HUBEI HONGSHAN IFM (CONVERSION OF LOGGED TO PROTECTED FOREST) PROJECT

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Project Title	Hubei Hongshan IFM (conversion of logged to protected forest) Project
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Project Location	China, Suizhou
Project Proponent(s)	Zhejiang Zhongzheng Forestry Development Co.,Ltd Room 308, Block C, Weiye Road, Puyan Street, Binjiang District,Hangzhou, Zhejiang +86 0571-87424258 391190031@qq.com
Validation Body	China Quality Certification Centre Section 9, No.188, the West Road, South Fourth Ring Road,Fengtai District, Beijing, China +8610 83886156 Zhuhailei@cqc.com.cn
Project Lifetime	01/01/2015 - 31/12/2044; 30 years
GHG Accounting Period	01/01/2015 - 31/12/2044; 30 years
History of CCB Status	N/A
Gold Level Criteria	N/A

Expected Verification Schedule	June.2021

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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) Improve local production conditions and ecological environment, enhance the quality of life, create a good investment and development environment and play a leading and demonstration role.	4
2) Provide experience of forest management in hilly land.	4
3) Improvement of the biodiversity and ecological environment of the project area and its surrounding area	5
4) Material improvement in the welfare of the minorities living within and around the project area. This includes but not limited to increase employment opportunities and better living conditions.	4

1.2 Standardized Benefit Metrics

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
GHG emission reductions or removals	Net estimated emission removals in the project area, measured against the without-project scenario	6,840,033 tCO_2e	3.2.1
	Net estimated emission reductions in the project area, measured against the without-project scenario	N/A	N/A
Forest[1] cover	For REDD[2] projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	N/A	N/A
	For ARR[3] projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario	N/A	N/A
Improved land management	Number of hectares of existing production forest land in which IFM[4] practices are expected to occur as a result of project activities, measured against the without-project scenario	23,769.42	2.1
	Number of hectares of non-forest land in which improved land management practices are expected to occur as a result of project activities, measured against the without-project scenario	N/A	N/A
Training	Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities	1800	2.3
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	1080	2.3
pl o y m	Total number of people expected to be employed in	1800	2.3

[1] Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)
[2] Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)
[3] Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)
[4] Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	project activities,[5] expressed as number of full-time employees[6]		
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	1080	2.3
Livelihoods	Total number of people expected to have improved livelihoods[7] or income generated as a result of project activities	1800	2.3
	Number of women expected to have improved livelihoods or income generated as a result of project activities	1080	2.3
Health	Total number of people for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	N/A	N/A
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	N/A	N/A
Education	Total number of people for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	N/A	N/A
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	N/A	N/A

[5] Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.
[6] Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from the UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])
[7] Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	N/A	N/A
	Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	N/A	N/A
Well-being	Total number of community members whose well-being[8] is expected to improve as a result of project activities	1800	2.3
	Number of women whose well-being is expected to improve as a result of project activities	1080	2.3
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation,[9] measured against the without-project scenario	23,769.42	5.2
	Expected number of globally Critically Endangered or Endangered species[10] benefiting from reduced threats as a result of project activities,[11] measured against the without-project scenario	N/A	5.2

[8] Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Livelihoods, Health, Education and Water), and may also include other benefits such as strengthened legal rights to resources, increased food security, conservation of access to areas of cultural significance, etc.
[9] Managed for biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation, e.g. enhancing the status of endangered species
[10] Per IUCN's Red List of Threatened Species
[11] In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Project Proponent (G1.1)

Organization name	Zhejiang Zhongzheng Forestry Development Co.,Ltd
Contact person	Zhou Xiongjie
Title	General Manager
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2.1.2 Project Objectives (G1.2)

- Sequester greenhouse gas and mitigate climate change；
- Enhance biodiversity conservation by increasing the connectivity of forests；
- Improve soil and water conservation and contribute to sustainable development;
- Generate income and job opportunities for local communities.

2.1.3 Physical Parameters (G1.3)

The size of the project is 23,769.42 ha. And the project is located in Hongshan Town, Suizhou City, Hubei Province of China. The geographical coordinates of the project is between 112°43′~113°46″ east longitude and between 31°19′N~32°26′ north latitude.

The location of the project activity in Hubei Province is illustrated in Figure 2-1 and Figure 2-2, and the KML file has also been uploaded to Verra Registry.

The condition prior to the proposed carbon sequestration project is summarized as follows.

Topography

Hongshan Town is the southwest central town, and covers an area of 477.88 square kilometers. The landform of Hongshan Town is mainly characterized by low mountains and hills, located in the national scenic tourism area of Dahongshan, located in Suixian, Zengdu, Suizhou, Zaoyang, Yicheng, Zhongxiang, Jingshan seven counties and urban areas of the junction. Sisha, SuiNan line two provincial road cross through the whole territory, unique geographical position, geographical advantages.

Soils

The main soil types of Hongshan Town are argillaceous rock, yellow brown loam and paddy soil. The terrain is mainly low mountains, hills and hills. The altitude of the whole town is between 170-450 meters. Hongshan Town is mainly the stratigraphic area of South Qinling, and the Wudang rock group from Quaternary to Proterozoic is exposed. Among them, the quaternary system is mainly Holocene alluvium, which is composed of gravel layer, mud bearing pebble layer and soil layer; the Cretaceous outcrop Sigou formation is mainly composed of a set of red siltstone, sandstone, glutenite and conglomerate; the Cambrian outcrop liqiuwan formation, shuangjianshan formation, Yangjiapu formation and zhuangzigou formation are mainly developed with shallow marine black shale, sandstone and sandstone Limestone and dolomite; Sinian system includes Dengying Formation and Doushantuo Formation, mainly including argillaceous rock, dolomite, silty shale, siliceous carbonate rock and carbonate rock; Mesoproterozoic stratum mainly includes Wudang group metavolcanic rock group, which is composed of Yangqi schist, albite schist, sericite (dolomite) quartz schist and carbonaceous schist.

Climate

Hongshan Town is located in the intersection of Huaihe River Basin and Yangtze River Basin, in the middle of the county with mid latitude monsoon circulation. It has a subtropical monsoon climate, with an annual average temperature of about 15.4 ℃, a frost free period of 220-240 days, and an average annual precipitation of 960 mm.

Hydrology

Hongshan Town is located in the intersection zone of Huaihe River Basin and Yangtze River Basin, where Yunshui flows through, and jueshui, piaoshui, Fushui and junshui form Yunshui basin.

Types of vegetation

Hongshan Town is rich in vegetation resources. Because it is located in the transition zone of the warm temperate deciduous broad-leaved forest and the north subtropical evergreen deciduous mixed forest, it also has the vegetation resources of the north and the south. The main tree species are Pinus massoniana, oak, poplar, Robinia pseudoacacia, Paulownia, dry willow, Chinese toon, elm, gardenia etc., the precious tree species are ginkgo, metasequoia, etc.

2.1.4 Social Parameters (G1.3)

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

Main settlements

The area of the project activity is 23,769.42ha, including 5,562 subcompartments spreading over Baoji country, Wangtai country, Baiguofan country, Huoyantao country, Jimingsi country, Sanshenmiao country, Peijiayan country, Qiaohe country, Shuangfeng country, Zhoujiawan country, Qinglongmiao country, Wushenggong country, Yutingling country, Jieshanchong country, Yunlin country, Sishan Neighborhood committee, Maocifan Neighborhood committee, Zhoujiazui country, Huanglongsi country, Wenquan country, Gaojianshan country, Xujiachong country,

Guanyintang country, Zhuji country, Dujiadian country, Liangtinghe country, Wangheshan country, Guoji country, Dianzihe country, Huangjiafan country, Guihuayuan country. All these countries have the legal right to forest ownership. The species involved in the project are Oak, Masson Pine, Broad-Leaved Mixed Forest and Coniferous and Broad-Leaved Mixed Forest.

Land use and economic activities

Hongshan Town, known as the granary of Suizhou, is the production base of high-quality rice, high-quality wheat, high-quality cotton, commercial livestock and poultry and important edible fungi in China. The main land use and economic activities are agriculture. Before the implementation of the project activity, the trees are logged based on a valid and verifiable government-approved timber management plan for harvesting the project area.

Socio-cultural information

Hongshan Town has a long history and splendid culture. It was established in 1793. It is a famous old revolutionary base area. In 1947, Liu Deng's army marched into Dabie Mountain. The Party committee of Jianghan District, the headquarters of the military region, Jianghan daily, Jianghan administrative office and Hongshan prefectural committee were all stationed in Hongshan.

Hongshan covers an area of 477.88 square kilometers and has a population of 66459, including Hui, Tujia, Zhuang, Miao, she, Buyi and other ethnic minorities, the town has jurisdiction over 4 communities and 29 administrative villages. There are Pipa Lake and Xinyang hot spring in the east of the town, which is an ideal place for recuperation tourism. In October 2019, Hongshan Town was selected as one of the "Top 1000 towns with comprehensive strength in China in 2019".

In accordance with the 20 word policy of "development of production, affluence of life, civilized rural style, clean and tidy village appearance and democratic management", Hongshan Town, on the one hand, focuses on the revision of village and town planning to guide the overall planning and construction of the whole town, on the other hand, strengthens the construction of pilot villages to promote the new rural construction of the whole town.

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

The project is located in Hongshan County, Suizhou City, Hubei Province of P.R.China. The geo-coordinate range of the project is 112°43′ E~113°46′ E and 31°19′ N~32°26′ N. There are 5,562 subcompartments spreading over Baoji country, Wangtai country, Baiguofan country, Huoyantao country, Jimingsi country, Sanshenmiao country, Peijiayan country, Qiaohe country, Shuangfeng country, Zhoujiawan country, Qinglongmiao country, Wushenggong country, Yutingling country, Jieshanchong country, Yunlin country, Sishan Neighborhood committee, Maocifan Neighborhood committee, Zhoujiazui country, Huanglongsi country, Wenquan country, Gaojianshan country, Xujiachong country, Guanyintang country, Zhuji country, Dujiadian country, Liangtinghe country, Wangheshan country, Guoji country, Dianzihe country, Huangjiafan country, Guihuayuan country.

