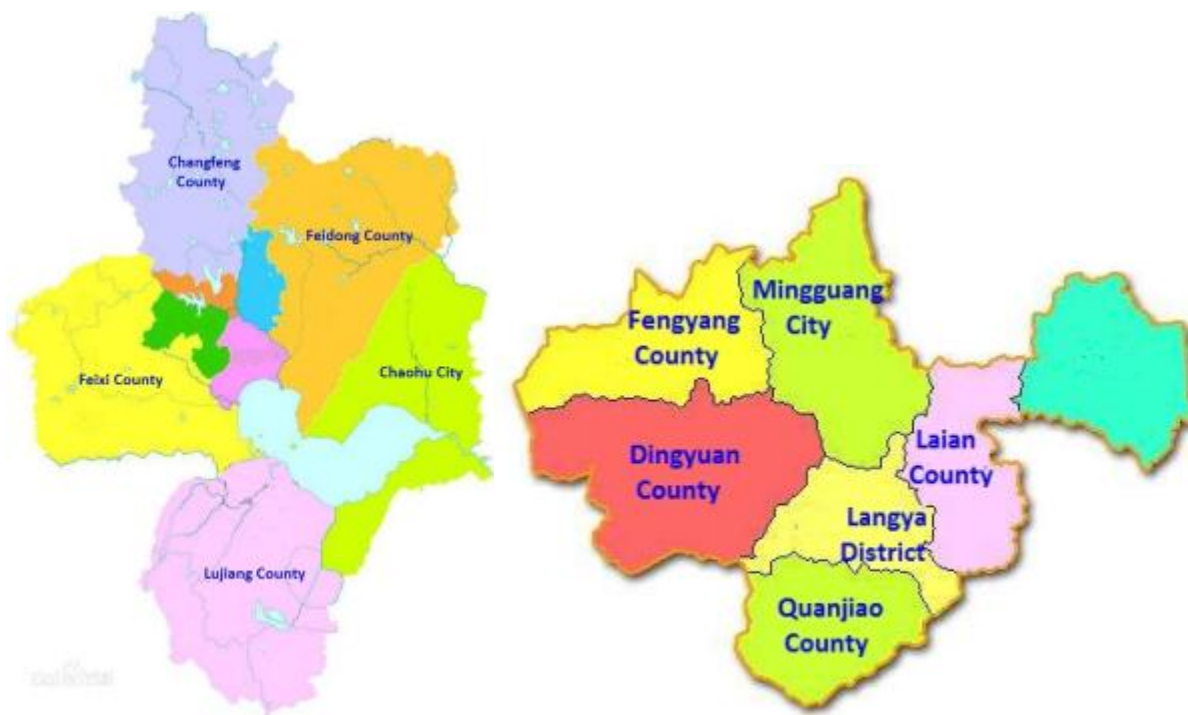
The location of the project zone in Anhui Province is illustrated in map 01. Location of the Project cities and counties (Changfeng County, Feidong County, Chaohu City, Feixi County and Lujiang County in Hefei City, and Mingguang City, Fengyang County, Dingyuan County, Laian County, Langya District, Quanjiao County in Chuzhou City) 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 Zone in Two cities

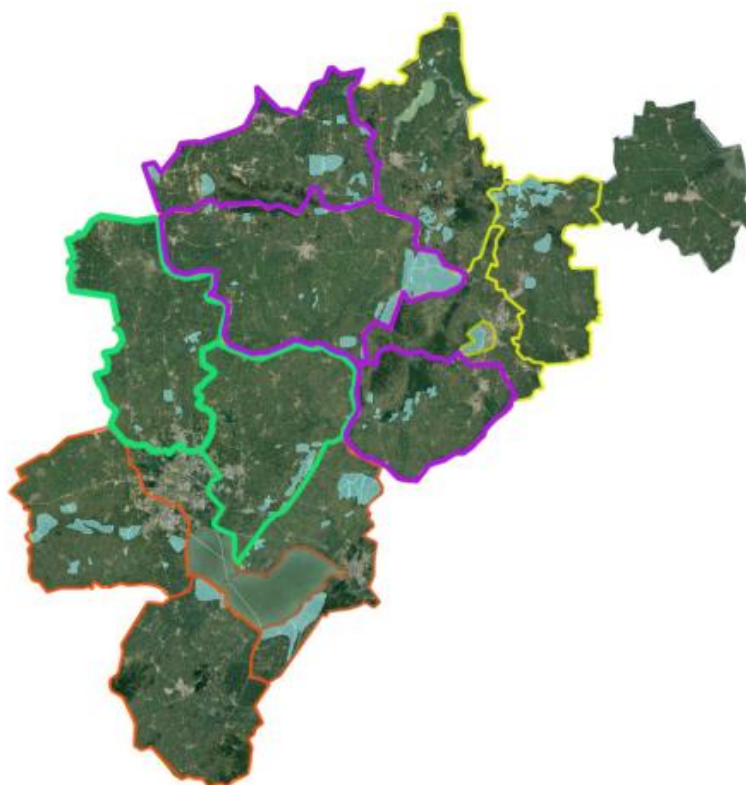
	East longitude	North latitude
Hefei City	116°41'-117°58'	30°57'-32°32'
Chuzhou City	117°09'-119°13'	31°51'-33°13'



Map 01: Location of the Project Zone 'Hefei City and Chuzhou City' in map of Anhui Province, China.



Map 02: Location of the Project cities and counties (Changfeng, Feidong, Chaohu, Feixi and Lujiang) in Heifei City, and(Mingguang, Fengyang, Dingyuan, Laian, Langya, Quanjiao)in Chuzhou City



Map 03: Project Zone (blue shadow) and Project Area.

In Map 03, the red-bordered areas are Chaohu City, Lujiang County and Feixi County in Hefei City where 37 villages involved in the project area. In the area, *koelreuteria paniculata* is the main species planted in 2014 that is indicated the stratification of Pro-1.

The green-bordered area represents Changfeng County and Feidong County in Hefei City where 21 villages involved in the project area. In this area, *Quercus robur* is the main species planted in 2014 that is indicated the stratification of Pro-2.

The purple-bordered area represents Quanjiao County, Fengyang County and Dingyuan County in Chuzhou City where 38 villages involved in the project area. In this area, *Celtis sinensis Pers* is the main species planted in 2015 that is indicated the stratification of Pro-3.

The yellow-bordered area represents Laian County, Mingguang City and Langya District in Chuzhou City where 32 villages involved in the project area. In this area, *zelkova schneideriana* is the main species planted in 2015 that is indicated the stratification of Pro-4.

Tianchang City and urban area in Hefei are excluded in the boundary line above. These areas have benefited when the afforestation activities were implemented as the climate of the communities in these areas has been improved.

2.1.8 Title and Reference of Methodology

Consolidated afforestation and reforestation baseline and monitoring methodology AR-ACM 0003/Version 2.0.0 Afforestation and reforestation of lands except wetlands” is applied.

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

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

- Calculation of the number of sample plots for measurements within A/R CDM project activities (Version 02.1.0)
- 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 program 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 registration 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.

Anhui province where the project is located, it is rich in natural resources, and always attaches great importance to the problem of environmental protection. The Chinese government is exploring the development of own sustainable development concept. 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 section 5 for details)

2.2 Project Implementation Status

2.2.1 Implementation Schedule (G1.9)

Date	Milestone(s) in the project's development and implementation
23-September-2013	The baseline survey was started.
01-December-2013	The Project Design for Afforestation Operation was finished.
16-January-2014	Hefei City and Chuzhou City's afforestation plan received approval by the local forestry department
29-January-2014	Biodiversity survey report of the project was completed.
10-March-2014	Participatory Rural Appraisal (PRA) report of the project was completed.
22-April-2014	Trees were started to be planted (start date of crediting period)
15-November-2015	Planting was completed.
22-April-2019	Registration as VCS project was completed.
15-January-2019 to 30-March-2019	The results of field survey were finished
20-September -2019	Draft MR finished
01-November-2019 to 01-December-2019	MR GSC
26-November-2019 to 29-November-2019	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*)

N/A.

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 should adopt the necessary measures for fire preventing then. There is no fire outbreak happened during this monitoring period.	This monitoring period strengthened the forest fire prevention propaganda and education work, has raised the whole society's forest fire prevention consciousness. 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)

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

- All the planted areas are 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.

- 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/#/project_details/1855), as well as the project summary in the Chinese version, which can be easily downloaded by the local communities and other stakeholders from the website (Figure 2). No public comments were received during the public comment period from 01-November-2019 to 01-December-2019. From November 2019, the project periodic development has been published on the notice board of 128 villages involved in the project, including PD, monitoring manual and monitoring plan. At the same time, the contact persons' information was also announced (Figure 3). If there is any negative feedback, a meeting will be immediately held in the village.

Hechu Afforestation Project in Anhui Province
ID: 1855
Programs: VCS and CCB Programs
Location: China
Project Proponent: Hefei Zhuoya Landscaping Engineering Co., Ltd.
Benefits achieved during monitoring period:

- The project activity aims to: Sequester carbon dioxide and mitigating climate change. Enhance biodiversity conservation by increasing the connectivity of forests. Improve the quality and quantity of the vegetation. Improve soil and water conservation in the lower reaches of the Yangtze River and the Jianghuai hilly area. Generate income and job opportunities for local communities.

CCB Public Comment Period: 01 November – 01 December 2019

Figure 2 Published on VCS and CCB website



Figure 3 Documents on the village notice board

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

The on-site verification and Stakeholder interviews were held in Feidong County on 26-November-2019. Stakeholder meetings in the project areas were organized locally by the Hefei and Chuzhou Forestry Bureau through inviting villagers in each region, attended by technicians, tree planting workers, local villagers, representatives of forestry bureau and project leaders of Shanghai Libra Investment & Management Co., Ltd and Hefei Zhuoya Landscaping Engineering Co., Ltd. The questionnaires were handed out for their opinion and suggestions, at the same time explained the content of monitoring and provided monitoring documents. (Figure 4).



Figure 4 Stakeholder meeting

2.3.2 Dissemination of Summary Project Documents (G3.1)

Along with the project implementation, the project documentation had been published on VCS and CCB website for all stakeholders to obtain detailed project information and verification progress. Also, the summary of project monitoring reports in local language had been disseminated to local communities through local government, as well as the summary of Monitoring Report.

2.3.3 Informational Meetings with Stakeholders (G3.1)

From March to April 2019, in order to acquire the project impacts to the stakeholders, the project proponent held four village meetings before the start of the monitoring period in Hefei City and Chuzhou City respectively, which were involved in the project zone. The project proponent also distributed 100 questionnaires for collecting stakeholders' suggestions, opinions and complains on this project. The questionnaire also included the basic data and information on the local socio-economic status and environmental issues, which contributes to a better understanding of stakeholders (shown in figure 5). The auditor on-site visit meeting was also held in Feidong County on 26-November-2019, stakeholder meeting in the project area was held locally by the Hefei and Chuzhou Forestry Bureau through organizing villagers in each region, attended by technicians, tree planting workers, local villagers, representatives of forestry bureau, county government, the project leaders of Shanghai Libra Investment & Management Co., Ltd and Hefei Zhuoya Landscaping Engineering Co., Ltd. During the meeting, local villagers were also given questionnaires to fill out.

合源碳汇造林利益相关方调查问卷	
填表时间: 2019.3.12	
被调查人情况:	
姓名: 徐成林	年龄: 35
人员类型: 农民 ☐	技术人员 ☒
性别: 女	所在地: 高刘村
是否了解本项目?	
1. 了解 2. 一般了解 3. 不了解	
项目实施后, 您认为项目对周围环境的改变有哪些:	
1. 泥石流减少, 土壤得到改善: (✓)	
2. 动物和植物数量有所增长: (✓)	
3. 提高空气质量: (✓)	
项目实施后, 您的幸福感是否增加?	
1. 增加 2. 一般增加 3. 没有增加	
项目实施后, 项目区域的社会凝聚力是否有所增加?	
1. 增加 2. 一般增加 3. 没有增加	
项目实施后, 您觉得项目对您而言是否有风险? 有什么风险?	
1. 没有风险 2. 有风险 (风险内容:)	
项目实施后, 您认为女性的社会地位提高了吗?	
1. 提高了 2. 没有变化 3. 降低了	
项目开始之后, 您是否从公共渠道收到或查看到项目的相关进度和信息? (比如项目文件公示, 利益相关方会议通知等)	
1. 是 2. 否	
您在项目公示期间, 所有的疑问或者建议都有技术人员为您解答吗?	
1. 是 2. 否	
项目实施后, 是否提高了您的生活水平?	
1. 是 2. 否 (如果在何方面? 高刘村生态林工本收入, 我家种的油茶树)	
项目实施后, 是否有强制占用您家的土地的情况发生?	
1. 没有 2. 有 (占用情况描述:)	
项目实施后, 是否发放了碳汇补助? 你得到了多少?	
1. 没有 2. 有 (发放情况描述:)	
项目实施后, 您是否得到了工作的机会? 工资是多少?	
1. 没有 2. 有 (临时:) (永久: 200元/月)	

以下由技工填写	
您在项目公示期间, 对项目涉及的人员提出的疑问是否都解答了?	
1. 是 2. 否	
在项目实施的过程中是否给您提供了相应的培训?	
1. 是 2. 否	
项目实施后, 您是否得到了工作的机会? 工资是多少?	
1. 没有 2. 有 (临时:) (永久: 200元/月)	
项目实施后, 您认为收入是否比以前增加了?	
1. 增加了 2. 没有变化 3. 减少了	
被聘用为技工后, 您认为这份工作是否占用了您国家法定节假日时间?	
1. 是 2. 否	
被聘用为技工后, 是否得到安全保障? 是否提供了相关培训及相关安全保障设备?	
1. 是 2. 否	
项目实施后, 是否出现过拖欠工资的情况?	
1. 是 2. 否	
项目实施后, 您的职业技术能力是否得到提高?	
1. 是 (何方面: 对林木的管护技能提高了) 2. 否	

Figure 5 Questionnaires distributed to stakeholders

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

During the PRA survey, project proponent once explained the potential costs, risks, and benefits to relevant villagers and stakeholders before the start of the project, which were shown as the following:

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

Risks: nature disaster

Benefits: soil improvement.

On every village meeting, 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.The increase of labor cost for project monitoring 2.The increasing time for tree survey
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.
Benefits	1. The carbon credit revenue 2. The improving well-being

Meanwhile during the on-site visit meetings (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)

On the one hand, the status and process of the project for CCB and VCS verification has been published through routine villager assembly and posted on every 128 village notice boards before 26-November-2019 when the on-site verification began. On the other hand when project proponent and Shanghai Libra have known the on-site visit meeting 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 with 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 26 November to 29 November 2019. The project proponent arranged a stakeholder meeting with the auditor on 26 November 2019, technicians, tree planting workers, local villagers, representatives of forestry bureau, county government, and project leaders of Shanghai Libra Investment & Management Co., Ltd and Hefei Zhuoya Landscaping Engineering Co., Ltd. to verify the project status. During the meeting, 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. The project proponent and auditor provided detailed answers to stakeholders representatives for all the questions. After the meeting, 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.



Figure 6 On-site visit meeting in Feidong County

This picture above shows the on-site visit meeting in Feidong County on 26 November 2019. All the attendees agreed to do verification and their understanding for the potential risks and costs.

2.3.7 Stakeholder Consultation (G3.4)

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

Prior to the stakeholder meeting, Heifei Zhuoya distributed questionnaires to villagers to collect feedback from various stakeholders on the implementation of the project (mentioned in 2.3.3), The collection results are as follows -

- Most of the local villagers have enjoyed the benefits of afforestation. It prevents soil erosion, purifies 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 could 1) created stable employment opportunities;2) gain more revenue by selling carbon credits in this monitoring period;3) improved the local environment, protected arable land and reduced the natural disasters;4) improve the social status of the women involved in planting trees at the beginning of the project.

Stakeholders have no negative views on project implementation.

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 1 to 2 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 Heifei Zhuoya, but also to enable the project manager of Heifei Zhuoya 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 survey, when some villagers reported that their measurement tools had been damaged or lost, 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 128 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, 110 technicians have been working on forest management and tree and CCB monitoring. Since the start of this project, they recorded the growth of trees every year and kept in touch with the project proponent. 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, Heifei Zhuoya 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 Zhuoya, daily routine communication matters, problem-solving measures, etc. So far, the design and implementation of the project have not been modified, as comments received did not affect the design of the project.

2.3.9 Stakeholder Consultation Channels (G3.5)

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

Local villagers can know the status of the project through the notice board of the village committee and leave comments on the village committee comment book. They can also put forward their own opinions through the Internet or the visit of technicians. All stakeholders can express their opinions in this way and finally give feedback to the forest bureau. On this basis, the information of stakeholders can be shared.

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

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

Before the project is preparing for monitoring, the village meeting notices were already published on the notice board outside of each village committee office together with the contact numbers, so that those who missed the meetings can also share their opinions (shown in the figure 7). 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.

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 are any feedbacks from stakeholders. During the monitoring period, the opinions and suggestions of stakeholders were obtained through questionnaires, and they were involved in decision-making.

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.



Figure 7 the women were watching the village meeting notice

In this monitoring period, 70% village meeting attendees are women and all the project jobs are 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 the 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 dismissed immediately and the project proponent will find someone else to take over his/her job. During the current monitoring period, 45 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 patroller in each project site play an important role in treating with ordinary conflicts and grievances and report to the forest stations or bureau. First, once getting the reports, project owner and local forest agency shall contact and discuss with relevant community or other stakeholders within 3 days; second, 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 5 years of training for 110 technicians were held on every September during this monitoring period from 2014 to 2018. 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 Zhuoya project manager, the experts from the local forestry bureau were also invited to participate in teaching for each training session. These 110 technicians which were consist of 36 technicians conducting field measurement and 74 technicians conducting community survey were the core of the entire monitoring team in the project. In this monitoring period, the field measurement work was mainly conducted by 36 people while the other 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 110 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 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 Hefei Zhuoya should be timely and constantly. When necessary, guarding in the forest and waiting for the contact person of Hefei Zhuoya 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. Measurements shall be taken once a year from January, which 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

The height and thickness of the trees are measured, started in January, once a year. Besides, the animal and plant observations are made once a month and the data should be recorded. Afterward, whether the growth compared with previous years conforms to the growth curve of this species should be considered during the preliminary check. If the negative growth is found, figuring out the problem in time by testing the following questions: 1) Whether the tree number was wrong; 2) Whether the measuring point was improper; 3) Whether there were recording errors, and 4) Whether the measuring instruments were damaged. If it is necessary, the second measurement should be conducted. If there were no problems after the preliminary check, the data should be transferred to the Hefei Zhuoya for review.