The schematic diagram of the location of the project is shown in Figure 2-1 and Figure 2-2 below, and the KML file has also been uploaded to Verra Registry.

Besides, there is no leakage of the project, therefore, no offsite climate impacts were predicted. And there are no potential negative offsite impacts on biodiversity, thus no offsite biodiversity impacts was predicted either.

Areas where other stakeholders will be impacted are identified as Hongshan Town.

Figure 2-1: The project location

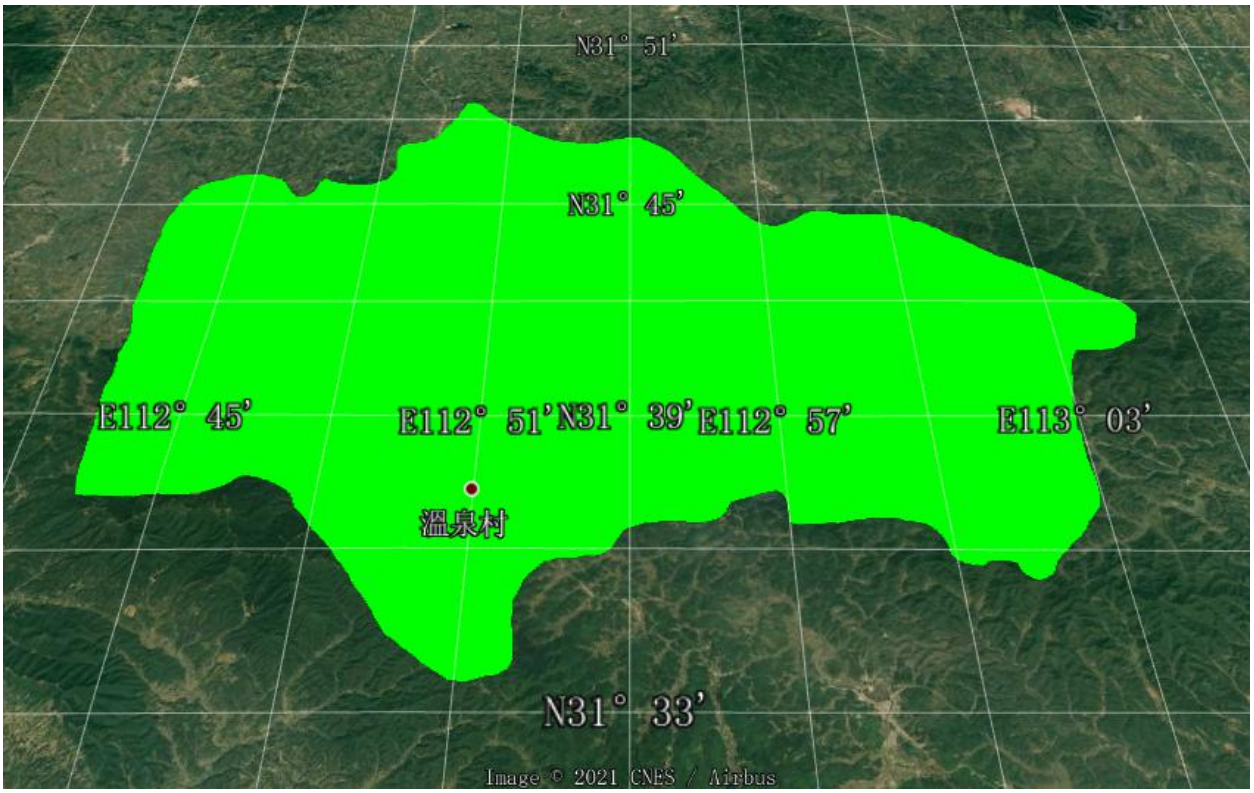


Figure 2-2. The Project Zone and Project Area

2.1.6 Stakeholder Identification (G1.5)

Brainstorm with key informants or focus groups to list and classify stakeholders. This brainstorm starts by listing all the people or groups who might have an influence over or be impacted by a project. The local village committees and village officials were considered to be the key informants and focus groups who know best about the local residents. In November 2014, the project proponent and local Forest Bureau held a meeting with local village committees before the project start.

1) Residents of Hongshan Town

Hongshan Town has been identified as the project zone which will be impacted by the project activities as shown in the above map, hence all local residents from Hongshan Town have been identified as stakeholders. The project improves the soil condition and biodiversity in the project area. Approximately 1800 local residents who were directly involved in maintenance of project. They were all trained by the local Forestry Bureau and PP and were provided with allowance/income for their effort.

For the local residents in the project zone, we also identified some community groups separately, which include migrant rural workers, local rural workers, and female rural workers.

2) Involvement of women in the project

Approximately 60% of the local residents directly involved in the project are women. Women and men often have very different roles and interests in natural resource management and can contribute complementary skills and knowledge, working with women as a separate stakeholder group can result in increased overall levels of participation due to greater involvement and commitment of women.

3) Hongshan Town rural workers involved in the project

Due to low developmental level of local economy, most of the local labors became migrant rural workers who worked in other large cities for living while their family members (old people, women and children) stayed at home. The project will provide more job opportunities for local residents so that some of the migrant rural workers don't need to go the other cities for work which will definitely effect their lives.

4) Hongshan Town Forestry Bureau

Forest harvesting needs to be approved by local administration. Therefore, the local Forestry Bureau should be identified as stakeholders. Before the implementation of the project activity, the trees are logged based on government-approved timber management plan for harvesting the project area, after the activity, trees could be avoided to be logged and then there would be no timber revenue, so it is difficult to raise enough fund and effectively maintain the implementation of the project during such a long period. Therefore, after seriously considered the carbon revenue and thought the revenue could help to mitigate the investment barrier, Hongshan Forest Bureau has organized and managed the project implementation during the early phase, including conducting baseline survey, signing consultant agreement for development of carbon credits .

The Forestry Bureau also helped in the coordination of the project implementation and disseminating information to the local communities. The Forestry Bureau also provided forestry management techniques to the local communities.

5) Other stakeholders

NGOs, VCSA and CCBA

In addition, entities and organizations that could have interest in the project activity, like NGOs, VCSA and CCBA were identified as stakeholders

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

As described above, Hongshan Town is defined as the project zone, so the stakeholders can summarize below:

Stakeholder	Rights, Interest and Overall Relevance to the Project
Residents of Hongshan town	Some of local residents participate the implementation of the project by working on forest management. They will be directly affected by the project.

Migrant rural workers in Hongshan town	Migrant rural workers will be affected by the project through their family members who participate the implementation of the project.
Female rural workers in Hongshan town	Female rural workers are the main labor resources during the project implementation, since most of the male workers go out of their villages for working. Women accounted for 60% of the local residents involved in the project.
Forest Bureau of Hongshan town	The local administration who is in charge of the official approval and management of the forest projects.
NGOs, VCSA and CCBA	These entities and organizations could have interest in the project. And there is no local specific NGOs.

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

As one of the most precious ecological resources, forest is the key to biodiversity and all life forms. The protection of local forest will enrich the biodiversity and provide more opportunity for adaptive response to natural challenges and economic development (e.g. climate change). The project activity will result in significant carbon sequestration and contribute to the environment (e.g. biodiversity conservation and soil erosion control), thus contribute to sustainable development. Therefore the project does not include activities that convert native ecosystems to generate GHG credits, the eligibility criteria of VCS AFOLU projects are fulfilled.

The implementation of the project activity includes the conversion from logged to protect forests in the parcels mentioned above. After the activity, trees could be avoided to be logged and then the carbon stocks could be increased. Therefore, net GHG emission reductions/removals resulting from the implementation of IFM projects aimed at the protection of forests that would be logged in the absence of carbon finance could be earned by the project activity.

The local government developed a comprehensive control mode, 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.

The project is estimated to generate GHG emission removals of 6,840,033 tCO_2^e in 30 years, with an average annual GHG emission removal of 228,001 tCO_2e.

Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
The conversion from logged to protect forest	Create job opportunities	Improve the local environment	Generate GHG emission removals	Climate
Offer permanent and temporary job opportunities related to forest	Increase household incomes of local residents	Improve living level of local villages	Improve well-being of local residents	Community

management				
Provide technical skills and training of forest management	Improve motivation of community groups	Enhance capabilities of local residents	Enhance social cohesion	Community
Conduct continuous management and protection of the forest	Improve local ecological environment	Provide better habitat for wild lives	Increase local biodiversity	Biodiversity

2.1.9 Climate, Biodiversity and Community Benefits Assessment Period (G1.9)

The project crediting period is from 01/01/2015 to 31/12/2044 with a lifetime of 30 years.

2.1.10 Differences in Assessment Periods (G1.9)

The project crediting period is from 01/01/2015 to 31/12/2044 with a lifetime of 30 years which is the same as the CCB benefits assessment period.

2.1.11 Implementation Schedule (G1.9)

Date	Milestone(s) in the project's development and implementation
2014.11.12	Village committee and villagers Decision
2014.11.17	Stakeholder meeting
2014.12	Distribution and collection of the project opinion questionnaires
2014.12.10	Application for stopping logging
2014.12.18	Reply on stopping logging
2015.01.01	The date of stopping logging (start date of crediting period)
2015.01.06	Signing development contracts for forestry carbon credits projects
2015.01	Participatory Rural Appraisal (PRA) report of the project was completed.
2017.01	Participatory Rural Appraisal (PRA) report of the project was completed.
2019.01	Participatory Rural Appraisal (PRA) report of the project was completed.