-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 22,543 of which 70% were women. In addition, approximately 110 locals were employed as technicians for both project management and monitoring survey, with 41% 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 Anhui large parts of adult males are working in the developed provinces for higher salary. The females are more welcomed in planting. After planting, they get the payment 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 110 technicians for project management. These 110 technicians are hired by local forestry bureau rangers who are familiar with local villagers and forestry-related situations, therefore, Hefei Zhuoya 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 Hefei Zhuoya, 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 are regular new-employee training provided to workers before they start the job, which clearly indicate 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 plans is made available for workers and implemented by the village committee.

The annual technician training introduce 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 Hefei Zhuoya reminded the importance of safe operation repeatedly in daily communication with technicians. The technicians were told that they should contact and inform the Hefei Zhuoya if special circumstances happened. Hefei Zhuoya, 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, one party 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 a large number of project owners so that the developer should have the ability to get the authorization that requires abundant employees 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?
- Skill on the development of carbon projects and environmental services: How to draft PD? What evidence should be collected? How to hold the stakeholders meeting? How to conduct the monitoring plan? How to calculate the amount of GHG sink?
- Skills on the evaluation and monitoring of biodiversity: How to do CCB monitoring is the main skill for the developer, such as whether the number of animals increased, whether their living range has enlarged, and whether the number of plant and species has increased.

2.4.2 Management Team Experience (G4.2)

Local Forestry Bureaus and Shanghai Libra Investment & Management Co., Ltd. have 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 Bureaus has already set up an expert pool on the land, soil, vegetation, animals and other natural resources affected by forests. Besides, forestry bureaus fed massive data to the biodiversity report and the experts from that pool will provide assistance and share experience during the biodiversity monitoring. The project proponent has rich experience in forest management in Anhui 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 standard. 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 is experiences 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 routine basis. During this monitoring period, the measurement of data and the monitoring of biodiversity are mainly undertaken by 110 technicians employed by Hefei Zhuoya. The local Forestry Bureau and local government provided technical support for community engagement and biodiversity assessment. The project manager of Hefei Zhuoya was responsible for on-site verification, continuously guiding the tasks and specifications of these technicians, and the final data collection and inspection.

Therefore, both of the project management team and monitoring team have 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 property, 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 Heifei Zhuoya 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 for any violation of their land rights.

Village committee has right to authorize Heifei Zhuoya as a representative of the project owner while Heifei Zhuoya only has the right related to carbon sink project including deciding to develop the Project under which standard, the seller, the selling price etc.¹²

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

Prior to the project initiation, all the project land is collective-owned by local villages. In December 2013, 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, Hefei Zhuoya Landscaping Engineering 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 information of the project such as the nature, size, pace, the scope of the project, the reason for it, and its duration are presented in native language to villagers.

2.5.3 Property Right Protection (G5.3)

Prior to the project implementation, the project area was mainly barren land that is why farmers voluntarily use these lands to plant trees after they learned about the project. Therefore, the project activities do not force the use of the land owned by the property owners, occupy or force the property owners to move from their land, and do not affect their cultural life or other important activities.

2.5.4 Identification of Illegal Activity (G5.4)

Under the current law of China, any illegal logging activities should be fined or sentenced to punishment. Currently all project lands were 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 impact of the project on climate, community and biodiversity will not be affected by the illegal activities.

2.5.5 Ongoing Disputes (G5.5)

Since the project proponent signed a carbon sink cooperation agreement with the village committees, the forest land was developed reasonably and legally. Thus, there have been 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.

¹² Source: carbon sink project cooperation agreement signed between village committee and Hefei Zhuoya

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;

-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	A_i					
Data unit:	ha					
Description:	Area of strata i					
Source of data:	Field measurement					
Value applied:	The difference among planting category is sapling size of <i>Koelreuteria paniculata</i> , <i>Quercus robur</i> , <i>Celtis sinensis Pers</i> and <i>Zelkova schneideriana</i> . 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	koelreuteria paniculata	Chaohu county-level City, Lujiang County, Feixi County in Hefei City	1700	2014	9324
	Proj -2	Quercus robur	Changfeng County, Feidong County in Hefei City	1700	2014	6704
	Proj -3	Celtis sinensis Pers	Quanjiao County, Fengyang County, Dingyuan County in Chuzhou City	1700	2015	7425
	Proj -4	zelkova schneideriana	Laian County, Mingguang county-level City, Langya District in Chuzhou City	1700	2015	6604
The total area is 30,057 ha.						
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 data or description of measurement methods and procedures applied	National authority data
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

Data / Parameter	CF _{TREE}
Data unit	t C t ⁻¹ d.m.
Description	Carbon fraction of tree biomass for species or group of species j
Source of data	The People's Republic of China Second National Communication on Climate Change, issued by NDRC, 2013
Value applied:	See Table 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
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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 applied	The ex-post estimation during this monitoring period has used allometric equations of each tree species to calculate the stem volume.				
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		0.31364	ID13	

		koelreuteria paniculata	0.30199	ID16
			0.34117	ID10
			0.31406	ID45
			0.31769	ID44
			0.30285	ID29
			0.31994	ID36
			0.31287	ID41
	Proj -2	Quercus robur	0.26043	ID22
			0.26602	ID23
			0.29164	ID24
			0.27061	ID48
			0.24966	ID54
			0.28069	ID46
	Proj -3	Celtis sinensis Pers	0.41590	ID121
			0.39872	ID126
			0.41437	ID80
			0.41355	ID81
			0.43900	ID76
			0.47799	ID75
	Proj -4	zelkova schneideriana	0.47175	ID100
			0.48321	ID114
			0.48899	ID97
			0.46125	ID86
			0.46127	ID96
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. Broadleaf forest ¹³ : $V_{TREE,j} = 1.0554 / (((1 + 0.003545 * EXP(-0.057847 * A))^{(1/0.000485)})$			

¹³ As there are no specific allometric equations data sources for the four trees in this project, according to Study on biomass and growth rule of dominant tree species in oak broad-leaved forest in Qingyang County by Anhui Agricultural University, it is determined that all four trees are Broadleaf, so unified use of Broadleaf forest equation.

Comments	N/A
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Data / Parameter	$H_{l,p,j,i}$, $DBH_{l,p,j,i}$				
Data unit	m; cm				
Description	Height of tree l of species j in sample plot p of stratum i ; Diameter at breast height of tree l of species j in sample plot p of stratum i				
Source of data	Field measurements in sample plots				
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.				
Frequency of monitoring/recording	Before every verification event				
Value applied:		Project Stratifications number	Category of tree	Average DBH(cm)	Average H(m)
		Proj -1	koelreuteria paniculata	4.22	5.14
		Proj -2	Quercus robur	4.08	4.06
		Proj -3	Celtis sinensis Pers	4.48	5.05
		Proj -4	zelkova schneideriana	4.45	4.81
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 is not required 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 from IPCC GPG LULUCF 2003 may be applied. The measure is in line with LY/T 2253-2014 <Guidelines on carbon accounting and monitoring for afforestation project> issued by National Forest Bureau. ¹⁴ & HJ 710.1-2014 "Technical guidelines for				

¹⁴ <https://www.renrendoc.com/p-20779950.html>

	biodiversity monitoring—terrestrial vascular plants”. ¹⁵ 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 four type 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 aboveground tree biomass in A/R CDM project activities” in project monitoring report.

Data / Parameter	A _i ; A _{PLOT,i}														
Data unit	ha														
Description	Area of stratum <i>i</i> ; Size of sample plot in stratum <i>i</i>														
Source of data	Field measurement														
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.														
Frequency of monitoring/recording	Before every verification event														
Value applied:	A_i:<table><tr><th>Project Stratifications number</th><th>Category of tree</th><th>Area (ha)</th></tr><tr><td>Proj -1</td><td>koelreuteria paniculata</td><td>9324</td></tr><tr><td>Proj -2</td><td>Quercus robur</td><td>6704</td></tr><tr><td>Proj -3</td><td>Celtis sinensis Pers</td><td>7425</td></tr></table>			Project Stratifications number	Category of tree	Area (ha)	Proj -1	koelreuteria paniculata	9324	Proj -2	Quercus robur	6704	Proj -3	Celtis sinensis Pers	7425
Project Stratifications number	Category of tree	Area (ha)													
Proj -1	koelreuteria paniculata	9324													
Proj -2	Quercus robur	6704													
Proj -3	Celtis sinensis Pers	7425													

¹⁵ <http://www.doc88.com/p-4512190031524.html>

	<table><tr><td>Proj -4</td><td>zelkova schneideriana</td><td>6604</td></tr></table> A _{PLOT,i} : 0.07 (ha)	Proj -4	zelkova schneideriana	6604
Proj -4	zelkova schneideriana	6604		
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>. ¹⁶			
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 <i>j</i> of strata <i>i</i>
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	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

¹⁶ <https://www.renrendoc.com/p-20779950.html>

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:	25
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>i</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 Project Area before monitoring.																				
Frequency of monitoring/recording	Before first verification																				
Value applied:	<table><tr><td>Project Stratifications</td><td>Category of tree</td><td>n_i</td><td></td></tr><tr><td>PROJ-1</td><td>koelreuteria paniculata</td><td>8</td><td></td></tr><tr><td>PROJ-2</td><td>Quercus robur</td><td>6</td><td></td></tr><tr><td>PROJ-3</td><td>Celtis sinensis Pers</td><td>6</td><td></td></tr><tr><td>PROJ-4</td><td>zelkova schneideriana</td><td>5</td><td></td></tr></table>	Project Stratifications	Category of tree	n _i		PROJ-1	koelreuteria paniculata	8		PROJ-2	Quercus robur	6		PROJ-3	Celtis sinensis Pers	6		PROJ-4	zelkova schneideriana	5	
Project Stratifications	Category of tree	n _i																			
PROJ-1	koelreuteria paniculata	8																			
PROJ-2	Quercus robur	6																			
PROJ-3	Celtis sinensis Pers	6																			
PROJ-4	zelkova schneideriana	5																			
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>i</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>i</i> is equal to the area of the stratum <i>i</i> divided by the project area.				
Frequency of monitoring/recording	Before first verification.				
Value applied:		Project Stratifications	Category of tree	W _i	
		PROJ-1	koelreuteria paniculata	0.310	
		PROJ-2	Quercus robur	0.223	
		PROJ-3	Celtis sinensis Pers	0.247	
		PROJ-4	zelkova schneideriana	0.220	
Monitoring equipment	/				
QA/QC procedures to be applied	The relative weight of the area of stratum <i>i</i> is equal to the area of the stratum <i>i</i> divided by the project area				
Purpose of Data	<i>The parameter is used to calculate number of sample plots</i>				
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>i</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 local 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 Hefei and Chuzhou.. ¹⁷																				
Frequency of monitoring/recording	Before first verification.																				
Value applied:	<table><tr><td>Project Stratifications</td><td>Category of tree</td><td>S_i</td><td></td></tr><tr><td>PROJ-1</td><td>koelreuteria paniculata</td><td>27.164</td><td></td></tr><tr><td>PROJ-2</td><td>Quercus robur</td><td>27.164</td><td></td></tr><tr><td>PROJ-3</td><td>Celtis sinensis Pers</td><td>23.693</td><td></td></tr><tr><td>PROJ-4</td><td>zelkova schneideriana</td><td>23.693</td><td></td></tr></table>	Project Stratifications	Category of tree	S _i		PROJ-1	koelreuteria paniculata	27.164		PROJ-2	Quercus robur	27.164		PROJ-3	Celtis sinensis Pers	23.693		PROJ-4	zelkova schneideriana	23.693	
Project Stratifications	Category of tree	S _i																			
PROJ-1	koelreuteria paniculata	27.164																			
PROJ-2	Quercus robur	27.164																			
PROJ-3	Celtis sinensis Pers	23.693																			
PROJ-4	zelkova schneideriana	23.693																			
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	/																				

¹⁷ Evidence on variable coefficient data provided by Hefei forestry bureau and Chuzhou forestry bureau.

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 calculated from the sample plots.
Description of measurement methods and procedures to be applied	The project monitoring team calculated the mean value of the biomass stock in each strata, and the mean value of biomass stock within the project 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	1.71%
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 1.71%, 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	$u_C = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^N w_i^2 \times \frac{s_i^2}{n_i}}}{b_{TREE}}$
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	6.626
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	1.721 ¹⁸
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

¹⁸ During this monitoring period, $n=25$, $M=4$, therefore $n-M=21$, so t_{VAL} is the two-sided Students t-value for a confidence level of 90 per cent and degrees of freedom of 21 which is 1.721 according to the t-distribution Table.

3.1.3 Monitoring Plan

Monitoring team

The monitoring team consists of the project proponent, Shanghai Libra, technicians and the forestry bureau. Firstly Shanghai Libra sets the monitoring boundary, the number of plots, and then drafted the monitoring manual and tables. Secondly, the project proponent and technicians selected the sample plots at random and marked out the plots with ropes. Thirdly project proponent and Shanghai Libra confirmed the monitoring frequency and notified the technicians and the forestry bureaus. Lastly the monitoring results would be double-checked by experts of the forestry bureaus.

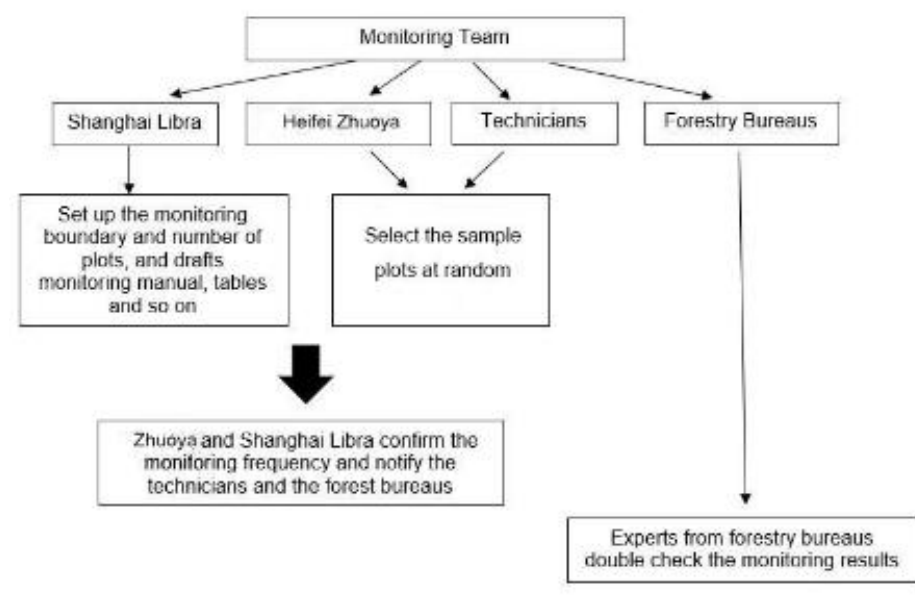


Figure 8 The figure of the monitoring team

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 September 2015, and the monitoring team started the field work started from 2016 to 2019 on every 15 January to 30 March.

Monitoring process

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

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

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

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

The soil disturbance due to this project is in line with the requirements of soil and water conservation. Afforestation density was 1,700 plant/Ha, soil disturbance area ratio was 2.72%.¹⁹, 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 for the proposed project.

¹⁹ Proportion of soil disturbed area: $0.16 \text{ m}^2 \times 1700 / 10000 \text{ m}^2 = 2.72\%$. Among them, 0.16 m^2 was derived from the surface area calculated from the specification of artificial afforestation cavities in the Project Design (40cm*40cm)

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

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

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

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

The proposed project is large-scale afforestation project.

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

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

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 stratum and the area change, the number of sample plots need to be recalculated.

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

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
- n_i Number 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
- W_i Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless
- S_i 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 (s_i) 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
koelreuteria paniculata	0.310	27.164	1.645	8.514	25	8	8
Quercus robur	0.223	27.164				6	6
Celtis sinensis Pers	0.247	23.693				6	6
zelkova schneideriana	0.220	23.693				5	5

Step 2 Setting sample plots

There are 128 plots in this project, and 25 of the 128 plots with 4 carbon layers should be randomly selected as the sample plots. Random sampling was to list 128 plots containing ID Numbers of 4 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, 25 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 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 stratum and carbon sub-stratum of each plot should be documented to ensure that 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
ID13	PROJ-1	N31°50'40" E117°53'59"	Koelreuteria paniculata	2014
ID16	PROJ-1	N31°54'12" E117°41'23"	Koelreuteria paniculata	2014
ID10	PROJ-1	N31°49'37" E117°51'24"	Koelreuteria paniculata	2014
ID45	PROJ-1	N31°30'50" E117°25'36"	Koelreuteria paniculata	2014
ID44	PROJ-1	N31°32'06" E117°20'55"	Koelreuteria paniculata	2014
ID29	PROJ-1	N31°38'40" E117°05'05"	Koelreuteria paniculata	2014
ID36	PROJ-1	N31°36'45" E116°57'45"	Koelreuteria paniculata	2014
ID41	PROJ-1	N31°46'53" E116°53'09"	Koelreuteria paniculata	2014
ID22	PROJ-2	N31°45'45" E117°36'25"	Quercus robur	2014
ID23	PROJ-2	N31°57'24" E117°35'15"	Quercus robur	2014
ID24	PROJ-2	N31°54'40" E117°31'27"	Quercus robur	2014
ID48	PROJ-2	N32°15'55" E117°18'18"	Quercus robur	2014
ID54	PROJ-2	N32°37'11" E117°01'57"	Quercus robur	2014
ID46	PROJ-2	N32°03'22" E117°15'41"	Quercus robur	2014
ID121	PROJ-3	N32°05'23" E117°54'23"	Celtis sinensis Pers	2015
ID126	PROJ-3	N32°04'44" E118°04'19"	Celtis sinensis Pers	2015
ID80	PROJ-3	N32°47'02" E117°47'24"	Celtis sinensis Pers	2015
ID81	PROJ-3	N32°53'35" E117°45'51"	Celtis sinensis Pers	2015
ID76	PROJ-3	N32°31'27" E118°03'36"	Celtis sinensis Pers	2015
ID75	PROJ-3	N32°31'41" E118°01'49"	Celtis sinensis Pers	2015
ID100	PROJ-4	N32°33'49" E118°11'07"	Zelkova schneideriana	2015
ID114	PROJ-4	N33°04'05" E118°04'31"	Zelkova schneideriana	2015
ID97	PROJ-4	N32°25'31" E118°27'08"	Zelkova schneideriana	2015
ID86	PROJ-4	N32°31'45" E118°29'35"	Zelkova schneideriana	2015
ID96	PROJ-4	N32°35'59" E118°24'37"	Zelkova schneideriana	2015

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.