2.1.12 Risks to the Project (G1.10)

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 will adopt the necessary measures for fire preventing.	Strengthen the work of forest fire prevention publicity education to increase the awareness of forest fire prevention in the whole society. Education activities, mainly covering forest law and forest fire prevention regulation, are carried out to popularize the basic knowledge of fire prevention and extinguishing. Relying on the masses, we will implement mass prevention and control and effectively raise the people's awareness of forest fire prevention.
Diseases and Insects	There could be diseases and insects that may damage the trees, but the diseases and insects will be prevented by routine overseeing.	Upon routine overseeing, the diseases will be treated immediately by biological control once occurred. The chemical pesticides are allowed to be used only if there is a serious pest problem erupted in the project area, and the pesticides will be used in accordance with the National Pesticides Policy.
Pesticide	Improper pesticide application would be harmful to natural environment, including polluting soil, water and air conditions, as well as the habitat of the wildlife.	Pesticide will be strictly managed by well trained staff to minimize the potential effect. Also, the environmental friendly measures will be adapted. Especially the biological measures to control pests and diseases will be adopted. Therefore, the pesticide application will be limited.
Frost	According to historic records, frost damage on trees was not common in the project area. During winter, there could be frost that might damage the trees that have suffered wounds before. Warming measures will be adopted to keep the survival rate.	If there are frozen branches found after winter, they will be cut off in spring, which enhances their ability of selfhealing and is good for the growth of new leaves and branches.

Also, please refer to Non-Permanence Risk Report of the project for more detailed analysis of project risk.

2.1.13 Benefit Permanence (G1.11)

To maintain and enhance the climate, community and biodiversity benefits, the implementation of the project activity includes the conversion from logged to protected forests. In addition, according to Forest Management And Monitoring Manual, commercial logging will be forbidden and human interference will be minimized.

The project proponent Zhejiang Zhongzheng Forestry Development Co.,Ltd. and the local forestry bureau will be responsible for the management of the project during the project lifetime. And the local government will take over of the responsibility beyond the project lifetime.

2.1.14 Financial Sustainability (G1.12)

Stakeholder seriously considered the carbon revenue and thought the revenue could help to mitigate the economic barrier. Zhejiang Zhongzheng Forestry Development Co.,Ltd. invest the development of carbon project and the project owner will use the carbon revenue for the continuous management and maintenance of the forest.

2.1.15 Eligibility Criteria for Grouped Projects (G1.14)

N/A.

2.1.16 Scalability Limits for the Grouped Projects (G1.15)

N/A.

2.1.17 Risk Mitigation Approach for Grouped Projects (G1.15)

N/A.

2.2 Without-project Land Use Scenario and Additionality

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

Before the implementation of the project activity, the trees are logged based on government-approved timber management plan for harvesting the project area. The baseline scenario is the same as the conditions existing prior to the project initiation, continuation of the pre-project land use as the timber harvest plan.Section 2.2.3 provides more detail information on baseline scenario.

2.2.2 Most-Likely Scenario Justification (G2.1)

The most-likely scenario is the same as baseline scenario, please refer to section 2.2.3 for detailed information

2.2.3 Additionality (G2.2)

According to VM0010, the “Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities” (version 3.0), the following steps are applied for the demonstration of the additionality for the project by project proponent:

a) STEP 1. Identification of alternative land use scenarios to the AFOLU project activity;

b) STEP 2. Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or

c) STEP 3. Barriers analysis; and

d) STEP 4. Common practice analysis.

Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

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

a) Identify realistic and credible land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the AFOLU project activity under the VCS. The scenarios should be feasible for the project area taking into account relevant national and/or sectoral policies and circumstances, such as historical land uses, practices and economic trends. The identified land use scenarios at least include:

i) Continuation of the pre-project land use as the timber harvest plan;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project;

iii) If applicable, activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from:

- Legal requirements; or

- Extrapolate similar activities in the geographical area under similar socioeconomic and ecological conditions to the proposed VCS AFOLU project activity which cover a period began a decade earlier than the project start date.

For (ii), the Net Present Value (NPV) under this scenario[12] is obviously not financially attractive compared to the scenario of logging.

For (iii), the lands within the project boundary of the proposed VCS AFOLU project are all with the same legal requirements and are existed as forests more than ten years prior to the project start date. So (iii) is not applicable.

Pre-project land use scenario is the timber forest which is the common practice in China, it is feasible for the project area taking into account Forest Law of People's Republic of China. And there is no land within the project boundary performed being registered as the VCS AFOLU project.

b) All identified land use scenarios must be credible. All land-uses within the boundary of the proposed VCS AFOLU project that are currently existing or that existed at some time in the period beginning ten years prior to the project start date but no longer exist, may be deemed realistic and credible. For all other land use scenarios, credibility shall be justified. The justification shall include elements of spatial planning information (if applicable) or legal requirements and may include assessment of economic feasibility of the proposed land use scenario.

[12] For (ii), there is no income, and lots of expenditure

The (i) and (ii) identified land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the AFOLU project activity under the VCS are realistic and credible, as all land-uses within the boundary of the project activity that existed in the period beginning ten years prior to the project start date but no longer exist. Therefore, it is deemed realistic and credible. Outcome of Section 2.5.1.1:

The identified land use scenarios include the two below:

i) Continuation of the pre-project land use as the timber harvest plan as analysed in section 2.4;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project.

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

The scenarios are feasible for the project area taking into account Forest Law of People's Republic of China. Therefore, the 2 identified realistic and credible alternative land used scenarios that could have occurred on the land within the project boundary of the VCS AFOLU project are listed below. The identified land use scenarios include the two below:

i) Continuation of the pre-project land use as the timber harvest plan as analysed in section 2.4;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project.

Step 2: Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or

This section will determine whether the proposed project activity, without the revenue from the sale of GHG credits is economically or financially less attractive than at least one of the other land use scenarios. To conduct the investment analysis, use the following sections.

Sub-step 2a: Determine appropriate analysis method

Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis. If the VCS AFOLU project generates no financial or economic benefits other than VCS related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III). Note, that Options I, II and III are mutually exclusive hence, only one of them can be applied.

According to the tool, Option I is not applicable for the proposed project since the project will generate other financial and economic benefits (e.g. income from tending and managing instead of commercial harvest) other than VCS related income.

The benchmark analysis is not applicable for the proposed project since there is neither practical nor public available standard benchmark for forest industry within the project area.

Therefore, the project will use the investment comparison analysis (Option II) since the 2 alternatives identified in step 1 both have cost and benefit separately.

Sub-step 2b: Option II. Apply investment comparison analysis

As the PP should compare to determine which one is more economic attractive in the 2 scenarios identified in step 1, NPV will be used as the financial indicator to calculate the discounting in 30 years for decision-making context.

Sub-step 2c: Calculation and comparison of financial indicators (only applicable to options II and III): NPV

a) Calculate the suitable financial indicator for the proposed VCS AFOLU project without the financial benefits from the VCS for the 2 alternatives identified in step 1. Include all relevant costs and revenues, and, as appropriate, non-market cost and benefits in the case of public investors.

Series	Item	Unit	Baseline value	Project value	Data source
Revenue					
1	Oak	RMB/m^3	862	0	Financial statement[13]
2	Masson Pine	RMB/m^3	1316	0	
3	Broad-Leaved Mixed	RMB/m^3	934	0	
4	Coniferous and Broad-Leaved Mixed	RMB/m^3	1125	0	
Extracted Volume					
1	Oak	m^3	567755	0	Timber Harvest Plan
2	Masson Pine	m^3	236544	0	
3	Broad-Leaved Mixed	m^3	721089	0	
4	Coniferous and Broad-Leaved Mixed	m^3	440702	0	
5	Total Area	Mu	356541.3	356541.3	
Cost					
1	A/R cost	RMB/Mu	1200	0	Financial statement
2	Harvest cost	RMB/m^3	300	0	

[13] Forest management expenses from local forestry bureau.

3	Management Fee	RMB/Mu	200	200	
4	Additional maintenance cost for protected forest	RMB/Mu/working day	0	0.1	

b) Present the investment analysis in a transparent manner and provide all the relevant assumptions in the VCS AFOLU project description

The NPV before and after the conversion of logged to protected forest is shown in the table below. The NPV under the scenario of logging is ¥4,292*10^4 Yuan with the discount rate of 8%. However, the NPV under the scenario of protected forest is ¥ -11,420*10^4 Yuan with the discount rate of 8%, which is lower than the scenario of logging. Therefore, the NPV under the scenario of protected forest is obviously not financially attractive compared to the scenario of logging. By taking into account the VCUs revenue, the NPV under the scenario of protected forest is increased to be ¥ -8,550*10^4 Yuan. With revenue from VCS at the assumed price level, the project would be more financially attractive. Table 3 shows the comparison of the NPV between project and baseline scenario.

Table 3: Comparison of NPV at different scenarios

	NPV (10^4 Yuan)
Scenario of Logging	¥ 4,292
Scenario of protected	¥ -11,420

Sub-step 2d: Sensitivity analysis

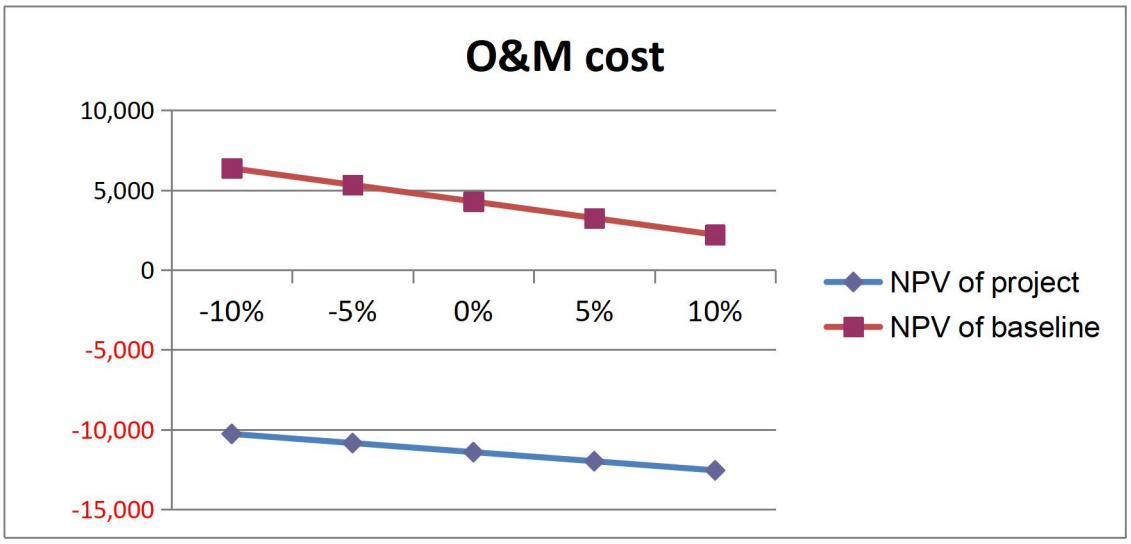
The objective of the sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favour of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the proposed VCS AFOLU project without the financial benefits from the VCS is unlikely to be financially attractive.

For the project, the key parameters of timber price, the O&M cost, and the extracted volume will be taken into account of the sensitivity analysis. Results of the 3 parameters are shown in the table 4 and figure 2 below:

Table 4: NPV comparison sensitivity analysis of the project

Key parameters	**NPV of baseline scenario (10^4 Yuan)**					**NPV of project scenario (10^4 Yuan)**				
	-10%	**-5%**	**0%**	**5%**	**10%**	**-10%**	**-5%**	**0%**	**5%**	**10%**
Timber price	1,779	3,035	4,292	5,548	6,804	-11,420	-11,420	-11,420	-11,420	-11,420
O&M cost	6,373	5,332	4,292	3,251	2,210	-10,278	-10,849	-11,420	-11,991	-12,562
Extracted volume	1,779	3,035	4,292	5,548	6,804	-11,420	-11,420	-11,420	-11,420	-11,420


Timber price
10,000
5,000
0
-5,000
-10,000
-15,000
-10%
-5%
0%
5%
10%
NPV of project
NPV of baseline


O&M cost
10,000
5,000
0
-5,000
-10,000
-15,000
-10%
-5%
0%
5%
10%
NPV of project
NPV of baseline

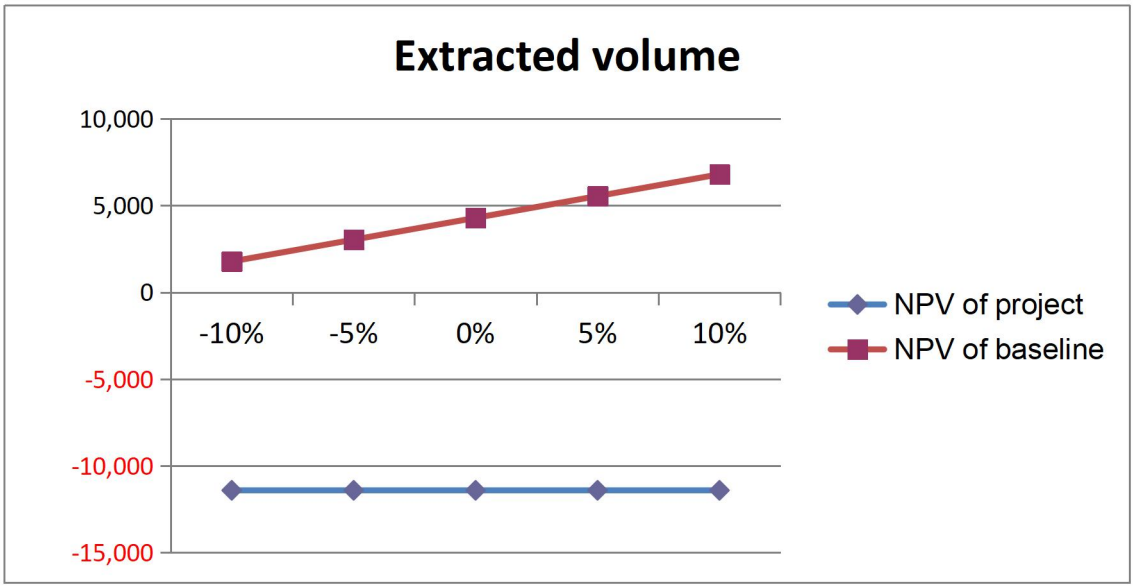


Figure 2-3: Sensitivity analysis of the project

By referring to the Figures above, the NPV under protected scenario will not exceed the baseline scenario if the price, the O&M cost and the extracted volume varies within ±10%.

In the baseline scenario, the project receives revenue from the commercial harvest. Under the project scenario, all the commercial harvest has been cancelled and only tending and managing is allowed, the revenue of the project scenario is 0. It is obvious that the revenue of the project can't reach the baseline scenario, which would not be influenced by the variation of the timber price and extracted volume. On the other hand, the cost in the project scenario will increase due to the more cost on tending and maintenance. Therefore, it is impossible for the NPV of the project scenario to reach to the baseline scenario no matter how the two parameters vary.

Therefore, the result of the sensitivity analysis confirms that the project is financially unattractive.

According to the tool, if after the sensitivity analysis it is concluded that the proposed VCS AFOLU project without the financial benefits from the VCS is unlikely to be financially most attractive (Option II and Option III), then proceed directly to Step 4 (Common practice analysis)

Step 3. Barrier analysis

Not applicable

Step 4. Common practice analysis

According to the "Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities" (version 3.0). "Similar activities are defined as that which are of similar scale, take place in a comparable environment, inter alia, with respect to the regulatory framework and are undertaken in the relevant geographical area, subject to further guidance by the underlying methodology".China has a vast territory, the development policies and economic environment for projects in each province of China are not

same. The investment environment varies considerably from province to province depending on the local conditions. The Project is located in Hubei Province. However, the geographic and geomorphic conditions are totally different in the whole province. And by searching the VCS, CDM websites, there is no similar project without applying the VCS, CDM[14] or other voluntary emission reduction project[15]

Therefore, according to the analysis above, the similar activities which haven't applied for the VCS are not common practice in Hubei Province. So the proposed project has additionality.

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

Climate benefits

As one of the most precious ecological resources, forest is the key to biodiversity and all life forms. The protection of local forest will enrich the biodiversity and provide more opportunity for adaptive response to natural challenges and economic development (e.g. climate change).

Community benefits

To maximize the socio-economic benefit, PRA methods were adopted in interviewing and consulting with farmer households in the project areas to understand the local farmers/communities' preferences, wishes and concerns, so that the proposed project activity would better respond to their desires for livelihood development.

The community benefits including employment and income generation, strengthening social cohesion, and technical training and demonstration, which would not exist in the absence of the project. Please refer to section 4 for detailed information regarding community benefits.

Biodiversity benefits

After the project is fully launched, it does not only produces positive benefits to soil erosion control, but also has far-reaching significance to wildlife resources protection. Also, the biodiversity benefits will be obtained by establishing a forest ecosystem and alleviating conflicts between environment conservation and economic activities of local communities due to income increase of local residents. Please refer to section 5 for detailed information regarding biodiversity benefits.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

The full project documentation will be published on VCS and CCB website for public comments, the local communities and other stakeholders can easily download from the website. The project owner will notice local stakeholders through the routine villager assembly regarding every milestones of the project development, including listing, registered, issuance, etc.

[14] http://cdm.unfccc.int/
[15] http://cdm.ccchina.gov.cn/ccer.aspx

2.3.2 Dissemination of Summary Project Documents (G3.1)

Along with the project implementation, the project documentation will be published on VCS and CCB website for all stakeholders to obtain the detailed project information and development progress.

2.3.3 Informational Meetings with Stakeholders (G3.1)

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

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

During the PRA survey and stakeholder meeting, project owner explained the potential costs, risks and benefits to relevant communities and stakeholders, and invited them to give their feedback. The analysis based on results chain is quite clear and understandable. According to the analysis, the community benefits of the project includes income improvement, job creation, and all the relevant communities are aware of the design concept of the project and have willingness to participate in the project.

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

The status and process of the project for CCB and VCS verification were published through routine villager assembly and posted on local bulletin boards, also the mobile phone number of contact person of the project was provided to the stakeholders so they can directly make a call in case they have any problem about the project.About a week prior to the visit, the project staff will inform relevant stakeholders in advance about the details of the audit process and arrang stakeholder meeting. Local Forest Bureau will invit local communities and stakeholders to attend the meeting on time.

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

About a week prior to the visit, the project staff will inform relevant stakeholders in advance about the details of the audit process and arrang stakeholder meeting. Local Forest Bureau will invit local communities and stakeholders to attend the meeting on time.During the meeting , representatives of the stakeholders from local villages will came to the local forest office to have a conversation with the project owner and the auditor regarding the issues of the project they concerned.

2.3.7 Stakeholder Consultations (G3.4)

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

Collect feedback on the questionnaire, which is summarized as follows:

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

- Most local residents have never heard of carbon trading or carbon credits. After the introduction, they strongly agreed that the project should be registered as a carbon sink project and joined the carbon trading market.

- Local residents believe that the project can 1) create jobs; 2) get more benefits from selling carbon credits; 3) improve the local environment, protect cultivated land, and reduce natural disasters; 4) create more education opportunities for local people.

- All the stakeholders agreed with the project design and willing to participate the implementation and follow-up management of the project activity.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

Throughout the lifetime of the project, the project owner, through their on-site project staff, will maintain a direct line of communication with community members and relevant stakeholders. This will establish a commitment to communication and consultation to keep stakeholders informed of project activities including restoration, maintenance, monitoring and the CCB validation and verification process. The project staff in the field will maintain communications with the community groups and other stakeholders through in-person meetings. And the project will actively listen to recommendations made by any identified community members, or other stakeholder groups, and adapt and improve methods as necessary.

The project has an adaptive management plan to effectively evolve as the project progresses, and systematically develop existing practices through project monitoring and evaluation. The project will periodically review plans, methods, goals and objectives, to incorporate new lessons learned, available technology, and scientific knowledge. These strategies will be in accordance with project's Standard Operating Procedures (SOPs) and monitoring plans.

2.3.9 Stakeholder Consultation Channels (G3.5)

Local residents directly impacted by the project were invited through their most convenient way: the routine villager assembly. All the stakeholders have been informed directly or through their legitimate representatives.

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

In the project planning phase, stakeholders were fully involved in stopping logging, protecting forest, etc, through villagers meeting and PRA methods. During the project implementation, the local communities and government will play as the direct implementers of the project, and the project proponent will play as coordinator who is in charge of the overall management. All the critical information regarding decision-making will be informed to local stakeholders, and the decision should be revised according to further discussion in case there is any feedback from stakeholders.