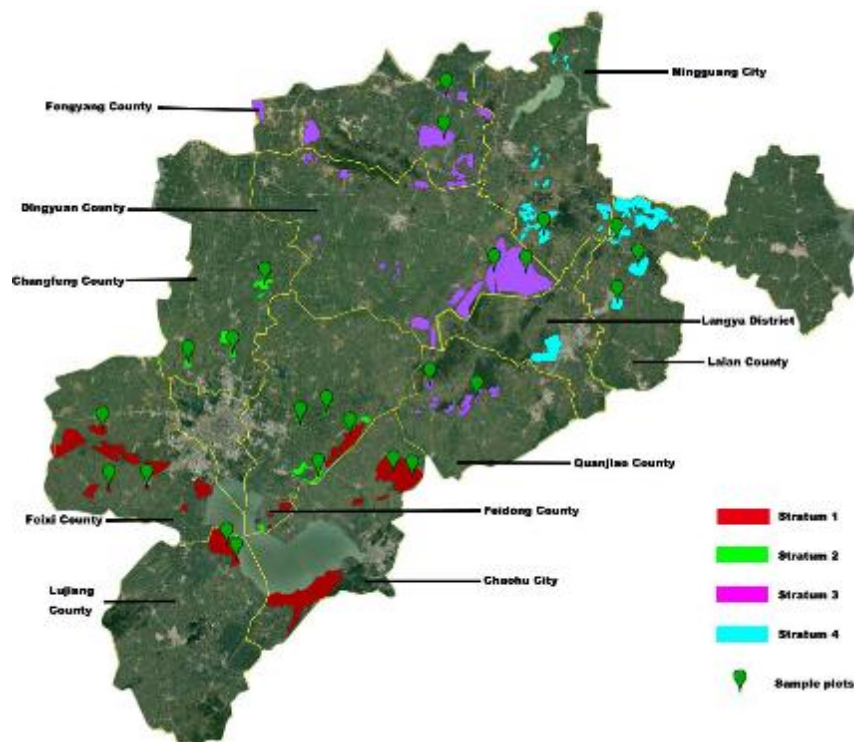


Figure 9 The Sample plots location with flags

iii) **Method for estimation of the change in carbon stock**

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

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} \quad (3)$$

Where:

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

The tool 'Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activity' (Version 04.2) was used to estimate the change in carbon stock above the ground, and Method (b) (Direct estimation of change by re-measurement of sample plots) was used to estimate the 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 CO2-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_i	=	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. $w_i = A_i/A$); dimensionless
$b_{TREE,i}$	=	Mean change in tree biomass per hectare in strata i; t d.m./ha
u_C	=	Uncertainty in ΔC_{TREE}
t_{VAL}	=	Two-sided Student's t-value for a confidence level of 90 per cent and degrees of freedom equal to $n - M$, where n is total number of sample plots within the tree biomass estimation strata, and M is the total number of tree biomass estimation strata

s_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:

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

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

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:

$b_{TREE,i}$ 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
$b_{TREE, t, t}$	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):

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

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 25 and M is 4 while n-m is 21 with the corresponding t _{VAL} value of 1.721.

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 is used for the calculation.

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

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

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

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

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

Where:

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

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

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

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

$B_{TREE,l,j,p,i}$ = 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 trees ($H_{l,p,j,i}$) and Diameter at breast height of trees ($DBH_{l,p,j,i}$).



Figure 10 Photos of technicians monitoring the sample site

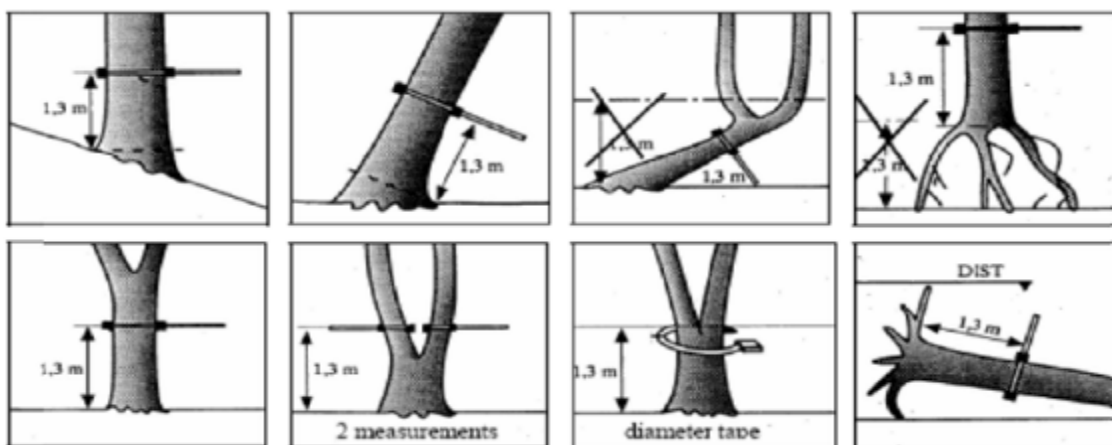


Figure 11 Tree measurements

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 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-11).

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, the following methodology was used according to the point where the fork divides the stem. If the fork began (the point where the core is divided) at a height of below 1.3m, each stem that has the required diameter (≥ 10 cm) was considered as a tree and was measured. The 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 12 Plot of tree monitoring table

QA/QC

There is a systematic internal review and correction process. The technicians provide the original record forms and Zhuoya checks on the data and if any negative growth is found which might be caused by data

entry errors, Zhuoya then feedback to the technicians and correct the data before sharing with Libra. Libra will draft the monitoring report based on the raw data and cross check with the forestry bureau experts. If no further comments from the experts, Libra will finalise the report. All parties are required to reply to any questions raised within 30 days. The monitoring equipment should be updated annually if there are new versions or more efficient monitoring tools available. The forestry bureaus are responsible for the monitoring equipment renewal or update.

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

Monitoring plan and manual, Chinese version MR summary have been posted on bulletin boards in 128 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.

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

$$\Delta C_{LI\_BSL,t} = \text{Change in carbon stock in baseline litter biomass within the project boundary, in year } t, \text{ as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; } t \text{ CO}_2\text{-e}$$

With the baseline scenario, dead wood biomass and litter biomass would not be changed by local farmers. All the plots in the two cities have been barren and do not change after the 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-CO₂ 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:

$$\begin{aligned} \Delta C_{ACTUAL,t} &= \text{Actual net GHG removals by sinks, in year } t; t \text{ CO}_2\text{-e} \\ \Delta C_{P,t} &= \text{Change in the carbon stocks in project, occurring in the selected carbon pools, in year } t; t \text{ CO}_2\text{-e} \\ GHG_{E,t} &= \text{Increase in non-CO}_2 \text{ GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year } t, \text{ as estimated in the tool "Estimation of non-CO}_2 \text{ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; } t \text{ CO}_2\text{-e} \end{aligned}$$

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

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

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

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t} \quad (19)$$

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

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

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) Difference of two independent stock estimations;
- (b) Direct estimation of change by re-measurement of sample plots;
- (c) Estimation by proportionate crown cover;
- (d) Demonstration of “no-decrease”.

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

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

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

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

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, $\Delta C_{TREE} = C_{TREE,t2}$

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 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. 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 stem biomass 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 (R^2) obtained was not less than 0.85.

The calculation formulas of this monitoring period are the allometric equations from <Tree volume tables of China> by China Forestry Publishing House>. The formula is the local standards of China. 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 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 CO₂-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 is Broadleaf forest. Allometric equation are used to estimate the average merchantable volume of one tree ($V_{TREE,j}$)

Broadleaf forest ²⁰	$V_{TREE,j} = 0.000050479055 \times D^{1.9085054} \times H^{0.99076507}$
--------------------------------	--

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 Broadleaf forest are listed in the below.