2.3.11 Anti-Discrimination Assurance (G3.7)

The project owner should obey Labor Law of the People's Republic of China with anti-discrimination assurance, and workers will sign up voluntarily regardless of gender, race, religion or any other basis. In case of any discrimination proved to be true, the person who is responsible for the discrimination shall be fired immediately and the project owner will find someone else to take over his/her job.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

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

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

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

All the feedback and grievances of the project will be recorded in time and kept by project owner during the whole project lifetime. The record is published to every stakeholders who can check at any time.

2.3.14 Worker Training (G3.9)

Interview with local communities indicated that local farmers/communities lack skills for forest management, as well as for preventing trees from being subject to fire, pest and disease attack. In the proposed project activity, the local forestry bureau had o trained for local communities on forest management and integrated pest management.

2.3.15 Community Employment Opportunities (G3.10)

The project will mobilize the whole community involvement, including the community of women, minorities and poor people. All people from the communities will be given an equal opportunity to fill all work positions if the job requirements are met.

During the implementation of the project, the total number of local farmers involved in managing forest was approximately 1800 of which 60% were women. Before the project, approximately 1800 locals were regularly trained in relevant skills.

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

The local people would be under the protection of Labor Law of the People's Republic of China and no forced labor is allowed, and they are free to establish and join any labor organizations as they wish. The worker's rights are guaranteed in the labour contracts for each workers.

2.3.17 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.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

Local Forestry bureau and Zhejiang Zhongzheng Forestry Development Co.,Ltd. will play as the expert group (Management team) who is in charge of guiding and coordinating the project's overall implementation and decision-making. Zhong Che (Beijing) Environment Energy Technology Development Co. Ltd. is the consultant, who prepares the Project Description and monitoring report, assist project proponent to complete the registration of the project, issue and transaction related work.

2.4.2 Required Technical Skills (G4.2)

For the development of the Project, are required skills and experience related to:

- Experience in management of natural resources conservation projects

- Ability to interact with different actors,

- Development of Projects with rural populations,

- Experience in the development of carbon projects and environmental services,

- Experience in the evaluation and monitoring of biodiversity.

2.4.3 Management Team Experience (G4.2)

As mentioned above, local Forestry bureau and Zhejiang Zhongzheng Forestry Development Co.,Ltd. will play as the expert group (Management team) who is in charge of guiding and coordinating the project's overall implementation and decision-making.

Zhong Che (Beijing) Environment Energy Technology Development Co., Ltd. is experienced in carbon measurement and monitoring. In the past, Zhong Che (Beijing) Environment Energy Technology Development Co., Ltd. has successfully developed many different carbon projects, including validation and verification under VCS and CDM standard. These experience will help project proponent to ramp up the capability of project implementing and management.

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

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

2.4.5 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.

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

As legally registered companies, the project proponent and other involved entities have the obligation to comply with relevant regulations, including anti-corruption law. The annual audit by the government makes sure that it operates with full compliance with China law and regulations.

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

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

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

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

2.5.2 Recognition of Property Rights (G5.1)

The ownership of the forest land of the project belongs to the local village committee, and the right to use the forest land belongs to the farmers. The farmers signed Project Development Cooperation Agreement[16] with Zhong Che (Beijing) Environment Energy Technology Development Co., Ltd. (Founded in May 2013 and hereafter “Zhongche”) on 06-01-2015, the local village committee authorizes Zhongche to use the land for the forest management. Due to the shortage of funds in the later stage of project operation, Zhongche terminated the agreement on project development. On 15-02-2019, Tripartite Project Cooperation Development Agreement[17] was signed by local village committee, Zhejiang Zhongzheng Forestry Development Co.,Ltd.(Founded in January 2019) and Zhong Che (Beijing) Environment Energy Technology Development Co.Ltd. Zhejiang Zhongzheng Forestry Development Co.,Ltd. was the new project

[16] The agreement has been submitted
[17] The agreement has been submitted

proponent, and Zhongche was the consultant of the project. Zhejiang Zhongzheng Forestry Development Co.,Ltd.[18] (hereafter "the project proponent"), established in January 2019. The project proponent has the ownership and legal right of the carbon sink credit of this project.

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

Zhejiang Zhongzheng Forestry Development Co.,Ltd. and the village collective had signed a carbon sink cooperation and development agreement, which clarifies the forest land rights by all parties during the project crediting period. In addition, the signed of the carbon sink cooperation and development agreement is based on the principle of voluntary and legal. So the project will not encroach uninvited on private property, community property or government property.

2.5.4 Property Rights Protection (G5.3)

Prior to the project implementation, the project land use continues to be used as the timber harvest land, the village collective and the farmers of the village voluntarily converse the trees to protected forest instead of logging, therefore the project activities will not lead to involuntary removal or relocation of property rights holders from their lands or territories, and does no force rights holder to relocate activities important to their culture or livelihood.

2.5.5 Illegal Activity Identification (G5.4)

Under current law of China, any illegal logging activities will be fined or sentenced to punishment. Currently all project lands are defined for forestry purpose by local government. Deforestation must be carried on under the approval of local Forestry Bureau, and the forests are nursed by project staff regularly as a result of the implementation of the project, so there will not be illegal deforestation. The project benefits are gained from legal activities. Therefore, the project's climate, community and biodiversity impacts will not be affected by the illegal activities.

2.5.6 Ongoing Disputes (G5.5)

Because the project proponents signed a cooperative development agreement, the forest land was developed reasonably and legally, so there is neither ongoing or unresolved conflicts or disputes over rights to lands, territories and resources nor any disputes that were resolved and recorded during the last twenty years.

2.5.7 National and Local Laws (G5.6)

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

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

Regulations for tending of forest;.

[18] Business license is submitted as evidence.

The project has complied with the above regulations and laws during construction period and will be under regular inspection by local government during the implementation period to ensure the continuous compliance.

2.5.8 Approvals (G5.7)

The project has been approved by Hongshan Town Forest Bureau on 18/12/2014.

2.5.9 Right to Claim Benefits (G5.8)

The ownership of the forest land of the project belongs to the local village committee, and the right to use the forest land belongs to the farmers of the village. The local village committee authorizes Zhejiang Zhongzheng Forestry Development Co.,Ltd.(hereafter "the project proponent") to develop the carbon project. The project proponent has the right to claim benefits.

2.5.10 Other Programs (G5.9)

The project will not seek to generate or has received any form of environmental credits, and the GHG emission removals generated by the project will not be used for compliance under such programs or mechanisms.

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates.

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

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

2.5.11 Double Counting (G5.9)

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

3 CLIMATE

3.1 Without-Project Climate Scenario

3.1.1 Without-Project Estimated Greenhouse Gas Emissions (CL1.1)

The carbon pools included or excluded from the project boundary are shown in the table below：

Carbon pools	Included/Optional/ Excluded	Justification / Explanation of choice
Aboveground trees	Included	The stock change in the aboveground tree biomass is estimated
Aboveground non-tree	Excluded	Exclusion is always conservative when forests remains as forest

Belowground	Excluded	Unlikely to change significantly in forests remaining as forests and is difficult to measure - omission is conservative
Dead wood (logging slash)	Included in the baseline	The dead wood (logging slash) carbon pool is expected to be larger in the baseline than in the project scenario, and therefore this pool must be included
Dead wood (naturally accumulated)	Excluded	Following IPCC guidelines, it is assumed that carbon stocks in the naturally occurring dead wood pool (both standing and lying) are equivalent in both the project and baseline scenario, and therefore this pool is conservatively excluded.
Harvested wood products	Included	Will be greater in baseline than project scenario and significant
Litter	Excluded	Insignificant and exclusion is conservative
Soil organic carbon	Excluded	Exclusion is always conservative when forests remains as forest

The emissions sources included in or excluded from the project boundary are shown in the table below. The project proponent has chosen to exclude to account for GHG emissions related to the combustion of fossil fuels, which is conservative.

Gas	Source	Included?	Justification
CO_2	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Conservative as emissions will be greater in the baseline scenario than in the project scenario.
	Removal of herbaceous vegetation	Excluded	Based on CDM EB decision reflected in paragraph11ofthe report of the 23rd session of the board: cdm.unfccc.int/Panels/ar/023/ar_023_rep.pdf
CH_4	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Conservative as emissions will be greater in the baseline scenario than in the project scenario.
	Burning of biomass	Included	Included as CO_2 equivalent emission
N_2O	Combustion of fossil fuels (in vehicles, machinery and	Excluded	Conservative as emissions will be greater in the baseline scenario than in the project scenario.

	equipment)		
	Nitrogen based fertilizer	Excluded	Potential emissions are negligible. Following the VCS update to the Tool for AFOLU Methodological Issues and Guidance for AFOLU Projects, emissions through the use of fertilizer are considered insignificant and are not considered here.
	Burning of biomass	Excluded	Potential emissions are negligible

Calculation of baseline emissions for all land parcels under both the historical and common practice baseline scenarios requires the application of the equations presented in Sections 8.1.1 to Section 8.1.6 of the methodology.

Baseline projections are calculated ex-ante and are not adjusted through-out the project lifetime.

According to the methodology, Section 8.1.1 serves to calculate carbon stocks in commercial timber volumes. Next, baseline emissions are estimated based on the calculation of deadwood (logging slash) generated in the process of timber harvest and establishment of forestry infrastructure (Section 8.1.2), the emissions resulting from production and subsequent retirement of wood products derived from timber harvesting (including timber harvesting from the establishment of forestry infrastructure (Section 8.1.3)), the combustion of fossil fuels in forestry machinery including mechanized felling, skidding / forwarding /hauling, loading and transporting inside the project area, and processing (Section 8.1.5), minus the rates of forest regrowth post-timber harvest (Section 8.1.6).

The following table lists the baseline emissions modelled by the methodology:

Included in modelling
1. Emission from wood product conversion 2. Decomposition of deadwood from harvested trees 3. Emissions from wood product retirement 4. Stock change due to regrowth following timber harvest
5. Decomposition of trees incidentally killed during tree felling Where project proponent accounts for forest infrastructure： 6. Decomposition of trees killed through skid trail creation 7. Decomposition of trees killed through road construction Optional (as omission is conservative) 8. Emissions from fossil fuels burned in baseline harvesting practices
Conservatively excluded from modeling

9. Emissions through subsequent forest re-entry

The options of 5 to 9 are hard to calculate and tiny in baseline scenario, as emission is conservative so it is reasonable to exclude those from baseline emissions modelling. Baseline commercial timber volumes must be derived for development of the timber harvest plan and for ex-post accounting of emissions resulting from natural forest disturbance.

The equations below calculate the total emissions across the project crediting period for each emission source. Total emissions are averaged across the crediting period to give annual emissions and are multiplied by t*, time elapsed since the start of project activity. EX-post, t* is updated so baseline projections are available for each proposed future verification date.

Data for input into these carbon stock change calculations for the baseline scenario shall be established from the same data used to create the timber harvest plan.

According to VM0010 version 1.3, the baseline emissions are calculated in the sections below:

3.1.2 Calculation of carbon stocks in commercial timber volumes

This section calculates $C_{HB,j,i|BSL}$, the mean carbon stock in total harvested biomass in $tC \cdot ha^{-1}$ and $C_{EX,j,i|BSL}$, the mean carbon stock in extracted timber (merchantable timber that leaves the forest) in $tC \cdot ha^{-1}$.

The pre-existing forest inventory data are used for this purpose provided that the pre-existing data:

a) represents the project strata;

b) is not more than 10 years old.

These inventory data used the method of sample plot inventory. These data were carried out through field surveys which were finished at the end of 2014 by who is qualified, experienced for the forestry investigation. The project involves 4 strata and 5,562 subcompartments. For each stratum, mean volume is estimated from sample plot size of 0.04 ha and at least 1 sample plot will be selected in 1 subcompartment within the project area using standard forest inventory assessment methods, which satisfies the number of sample plots required by the Tool for Calculation of the Number of Sample Plots for Measurements within A/R CDM Project Activities (version 02.1.0).

The estimate of merchantable volume for each species j at the sample plot level will be calculated as:

$$V_{j,i,sp} = \sum_{l=1}^{L} V_{l,j,i,sp} \quad (1)$$

Where:

$V_{j,i,sp}$ merchantable volume for species j in stratum i in sample plot sp, m^3;

$V_{l,j,i,sp}$	merchantable volume for tree l of species j in stratum i in sample plot sp, m^3;
l	1, 2, 3 …L sequence of individual trees in sample plot;
i	1, 2, 3 …M strata;
sp	1, 2, 3 …SP sample plots; and
j	1, 2, 3 …J tree species.

Therefore, the merchantable volume per unit area of species j in stratum i will be calculated as the mean merchantable volume in all sample plots in stratum i:

$$V_{j,i|BSL} = \frac{1}{SP} * \sum_{sp=1}^{SP} \frac{V_{j,i,sp}}{A_{sp}} \quad (2)$$

Where:

$V_{j,i\|BSL}$	mean merchantable volume per unit area of species j in stratum i in the baseline scenario, $m^3 \cdot ha^{-1}$;
$V_{j,i,sp}$	merchantable volume for species j in stratum i in sample plot *sp*; m^3;
A_{sp}	area of sample plot *sp*, ha;
i	1, 2, 3 …M strata;
sp	1, 2, 3 …SP sample plots; and
j	1, 2, 3 …J tree species.

Therefore, the carbon stock of timber harvested per unit area for species j in stratum i will be calculated from this mean volume of extracted timber:

$$C_{HB,j,i|BSL} = V_{EX,j,i|BSL} * BCEF_R * CF_j \quad (3)$$

Where:

$C_{HB,j,i\|BSL}$	mean carbon stock of harvested biomass per unit area for species j in stratum i, $tC \cdot ha^{-1}$;
$V_{EX,j,i\|BSL}$	mean volume of extracted timber per unit area for species j in stratum i, $m^3 \cdot ha^{-1}$;
$BCEF_R$	biomass conversion and expansion factor applicable to wood removals in the project area, t.d.m m^{-3};
CF_j	carbon fraction of biomass for species j, tC t $d.m^{-1}$;
i	1, 2, 3 …M strata; and
j	1, 2, 3 …J tree species.

Not all of the harvested biomass leaves the forest because the timber harvested has two components: 1) wood removed to market (extracted timber) and, 2) wood remaining in the forest as a result of harvest.

Therefore, the mean carbon stock of extracted timber per unit area for species j in stratum i will be calculated from the mean volume of extracted timber multiplied by density and carbon fractions:

$$C_{EX,j,i|BSL} = V_{EX,j,i|BSL} * D_j * CF_j \quad (4)$$

Where:

$C_{EX,j,i\|BSL}$	mean carbon stock of extracted timber per unit area for species j in stratum i; $tC \cdot ha^{-1}$;
$V_{EX,j,i\|BSL}$	mean volume of extracted timber per unit area for species j in stratum i, $m^3 \cdot ha^{-1}$;
D_j	basic wood density of species j; t d.m. m^{-3};
CF_j	carbon fraction of biomass for species j, tC t $d.m^{-1}$;
i	1, 2, 3 …M strata; and
j	1, 2, 3 …J tree species.

3.1.3 Calculation of dead wood (logging slash) generated in the process of timber harvest

This section calculates $\Delta C_{DWSLASH,i,p|BSL}$, the change in carbon stock in dead wood resulting from timber harvest in stratum i in land parcel p, using $C_{EX,j,i|BSL}$ and $C_{HB,j,i|BSL}$ as calculated in section 3.1.1.

The simplifying assumption is made that dead wood created during timber harvest is emitted in the year of harvest.

Therefore, the change in carbon stock in the dead wood pool in stratum i in land parcel p will be calculated as the difference between the total carbon stock of the harvested biomass and the carbon stock of the extracted timber:

$$\Delta C_{DWSLASH,i,p|BSL} = [\sum_{j=1}^{J}(C_{HB,j,i|BSL} - C_{EX,j,i|BSL})] \quad (5)$$

Where:

$\Delta C_{DWSLASH,i,p\|BSL}$	change in carbon stock of dead wood as logging slash resulting from timber harvest per unit area in stratum i in land parcel p, in $tCha^{-1}$;
$C_{HB,j,i\|BSL}$	mean carbon stock of harvested biomass per unit area for species j in stratum i, $tC \cdot ha^{-1}$;
$C_{EX,j,i\|BSL}$	mean carbon stock of extracted timber per unit area for species j in stratum i, $tC \cdot ha^{-1}$;
i	1, 2, 3 …M strata; and
j	1, 2, 3 …J tree species.

p 1, 2, 3 ...P land parcels.

3.1.4 Calculation of baseline carbon sequestered in wood products

The carbon stock of extracted timber across species is calculated as:

$$C_{EX,i|BSL} = \sum_{j=1}^{J} C_{EX,j,i|BSL} \quad (6)$$

Where:

$C_{EX,i|BSL}$ change in carbon stock of extracted wood products resulting from timber harvest per unit area in stratum i in land parcel p, $tC \cdot ha^{-1}$;

$C_{EX,j,i|BSL}$ mean carbon stock of extracted timber per unit area for species j in stratum i, $tC \cdot ha^{-1}$;

i 1, 2, 3 …M strata; and

j 1, 2, 3 …J tree species.

In accordance with the VCS AFOLU Requirements, the amount of carbon stored in wood products that would decay within 3 years after harvest (ie, the Wood Waste (WW) and the Short Lived Fraction (SLF)), are assumed to be emitted at the time of harvest.

Wood products that are retired between 3 and 100 years after harvest (ie, the Additional Oxidised Fraction, OF), must be accounted according to a 20 year linear decay function. This decay function is applied when the net greenhouse gas emissions/removals are calculated on an annual basis in equations 11 and 12.

All other wood product pools are considered to permanently store carbon.

Therefore, the carbon stock of extracted timber that is immediately emitted to the atmosphere at the time of harvest is calculated as

$$C_{WP0,i|BSL} = \sum_{k} C_{EX,i,k|BSL} * (WW_k + SLF_k) \quad (7)$$

Where:

$C_{WP0,i|BSL}$ carbon stock of extracted timber from stratum i that is assumed to be emitted immediately at the time of harvest, in $tC \cdot ha^{-1}$;

$C_{EX,i|BSL}$ mean carbon stock of extracted timber per unit area in stratum i, for wood product type k, $tC \cdot ha^{-1}$;

WW_k fraction of biomass carbon from wood waste that is assumed to be emitted to the atmosphere immediately at the time of harvest for wood product k, dimensionless;

SLF_k fraction of biomass carbon from the short lived wood product pool that is

	assumed to that be emitted to the atmosphere immediately at the time of harvest for wood product k, dimensionless;
i	1, 2, 3 …M strata; and
k	Wood products (sawnwood, wood base products, etc).

The amount of extracted carbon stock that is assumed to enter the wood products pool that is not immediately emitted at harvest is calculated as per equation 8 below:

$$C_{WPi|BSL} = \sum_k C_{EX,i,k|BSL} - C_{WP0,i|BSL} \quad (8)$$

Where:

$C_{WP,i\|BSL}$	carbon stock of extracted timber from stratum i that is assumed to enter the wood products pool that is not immediately emitted at the time of harvest ,in $tC \cdot ha^{-1}$;
$C_{EX,i\|BSL}$	mean carbon stock of extracted timber per unit area in stratum i, for wood product type k, $tC \cdot ha^{-1}$;
$C_{WP0,i\|BSL}$	carbon stock of extracted timber from stratum i that is assumed to be emitted immediately at the time of harvest, in $tC \cdot ha^{-1}$;
i	1, 2, 3 …M strata; and
k	Wood products (sawnwood, wood base products, etc).