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

Parameter	factor	Source
Wood density (tonnes d.m.m-3)	0.598	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"
$BEF_{2,j}$	1.674	
Root-shoot ratio	0.261	
CF	0.497	

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

Table 4-2 Tree 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	$b_{tree,p,i}$
Proj-1-01	5.66	Proj-2-01	4.70	Proj-3-01	7.50	Proj-4-01	8.51
Proj-1-02	5.45	Proj-2-02	4.80	Proj-3-02	7.19	Proj-4-02	8.71
Proj-1-03	6.15	Proj-2-03	5.26	Proj-3-03	7.47	Proj-4-03	8.82

²⁰"Tree volume tables of China" by China Forestry Publishing House

Proj-1-04	5.66	Proj-2-04	4.88	Proj-3-04	7.46	Proj-4-04	8.32
Proj-1-05	5.73	Proj-2-05	4.50	Proj-3-05	7.92	Proj-4-05	8.32
Proj-1-06	5.46	Proj-2-06	5.06	Proj-3-06	8.62		
Proj-1-07	5.77						
Proj-1-08	5.64						

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 1cm. So if the dimension of tree in the sample plot is not above 1cm, $V_{TREE, t}$ of the tree is equal to 0. The dimension of the sample trees in this project is all over 1cm.

Table 4-3 Tree biomass per hectare in stratum

Stratum ID	Tree species	Area (ha)	$b_{tree, l}$ (t d.m. ha ⁻¹)	W_i	S_i^2	$W_i^* b_{tree, l, t}$	Number of Plots n_i	S^2_{bTREE}
Proj-1	koelreuteria paniculata	9324.0	5.69	0.310	0.048	1.765	8	0.00058
Proj-2	Quercus robur	6704.0	4.87	0.223	0.072	1.085	6	0.00060
Proj-3	Celtis sinensis Pers	7425.0	7.69	0.247	0.261	1.900	6	0.00265
Proj-4	zelkova schneideriana	6604.0	8.54	0.220	0.052	1.875	5	0.00050

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):

$$b_{TREE} = \sum_{i=1}^M w_i \times b_{TREE,i} = 6.26$$

$$S_{b_{TREE}} = 0.06577$$

$$u_c = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^M w_i^2 \times \frac{s_i^2}{n_i}}}{b_{TREE}} = 0.0171$$

Table 4-4 Statistical parameters from monitoring

Item	Unit	Value
		Total
B_{TREE} (Tree biomass of the project)	t d.m.	362,936.581
C_{TREE} (Carbon stock in trees of the project)	t CO ₂ e	362,937
ΔC_{p,t} (Change in the carbon stocks in project)	t CO ₂ e	362,937
U_c (Uncertainty in C _{TREE})	%	1.71%

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

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

$$LK_{AGRIC,t} = \frac{44}{12} \times (\Delta C_{BIOMASS,t} + \Delta SOC_{LUC,t})^{21} \quad (28)$$

Where:

- $LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year t; tCO₂-e
- $\Delta C_{BIOMASS,t}$ = Decrease in carbon stock in the carbon pools of the land receiving the activity displaced in year t; t d.m
- $\Delta SOC_{LUC,t}$ = Change in soil organic carbon (SOC) stock due to land-use change in the land receiving the displaced activity in year t; tC ha

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

Therefore, leakage is zero for the proposed project.

3.2.4 Net GHG Emission Reductions and Removals

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

²¹ Equation (1) in page 5 in the A/R Methodological tool "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity" (Version 02.0)

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

Where:

- $\Delta C_{AR,t}$ = Net anthropogenic GHG removals by sinks, in year t ; t CO₂-e
 $\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year t ; t CO₂-e
 $\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks, in year t ; t CO₂-e
 LK_t = GHG emissions due to leakage, in year t ; t CO₂-e

The net anthropogenic GHG removals by sinks are summarized below.

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
22-April-2014 to 31-December-2015	0	110,770 ²²	0	110,770
01-January-2016 to 31-December-2016	0	68,927 ²³	0	68,927
01-January-2017 to 31-December-2017	0	84,103 ²⁴	0	84,103
01-January-2018 to 31-December-2018	0	99,137 ²⁵	0	99,137
Total	0	362,937	0	362,937

Year	Change in GHG benefit (tCO ₂ e)	Buffer 10% (tCO ₂ e)	VCUs	VCUs available
22-April-2014 to 31-December-2015	110,770	11,077	99,693	99,693
01-January-2016 to 31-December-2016	68,927	6,893	62,034	62,034
01-January-2017 to 31-December-2017	84,103	8,410	75,693	75,693

²² Calculated based on data from January 2016 monitoring records

²³ Calculated based on data from January 2017 monitoring records

²⁴ Calculated based on data from January 2018 monitoring records

²⁵ Calculated based on data from January 2019 monitoring records

01-January-2018 to 31-December-2018	99,137	9,914	89,223	89,223
Total	362,937	36,294	326,643	326,643

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 326,643 VCU.

The total VCUs that must be deposited in the AFOLU pooled buffer account are 36,294 VCUs.

3.3 Optional Criterion: Climate Change Adaptation Benefits

The project activity does not include this optional criterion in the project description

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	Migrant rural workers
Impact(s)	Income increased and work in their living villages instead of to go outside
Type of Benefit/Cost/Risk	1. Time is required for training and work 2. Consuming physical strength for forest management, forest monitoring and forest patrol

	3. Gaining extra pay 4. Enjoying benefit brought by environmental improvement
Change in Well-being	Part of them was hired as technicians. Firstly, they do not have to be uprooted. Secondly, the project has brought them an additional income of 200 CNY per month. The extra 2400 CNY earned over the course of a year can improve their quality of life and their living standards, thus improving the health level and happiness of local people.

Community Group	Local rural workers
Impact(s)	Increase household income and living level
Type of Benefit/Cost/Risk	1. Time is required for training and work 2. Consuming physical strength for forest management, forest monitoring and forest patrol 3. Gaining extra pay 4. Enjoying benefit brought by environmental improvement
Change in Well-being	For residents, the project has brought them an additional income of 200 CNY per month. The extra 2400 CNY earned over the course of a year can improve their quality of life and their living standards, thus improving the health level and happiness of local people.

Community Group	Surplus rural labors
Impact(s)	Increase household income and living level
Type of Benefit/Cost/Risk	1. Gaining extra pay 2. Enjoying benefit brought by environmental
Change in Well-being	The improvement of environmental quality is beneficial to all villagers. With the soil and water conservation, the crop harvest will be greatly improved, so the income will increase, and so will the villagers' happiness.

Community Group	Rural cooperatives
Impact(s)	Through the implementation of the project, training in seeding and planting techniques has been provided to people working in rural cooperation.

Type of Benefit/Cost/Risk	1. Acquiring the technical knowledge of forestry. Improving the cohesion of the villagers' organization.
Change in Well-being	Villagers acquired knowledge and gained the ability to participate in labor and raise their incomes.

Community Group	Female rural workers
Impact(s)	social status improved and income increased
Type of Benefit/Cost/Risk	1. Time is required for training and work 2. Consuming physical strength for forest management, forest monitoring and forest patrol 3. Gaining extra pay Enjoying benefit brought by environmental improvement
Change in Well-being	Women's incomes have increased, not only results in the advancement of family status but also results in the improvement of individual working competence.

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 Heifei Zhuoya (200 CNY per technician per month for monitoring, total of 110 technicians) as well as carbon credit sale income.

This project has significantly alleviated the natural disaster and improved the soil quality in 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 flood and windstorm.

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 8,989-9,521CNY²⁶ on average a year and this project can provide 2,400 CNY 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 leads 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.

Zhuoya has strong expertise in the application and research of new agricultural technologies and forest efficient seedling breeding. During the implementation of this project, Zhuoya organized many pieces of 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 the 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 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 years, 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 *Koeleria paniculata*, *Quercus robur*, *Celtis sinensis* Pers and *Zelkova schneideriana*, which significantly contributes to the production increase of the economic crops.

6) After the implementation of the project, the area of green space and beautify the environment has been increased, without deforestation and obstruction projects. In summary, the relevance of the project area does not have a negative impact on the high value of protection.

²⁶ Reference to 15.



Figure 13: koelreuteria paniculata



Figure 14: Quercus robur



Figure 15: Celtis sinensis Pers



Figure 16: zelkova schneideriana

It clearly shows that Koelreuteria paniculata, Quercus robur, Celtis sinensis Pers and Zelkova schneideriana have very strong adaptability and have a very direct effect on controlling soil erosion in the hill area.

7) Gender equality improvement: women technician accounts 41% of the total technician. Through regular training their capability has been obviously improved even well 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 had no negative impacts within and beyond the project zone. Besides, it increased the income of the local communities and brought positive environmental benefits. Therefore, this project had no 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', etc. A total of 100 questionnaires were issued and collected during the project (mentioned in 2.3.3). After the questionnaires were collected, 90% of the representatives from groups of migrant rural workers, surplus rural labors, 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; 80% of the representatives from group of rural cooperatives considered that there was an improvement of their capability and technical skills due to the project; 70% of the representatives from group of local rural workers considered that there was an improvement of social activities resulting from the project. It is concluded that no negative 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 rural workers, surplus rural labors, female rural workers
Result of monitoring	Technicians earn an extra 200 CNY per month total 2400 per year

Variable	Capability of technical skills
monitoring methods to be applied	Questionnaire and interview
Frequency of monitoring/recording	Before verification event

Affected community groups	Skilled workers and villagers planting trees.
Result of monitoring	From 2013, Local Forest of Bureau and Heifei Zhuoya held several pieces of trainings for technicians mainly in the aspects of physical safety and health and technology. The training content is related to the knowledge of forest land clearing, how to plant trees, afforestation and management, carbon sink afforestation and carbon emission drafted by afforestation experts in forest bureau. Furthermore due to the project the farmers were taught to use cameras, monitoring equipment, writing, reading and a few farmers can even use computers.