Therefore, the carbon stock of wood products assumed to be retired between 3-100 years following harvest is calculated as:

$$C_{WP100,i|BSL} = C_{WP,i|BSL} * OF_k \quad (9)$$

Where :

$C_{WP100,I,p\|BSL}$	Amount of carbon stored in wood products that are assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, $tC \cdot ha^{-1}$;
$C_{WP,i\|BSL}$	carbon stock of extracted timber from stratum i that is assumed to enter the wood products pool that is not immediately emitted at the time of harvest ,in $tC \cdot ha^{-1}$;
OF_k	fraction of biomass carbon for wood product type k that is assumed to be emitted to the atmosphere between 3 and 100 years of timber harvest, dimensionless; and
i	1, 2, 3 …M strata

3.1.5 Change in carbon stocks due to forest regrowth after harvest

The carbon sequestration in the baseline resulting from forest regrowth after timber harvest up to year t is equal to the forest regrowth rate of each stratum.

Therefore, carbon sequestration resulting from forest regrowth after timber harvest is calculated as:

$$C_{RG,i,p|BSL} = \sum_i RGRi \quad (10)$$

Where:

$C_{RG,i,p\|BSL}$	carbon sequestration resulting from forest regrowth after timber harvest in stratum i in land parcel p, tC ha^{-1} yr^{-1};
RGR_i	regrowth rate of forest post timber harvest for stratum i, $tCha^{-1}$ yr^{-1};
i	1, 2, 3 …M strata

3.1.6 Calculation of baseline scenario greenhouse gas emissions from change in carbon stocks

The net carbon stock change to be converted to emissions is equal to the carbon stock change as a result of timber harvest plus the carbon stock change resulting from conversion and retirement of wood products minus carbon sequestration from forest regrowth after harvest.

In order to generate the annual carbon stock change in the baseline scenario, the total net change in carbon stocks for parcels within is multiplied by the area of forest in the particular age class (ie, years since harvest in the baseline).

The annualized calculations vary between years 1, 2-10; 10-20; and all years since the start of the project activity, depending on which decay functions apply.

Therefore, the net change in carbon stock from wood products and logging slash across all parcels within the first year of harvest in the baseline is calculated as:

$$\Delta C_{NET|BSL(1)} = \sum_{i,p} A_{1,i,p} * \sum_{i=1}^{M} (C_{DWSLASH,i,p\backslash BSL}/10) + C_{WP0,i,p\backslash BSL} + (C_{WP100,i,p\backslash BSL}/20) \quad (11)$$

Where:

$\Delta C_{NET\|BSL(1)}$	net change in carbon stock across all parcels in the baseline scenario in the first year since harvest in the baseline scenario, in tC;
$\Delta C_{DWSLASH,i,p\backslash BSL}$	change in carbon stock of dead wood as logging slash resulting from timber harvest per unit area in stratum i in land parcel p, in tC ha^{-1};
$\Delta C_{WP0,i,p\backslash BSL}$	change in carbon stock resulting from wood product conversion and retirement from stratum i in land parcel p, that is assumed to be emitted in

	the first year of harvest in the baseline tC ha^{-1};
$\Delta C_{WP100,i,p\backslash BSL}$	Amount of carbon stored in wood products that is assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC ha^{-1};
$A_{1,i,p}$	the area of stratum i in land parcel p that was harvested 1 year ago, ha;
i	1, 2, 3 …M strata; and
p	1, 2, 3 ...P land parcels harvested within the project crediting period.

The net change in carbon stock from wood products and logging slash across all parcels the years 2-10 since harvest in the baseline are calculated as:

$$\Delta C_{NET|BSL(2-10)} = \sum_{i,p} A_{2-10,i,p} * \sum_{i=1}^{M} (C_{DWSLASH,i,p\backslash BSL}/10) + (C_{WP100,i,p\backslash BSL}/20) \quad (12)$$

Where:

$\Delta C_{NET\|BSL(2-10)}$	net change in carbon stock across all parcels in the baseline scenario in years 2-10 since harvest in the baseline scenario, in tC;
$\Delta C_{DWSLASH,i,p\backslash BSL}$	change in carbon stock of dead wood as logging slash resulting from timber harvest per unit area in stratum i in land parcel p, in tC ha^{-1};
$\Delta C_{WP100,i,p\backslash BSL}$	Amount of carbon stored in wood products that is assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC ha^{-1};
$A_{2\text{-}10,i,p}$	the area of stratum i in land parcel p that was harvested 2 and 10 years ago, ha;
i	1, 2, 3 …M strata; and
p	1, 2, 3 ...P land parcels harvested within the project crediting period.

The net change in carbon stock from wood products across all parcels the years 11-20 since harvest in the baseline are calculated as:

$$\Delta C_{NET|BSL(11-20)} = \sum_{i,p} A_{11-20,i,p} * \sum_{i=1}^{M} (C_{WP100,i,p\backslash BSL}/20) \quad (13)$$

Where:

$\Delta C_{NET\|BSL(11\text{-}20)}$	net change in carbon stock across all parcels in the baseline scenario in years 11-20 since the start of the project activity, in tC;
$\Delta C_{WP100,i,p\backslash BSL}$	Amount of carbon stored in wood products that is assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC ha^{-1};
$A_{11\text{-}20,i,p}$	the area of stratum i in land parcel p that was harvested 11 and 20 years ago, ha;
i	1, 2, 3 …M strata; and

p	1, 2, 3 ...P land parcels harvested within the project crediting period.

The net change (sequestration) in carbon stock due to forest regrowth across all parcels in all years since harvest in the baseline scenario is calculated according to equation 14 below. Note that there will be no more emissions quantified from decay of logging slash or wood products.

$$\Delta C_{NET|BSL(1+)} = \sum_i A_{t*} * \sum_{i=1}^{M} (-\Delta C_{RG,i,p\backslash BSL}) \quad (14)$$

Where:

$\Delta C_{NET\|BSL(1+)}$	net change in carbon stock due to forest regrowth in all parcels that have been harvested in the baseline scenario, in tC;
$\Delta C_{RG,i,p\backslash BSL}$	carbon sequestration resulting from forest regrowth after timber harvest in stratum i in land parcel p, tC ha^{-1}
A_{t*}	Cumulative area harvested until time t*, ha;
i	1, 2, 3 …M strata; and
p	1, 2, 3 ...P land parcels harvested within the project crediting period.

Therefore, net change in carbon stock across all parcels harvested over each year of the project crediting period in the baseline scenario since the start of the project activity is calculated as:

$$\Delta C_{NET|BSL,t*} = \sum_{p=1}^{P} \Delta C_{NET|BSL(1)} + \Delta C_{NET|BSL(2-10)} + \Delta C_{NET|BSL(11-20)} + \Delta C_{NET|BSL(1+)} \quad (15)$$

Where:

$\Delta C_{NET\|BSL,t*}$	net change in carbon stock across all parcels in the baseline scenario in the year t* since the start of the project activity, in tC;
$\Delta C_{NET\|BSL(1)}$	net change in carbon stock in the baseline scenario for all parcels p that are within 1 year of harvest in the baseline scenario, in tC;
$\Delta C_{NET\|BSL(2\text{-}10)}$	net change in carbon stock in the baseline scenario for all parcels p, that were harvested between 2-10 years ago in the baseline scenario, in tC;
$\Delta C_{NET\|BSL(11\text{-}20)}$	net change in carbon stock in the baseline scenario in parcel p, that were harvested between 11-20 years ago in the baseline scenario, in tC;
$\Delta C_{NET\|BSL(1+)}$	net change in carbon stock due to forest regrowth in the baseline scenario for all parcels p that have been harvested in the baseline scenario, in tC;
t*	time elapsed since the start of the project, in years; and
p	1, 2, 3 ...P land parcels harvested within the project crediting period.

The net carbon stock change in the baseline scenario must be converted to net greenhouse gas emissions and is calculated as:

$$GHG_{NET|BSL,t*} = \Delta C_{NET|BSL,t*} * \frac{44}{12} \quad (16)$$

Where:

$GHG_{NET\|BSL,t*}$	net greenhouse gas emissions in the baseline scenario in the year t* since the start of the project activity, tCO_2e;
$\Delta C_{NET\|BSL}$	net change in carbon stock across all parcels in the baseline scenario in the year t* since the start of the project activity, tC; and
44/12	ratio of molecular weights of carbon dioxide and carbon, tCO_2-e tC^{-1}.

3.2 Net Positive Climate Impacts

3.2.1 With-Project Estimated Greenhouse Gas Emissions (CL2.1)

3.2.1.1 Ongoing forest growth in the project scenario

This section calculates $\Delta C_{AB,t|PRJ}$ annual carbon stock change in aboveground biomass of trees in the project scenario, in tCO_{2e}.

3.2.1.2 Allometry

Select the appropriate allometric equation for forest type/group of species j (e.g. tropical humid forest or tropical dry forest) or for each species or family j (group of species) found in the inventory (hereafter referred to as species group) that converts tree dimensions from field timber inventories on sample plots to aboveground biomass of trees.

3.2.1.3 Measurements

Only the individual trees, species and strata which were to be harvested in the baseline scenario are to be measured. Any minimum values employed in inventories are held constant for the duration of the project.

3.2.1.4 Determining Sample Plot Carbon Stocks

The carbon stock in aboveground biomass for each individual tree of species group j in the sample plot located in stratum i will be estimated using the selected allometric equation applied to the tree dimensions resulting from section 3.2.1.2.

Therefore, the sum of the carbon stock in each sample plot will be calculated as:

$$C_{AB,j,i,t,sp|PRJ} = \sum_{l=1}^{L_{j,i,sp,t}} f_j(X, Y \ldots) * CF_j \quad (17)$$

Where:

$C_{AB,j,i,t,sp\|PRJ}$	carbon stock in aboveground biomass of trees of species j in plot sp in stratum i at time t in the project scenario, tC
CF_j	carbon fraction of biomass for tree group j, tC t d.m.$^{-1}$;
$f_j(X,Y...)$	aboveground biomass of trees based on allometric equation for species group j based on measured tree variable(s), t. d.m. tree-1;
i	1, 2, 3, …M strata;
j	1, 2, 3 … J tree species;
l	1, 2, 3, … $L_{j,i,t,sp}$ sequence number of individual trees of species group j in stratum i at time t in sample plot sp;
t	0, 1, 2, 3, …t* years elapsed since start of the project activity; and
sp	1, 2, 3 …SP sample plots.