Variable	Level of social cohesion
monitoring methods to be applied	Questionnaire and interview
Frequency of monitoring/recording	Before every verification event
Affected community groups	All residents
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, villagers so have been connected by these forest. Because of the project, the villages can often gathered up for make decision, express opinion and training, they have become unity. Besides the project meeting, they can also gather up for festivals themselves.

4.3.2 Monitoring Plan Dissemination (CM4.3)

Monitoring plans and manuals for project monitoring periods have been posted on bulletin boards in villages. Besides, 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 the data were collected, and how patrol inspection were recorded.

VCS CCB California

Projects Verified Validated Pipeline Inactive

or Projects [Hechu Afforestation Project in Anhui Province, CHINA](#) [Back to Search Results](#)

Project ID: 1855

Project Proponent: [Hefei Zhuoyu Landscaping Engineering Co., Ltd.](#)

Sectoral Scope: 14. Agriculture, Forestry, Land Use

State / Province: Anhui

VCS

Project Status: Registered

Project Methodology: AR-ACM003

Project Validator: Tuv Nord Cert GmbH (Tuv Nord)

Registry: Marit

Estimated Annual Emission Reductions: 469,187

CCB

CCB Standards Status: Validation approved

CCB Standards Edition: Third Edition

Project Validator: Tuv Nord Cert GmbH (Tuv Nord)

Hechu Afforestation Project in Anhui Province (hereafter referred as "the project") is located in Hefei City and Chuzhou City, Anhui Province, China. The project is to establish forest on the barren land to generate GHG emission reductions and contribute to local sustainable development. The project is implemented by Hefei Zhuoyu Landscaping Engineering Co., Ltd. 30,057ha of forest was established by direct planted on barren lands in two Hefei City and Chuzhou City, Anhui Province.

The project activity aims to:

- Sequester carbon dioxide and mitigating climate change;
- Enhance biodiversity conservation by increasing the connectivity of forests;
- Improve the quality and quantity of the vegetation;
- Improve soil and water conservation in the lower reaches of the Yangtze River and the Jianghuai hilly area.
- Generate income and job opportunities for local communities.

There is no natural renewal and reforestation before the project, and all sites were covered by the barren hill. The main objective species is Broadleaf forest which is native species according to the baseline survey. The implementation of the project would reduce the GHG emissions for 9,383,744CO₂e in 20years, with an average annual GHG emission of 469,187CO₂e.

PUBLIC COMMENT PERIOD:
This project was open for public comment from 01 November - 01 December 2019.

Figure 17 In VERRA Publicity



Figure 18 Publicity at the project site.

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	Number 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 crops and these crops are grown faster than ever. According to the biodiversity survey report of the Anhui Academy of Social Sciences, the statistical data of 25 sample plots obtained showed that there were no Herbaceous plants in the herbaceous layer. In the arborous layer, Neolitsea sericea was found. Neolitsea sericea, with a total number of 16 strains, was the only

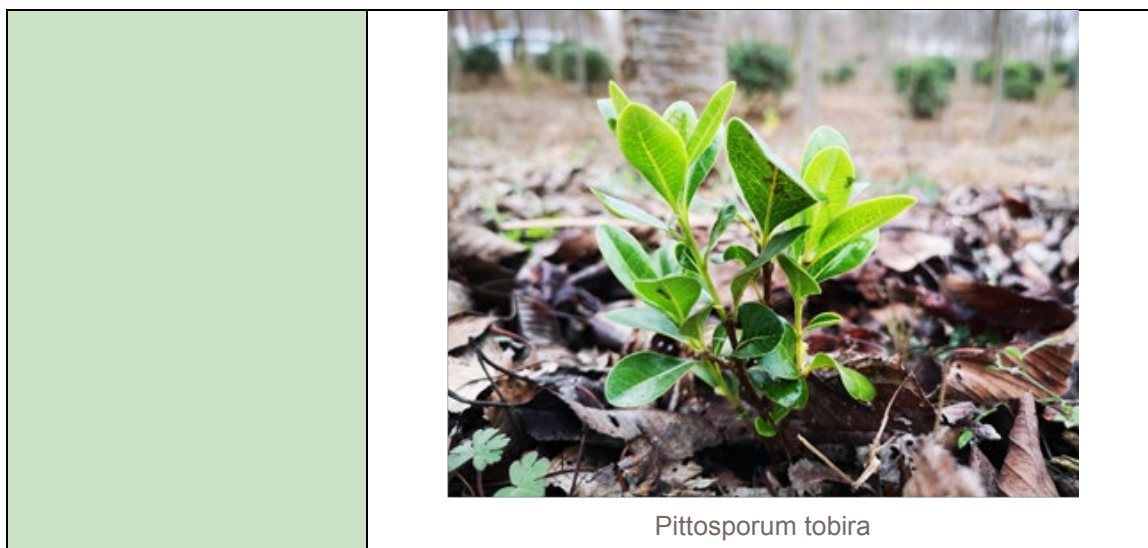
kind of species that was found on 25 plots, although no species were found on some plots. It has a coverage of 5% and has been photographed for evidence since the specimen collection was not suggested during the investigation. There are two kinds of shrub vegetation species were found in the 25 shrub layers. One of them is the *Solanum pseudocapsicum* which was found in 10 plots. There were three quadrats in each sample plot. However, not all quadrats were found with the *Solanum pseudocapsicum*, so a total number of 30 strains of it were found in 25 plots, covering 7% and the photos have been taken for evidence. The other one is the *Pittosporum tobira* with a total number of 42 strains. Similarly, not all of the plots were found with the *Pittosporum tobira* which means they were only found in 10 plots. So a total of 42 strains were found in 25 plots, covering 10% and had been photographed for evidence.



Neolitsea sericea



Solanum pseudocapsicum



Change in Biodiversity	Number of animals
Monitored Change	Predicted increase
Justification of Change	According to the Anhui Academy of Social Sciences biodiversity survey report, a total of 4 kinds of species were found on 25 plots, which are hare, Picapica, Oriolus chinensis and Cuculus poliocephalus. During this monitoring period, a total of 8 species were found and one species was found in the sampling line of each carbon layer. The traces of each species were different and a total of 4 kinds of traces were found. Among them, the physical object of a Picapica was found at a straight-line distance of 12m from the sample line and the photo of it was taken for evidence while the cries of three Oriolus chinensises were found at a vertical distance of 20m from the sample line. Cuculus poliocephalus was observed in the air at a vertical distance of 21m from the sample line, with a number of 4, but they flew too fast to be photographed. The last one found was the trace of hare, which was the feces of the hare at a vertical distance of 5m from the sample line and then the photo was taken for evidence.

	 Picapica on the Celtis sinensis Pers, photographed in Dingyuan County on 14-December-2018  Hare feces in the woods, photographed in Lujiang County on 18-March-2019
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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, the implementation of this project was not decreased biodiversity of project area.

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

First, due to long-term farming, the ecological structure of most project areas is relatively homogenous, with low biodiversity. The other small parts are wastelands, 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. Therefore, 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 Hefei and Chuzhou in Anhui Province, the surrounding area is concentrated on wildlife. The project site is also adjacent Chao Lake Nature Reserve, where is the habitat of many rare plants and animals. Therefore revegetation of project sites will facilitate biodiversity protection of Chao Lake Nature Reserve and the whole city.

The 14 national protected species in the project zone are shown in the following table:

<i>Animals</i>	<i>Plants</i>
<i>Aquila chrysaetos</i>	<i>Pseudolarix amabilis (Nelson) Rehd.</i>
<i>Syrnaticus ellioti</i>	<i>Cercidiphyllum japonicum</i>
<i>Pavo muticus</i>	<i>Cyclocarya paliurus</i>
<i>Polyplectron</i>	<i>Emmenopterys henryi Oliv</i>
<i>Cervus nippon</i>	<i>Ulmus gaussonii Cheng</i>
<i>Cygnus columbianus</i>	
<i>Circus spilonotus</i>	

One of them is the globally Endangered species according to IUCN, who will benefit from reduced threats as a result of the project activities, and it is listed shown in the following table:

Globally Endangered species
<i>Pavo muticus</i>

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 would be allowed to be used only if there was a serious disease problem erupted in the project area, and the pesticides would 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 would be treated by biological control once occurred according to the 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 increased the area of the habitat, as well as improved 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. There are 4 carbon layers during this biodiversity survey which covers Hefei City and Chuzhou City. Among them, 58 plots were surveyed in Hefei, 12 of which were sampled for investigation. The survey scope of Chuzhou was 70 plots, among which 13 plots were sampled for investigation. The specific information about relevant sampling plots is shown in the table below:

Table 5 Information table of the sample plots

the Number of Sample Plot	Sample Plot ID	Address	Carbon Layer	longitude and Latitude
1	ID13	Datang village, Zhegao town, Chaohu city	Carbon Layer1	North latitude31°50'41"East longitude117°53'59"
2	ID16	Lianhe village, Suwan town, Lianhe county	Carbon Layer1	North latitude31°54'12"East longitude117°41'23"
3	ID10	Shuangquan village, Zhegao town, Chaohu city	Carbon Layer1	North latitude31°49'37"East longitude117°51'24"
4	ID45	Wangjiatun village, Shengqiao town, Lujiang county	Carbon Layer1	North latitude31°30'50"East longitude117°25'36"
5	ID44	Dadoumen village, Daiqiao town, Lujiang county	Carbon Layer1	North latitude31°32'06"East longitude117°20'55"
6	ID29	Shengli village, Hugang town, Feixi county	Carbon Layer1	North latitude31°38'40"East longitude117°05'05"
7	ID36	Huanghua village, Shishugang town, Feixi county	Carbon Layer1	North latitude31°36'45"East longitude116°57'45"
8	ID41	Zhoudazhuang village, Guanting town, Feixi County	Carbon Layer1	North latitude31°46'53"East longitude116°53'09"
9	ID22	Liliu village, Cuozhenzhen town, Feidong County	Carbon Layer2	North latitude31°45'45"East longitude117°36'25"
10	ID23	Xinzhan village, Shitang town, Feidong County	Carbon Layer2	North latitude31°57'24"East longitude117°35'15"
11	ID24	Tangxi village, Shitang town, Feidong County	Carbon Layer2	North latitude31°54'40"East longitude117°31'27"
12	ID48	Lianhe village, Zaojia town, Changfeng County	Carbon Layer2	North latitude32°15'55"East longitude117°18'18"
13	ID54	Guanfu village, Wushan town, Changfeng County	Carbon Layer2	North latitude32°00'17"East longitude117°07'09"
14	ID46	Liangzhuang village, Shuangdun town, Changfeng County	Carbon Layer2	North latitude32°03'22"East longitude117°15'41"
15	ID121	Fuxing village, Machang town, Quanjiao County	Carbon Layer3	North latitude32°05'23"East longitude117°54'23"
16	ID126	Zhaodain village, Liuzhen town, Quanjiao County	Carbon Layer3	North latitude32°04'44"East longitude118°04'19"

17	ID80	Sanhe village, Zongpu town, Fengyang County	Carbon Layer3	North latitude32°47'02" East longitude117°47'24"
18	ID81	Xiaogang village, Xiaoxihe town, Fengyang County	Carbon Layer3	North latitude32°53'35" East longitude117°45'51"
19	ID76	Chiyang village, Chihe town, Dingyuan County	Carbon Layer3	North latitude32°31'27" East longitude118°03'36"
20	ID75	Xiaohuang village, Chihe town, Dingyuan County	Carbon Layer3	North latitude32°31'41" East longitude118°01'49"
21	ID100	Zhenggang village, Sanjie Town, Mingguang City	Carbon Layer4	North latitude32°33'49" East longitude118°11'07"
22	ID114	Nongzhuang village, Pancun town, Mingguang City	Carbon Layer4	North latitude33°04'05" East longitude118°04'31"
23	ID97	Zhifan village, Yangying town, Laian County	Carbon Layer4	North latitude32°25'31" East longitude118°27'08"
24	ID86	Huangying village, Banta town, Laian County	Carbon Layer4	North latitude32°31'45" East longitude118°29'35"
25	ID96	Doushan village, Yangying town, Laian County	Carbon Layer4	North latitude32°35'59" East longitude118°24'37"

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 belt transect method was adopted uniformly in Hefei and Chuzhou during the spring survey. Firstly, the start point of the belt should be found and recorded. Secondly, the record should be conducted along with the direction from northwest to southwest at a speed of 2 to 3 km/h. The content of the record includes the number of animal entities or traces, the vertical distance from the center line of the belt, the habitat, altitude and other relevant data and information. The survey areas are Hefei and Chuzhou in Anhui province. Before the start of the survey, the survey communities including each route were demarcated on the 1:100,000 topographic maps and the actual walking routes were selected according to the actual situation in the survey communities. The actual walking survey route was required to pass through various habitats of animals, and the whole survey plot was required to be controlled. The purpose was to find as many traces of animal activities as possible in the survey, such as feces, recesses, etc., and draw the actual walking survey route on the topographic map during the survey. The fresh animal feces must be sampled every time for molecular biological analysis. Besides, the information of other animals in the route (including entity, feces, footprints, food tracks, etc.) was required to be recorded. Meanwhile, the vegetation distribution in the area and the relevant environmental information should be investigated. The animal information should be confirmed by the way of the household survey. These 25 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 8km² controlled by a single line. A group containing 4 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 the natural succession of vegetation, the typical sampling method was used to investigate the plant communities at each succession stage. The area of survey sample plot was divided into :

- a. The arbor layer is selected to have a quadrat area of 10 meters in length and 10 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.
- c. The herb layer is selected to have a quadrat area of 1 meter in length and 1 meter in width, so as to determine the types and the number of the herb in the sample plot, number the identification tag, measure the height, crown diameter, coverage degree of the herb and judge their viability. All the measurement results were recorded.

Survey results:

The biodiversity monitoring was mainly completed by the 110 technicians who were hired by Hefei Zhuoya during this monitoring period started from, April 2014, the project start date. 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 Hefei Zhuoya project manager. The conclusion on biodiversity was obtained from a field survey conducted by Anhui Academy of Social Sciences for two months.

Animal diversity

According to the requirements of the survey method, the monitoring team fed back the monitoring results to the Anhui Academy of Social Sciences. Then, the survey report was completed based on the data from the survey. Totally, 25 sample plots were monitored and the collection was conducted in the sample plots

according to the direction of the map of the sample lines. The sample lines involved 625 hectares of land, of which at least 25 hectares for each sample plot and at least hectares for each sample line. Lastly, a total of 4 kinds of species were found by the statistics, which are hare, Picapica, Oriolus chinensis and Cuculus poliocephalus. During this monitoring period, a total of 8 species were found and one species was found in the sampling line of each carbon layer. The traces of each species were different and a total of 4 kinds of traces were found. Among them, the physical object of a Picapica was found at a straight-line distance of 12m from the sample line and the photo of it was taken for evidence while the cries of three Oriolus chinensises were found at a vertical distance of 20m from the sample line. Cuculus poliocephalus was observed in the air at a vertical distance of 21m from the sample line, with a number of 4, but they flew too fast to be photographed. The last one found was the trace of hare, which was the feces of the hare at a vertical distance of 5m from the sample line and then the photo was taken for evidence.

Plant diversity

According to the requirements of the survey method, the sample plots of three vegetation types were collected. After collecting the data, the survey report was compiled by the Anhui Academy of Social Sciences. Finally, the vegetation conditions in 25 sample plots were counted. The statistical data of 25 sample plots obtained showed that there were no Herbaceous plants in the herbaceous layer. In the arborous layer, Neolitsea sericea was found. Neolitsea sericea, with a total number of 16 strains, was the only kind of species that was found on 25 plots, although no species were found on some plots. It has a coverage of 5% and has been photographed for evidence since the specimen collection was not suggested during the investigation. There are two kinds of shrub vegetation species were found in the 25 shrub layers. One of them is the Solanum pseudocapsicum which was found in 10 plots. There were three quadrats in each sample plot. However, not all quadrats were found with the Solanum pseudocapsicum, so a total number of 30 strains of it were found in 25 plots, covering 7% and the photos have been taken for evidence. The other one is the Pittosporum tobira with a total number of 42 strains. Similarly, not all of the plots were found with the Pittosporum tobira which means they were only found in 10 plots. So a total of 42 strains were found in 25 plots, covering 10% and had been photographed for evidence. In conclusion, the data of biodiversity survey showed that the geographical characteristics of barren mountains in hilly areas had been solved to some extent since the launch of afforestation projects in Hefei and Chuzhou, which means that the project has a positive influence on the use of the barren hills. Although there was no endangered species found during this survey, the biodiversity within the project zone has increased. The results of the statistics were showed as the table below:

Table 6 Monitoring variables for biodiversity

Data variable	Data unit	Surveyed (s) calculated (c) estimated (e) or default (d)	Monitoring frequency	Number of sample plots at which the data will be monitored	Comment
Tree			During each verification	1 sample plot in each project strata	sample plot size: diameter 10m
species	dimensionless	s	1	1	1
number of each species	number	s	16	0.64	0.64

total canopy	%	s	5	5	5
canopy of each species	%	s	5	5	5
Shrub			During each verification	3 sample plots in each tree plot	sample plot size: diameter 5m
species	dimensionless	s	2	2	2
number of each species	number	s	30/42	3.6/5.04	1.2/1.68
total canopy	%	s	7/10	7/10	7/10
canopy of each species	%	s	7/10	7/10	7/10
Herbage			During each verification	1 sample plot in each shrub plot	sample plot size: diameter 1m
species	dimensionless	s	0	0	0
total canopy	%	s	0	0	0
Animals			During each verification	1 sample searching line in each project strata	Observe and search trace along the searching line
species	dimensionless	s	4	4	4
Species abundance	number	e	8	1	1
Habitat area	ha	e	625	25	25

5.3.2 Biodiversity Monitoring Plan Dissemination (B4.3)

Monitoring plan and manual, Chinese version MR summary have been posted on notice boards in 128 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 ADDITIONAL PROJECT IMPACT INFORMATION

N/A.