3.2.1.5 Determining Stratum Carbon Stocks

The total carbon stock in the aboveground biomass of all trees present in sample plot sp in stratum i at time t, must be calculated as:

$$C_{AB,i,t,sp|PRJ} = \sum_{j=1}^{J} C_{AB,j,i,t,sp|PRJ}$$

(18)

Where:

$C_{AB,i,t,sp\|PRJ}$	aboveground biomass carbon stock of all trees of stratum i at time t in sample plot sp in the project scenario, tC;
$C_{AB,j,i,t,sp\|PRJ}$	carbon stock in aboveground biomass of trees of species j in stratum i at time t in plot sp in the project scenario, tC;
i	1, 2, 3, …M strata;
j	1, 2, 3 … J tree species; and
t	0, 1, 2, 3 …t* years elapsed since the start of the project activity.

3.2.1.6 Determining Mean Carbon Stocks

Therefore, the mean carbon stock in aboveground biomass for each stratum per unit area is calculated as:

$$C_{AB,i,t|PRJ} = \frac{1}{SP} * \sum_{SP=1}^{SP} \left(\frac{C_{AB,i,t,sp|PRJ}}{A_{sp}}\right)$$

(19)

Where:

$C_{AB,i,t\|PRJ}$	mean aboveground biomass carbon stock of trees in stratum i at time t, tC ha^{-1};
$C_{AB,i,t,sp\|PRJ}$	aboveground biomass carbon stock of trees in stratum i at time t in sample plot sp, tC;
$A_{,sp}$	area of sample plot sp, ha;
sp	1, 2, 3 … SP sample plots;
i	1, 2, 3 … M strata; and
t	0, 1, 2, 3 … t* years elapsed since the start of the project activity.

3.2.1.7 Determining Carbon Stock Changes

The annual carbon stock change in aboveground biomass of trees in year t is the difference in mean carbon stock in aboveground biomass between sampling events and, when expressed in tCO_2e, is calculated as:

$$\Delta C_{AB,t|PRJ} = \left(\sum_{i=1}^{M} \left(A_i * \frac{C_{AB,i,t2|PRJ} - C_{AB,i,t1|PRJ}}{T}\right)\right) * \frac{44}{12} \quad (20)$$

Where:

$\Delta C_{AB,t\|PRJ}$	annual carbon stock change in aboveground biomass of trees in year t, tCO_2^e yr^{-1};
$C_{AB,i,t\|PRJ}$	mean aboveground biomass carbon stock of trees in stratum i at time t, tC ha^{-1};
$A_{,i}$	area covered by stratum i, ha;
sp	1, 2, 3 … SP sample plots;
T	number of years between monitoring time t1 and t2 ($T=t_2 - t_1$); years;
i	1, 2, 3 … M strata; and
t	0, 1, 2, 3 … t* years elapsed since the start of the project activity; and
44/12	ratio of molecular weights of carbon dioxide divided carbon, tCO_2^e tC^{-1}.

The carbon stock change in aboveground biomass of trees ($\Delta C_{AB,t|PRJ}$) is the output of this section and is necessary to calculate net greenhouse gas emissions in the project scenario.

3.2.2 Forest disturbance in the project scenario

This section calculates $\Delta C_{DIST\_FR,t|PRJ}$, carbon stock change due to fire disturbance in the project scenario; tCO_2-e, $\Delta C_{DIST,t|PRJ}$, carbon stock change due to non-fire natural disturbance in the project scenario; tCO_2-e

3.2.2.1 Natural disturbance

3.2.2.1a Natural Disturbance - Fire

Where fires occur ex post in the project area, the area burned shall be delineated. Therefore, based on the IPCC 2006 Inventory Guidelines, estimation of greenhouse gas emissions from biomass burning shall be calculated as:

$$\Delta C_{DIST_{FR},t|PRJ} = \sum_{i=1}^{M} A_{burn,i,t} * B_{i,t|PRJ} * COMF_i * G_{g,i} * 10^{-3}.GWP_{CH4} \quad (21)$$

Where:

$\Delta C_{DIST\_FR,t\|PRJ}$	net greenhouse gas emissions resulting from fire disturbance in year *t*, tCO_2^e ;
$A_{burn,i,t}$	area burnt for stratum *i* at time *t*, ha;
$B_{i,t\|PRJ}$	average aboveground biomass stock present in the project scenario but absent in the baseline scenario before burning stratum *i*, time *t*; t d. m. ha^{-1};
$COMF_i$	combustion factor for stratum *i*, dimensionless;
$G_{g,i}$	emission factor for stratum *i* for methane, g kg^{-1} dry matter burnt;
GWP_{CH4}	global warming potential for CH_4 (IPCC default: 21), tCO_2^e tCH_4^{-1};
i	1, 2, 3 …*M* strata; and
t	1, 2, 3, … *t** years elapsed since the start of the IFM project activity.

The average aboveground biomass stock present in the project scenario but absent in the baseline scenario before burning for a particular stratum shall be calculated as:

$$B_{i,t|PRJ} = \sum_{j=1}^{J}\{V_{EX,i,j|BSL} * BCEF_R\} \quad (22)$$

Where:

$B_{i,t\|PRJ}$	average aboveground biomass stock present in the project scenario but absent in the baseline before burning for stratum *i*, time *t*, t d. m. ha^{-1};
$V_{EX,j,i\|BSL}$	mean volume of extracted timber per unit area for species *j* in stratum *i*, $m3 \cdot ha^{-1}$;
$BCEF_R$	biomass conversion and expansion factor applicable to wood removals in the project area, t.d.m m^{-3};
i	1, 2, 3 …*M* strata;
j	1, 2, 3 …*J* tree species; and
t	1, 2, 3, … *t** years elapsed since the start of the IFM project activity.

3.2.2.1b Natural Disturbance – Non-Fire

There are no fire disturbance occurred in the project area, therefore, $\Delta C_{DIST\_FR,t|PRJ}=0$

Where non-fire natural disturbances occur ex post in the project area, the area disturbed must be delineated.

$$\Delta C_{DIST,t|PRJ} = \sum_{i=1}^{M}\left(A_{dist,i,t} * \sum_{j=1}^{J}\{C_{AB,j,i|BSL}\}\right) * \frac{44}{12} \quad (23)$$

Where:

$\Delta C_{DIST,t\|PRJ}$	net greenhouse gas emissions resulting from non-fire natural disturbance in year *t*, tCO_2^e ;
$A_{dist,i,t}$	area disturbed for stratum *i* at time *t*, ha;
$C_{AB,i\|BSL}$	carbon stock in aboveground biomass per unit area in stratum *i*, $tC \cdot ha^{-1}$;
44/12	ratio of molecular weights of carbon dioxide and carbon, $tCO_2^e\ tC^{-1}$;
i	1, 2, 3 …*M* strata;
j	1, 2, 3 …*J* tree species; and
t	1, 2, 3, … *t** years elapsed since the start of the IFM project activity.

There are non-fire natural disturbances occur ex post in the project area, therefore, $\Delta C_{DIST,t|PRJ}=0$

3.2.2.2 Illegal logging

Where the PRA and the limited sampling indicate degradation is occurring, net carbon stock changes as a result of illegal logging shall be calculated as:

$$\Delta C_{DIST-IL,t|PRJ} = \sum_{i=1}^{M}\left(A_{DIST-IL,j} * \frac{C_{DIST-IL,i,t|PRJ}}{AP_i}\right) \quad (24)$$

Where:

$\Delta C_{DIST\_IL,t\|PRJ}$	net carbon stock changes as a result of illegal logging at time *t*, tCO_2^e;
$A_{DIST\_IL,}i$	area potentially impacted by illegal logging in stratum *I*, ha;
$C_{DIST\_IL,i,t\|PRJ}$	biomass carbon of trees cut and removed through illegal logging in stratum i at time t, tCO_2^e;
APi	total area of illegal logging sample plots in stratum *i*, ha;
i	1, 2, 3 …*M* strata in the in the project case; and
t	1, 2, 3, … *t* years elapsed since the projected start of the project activity.

There are no degradation occurred indicated in PRA and limited sampling, therefore, $\Delta CDIST_{\_IL,t|PRJ} = 0$

3.2.3 Net greenhouse gas emissions in the project scenario

This section calculates $\Delta C_{NET,t|PRJ}$, the net greenhouse gas emissions in the project scenario in year t, in tCO_2e.

The net greenhouse gas emissions in the project scenario are the sum of net greenhouse gas emissions resulting from fire and non-fire forest disturbance, plus any carbon stock changes that occur as a result of illegal logging, minus the annual carbon stock change in the aboveground biomass of trees due to forest growth.

Therefore, net greenhouse gas emissions in the project scenario in year t, is calculated as:

$$\Delta C_{NET,t|PRJ} = \left(\Delta C_{DIST-FR\ ,t|PRJ} + \Delta C_{DIST,t|PRJ} + \Delta C_{DIST-IL\ ,t|PRJ}\right) - \Delta C_{AB,t|PRJ} \quad (25)$$

Where:

$\Delta C_{NET,t\|PRJ}$	net greenhouse gas emissions in the project scenario in year t, tCO_2^{-e}
$\Delta C_{DIST\_FR,t\|PRJ}$	net greenhouse gas emissions resulting from fire disturbance in year t, tCO_2^e
$\Delta C_{DIST,t\|PRJ}$	net greenhouse gas emissions resulting from non-fire natural disturbance in year t, tCO_2^e
$\Delta C_{DIST\_IL,t\|PRJ}$	Net carbon stock changes as a result of illegal logging at time t, tCO_2^e
$\Delta C_{AB,t\|PRJ}$	annual carbon stock change in aboveground biomass of trees in year t, tCO_2^e yr^{-1}; and
t	1, 2, 3, t* years elapsed since start of the project activity.

The net greenhouse gas emissions across in the project scenario since the start of the project activity is calculated as:

$$GHG_{NET|PRJ} = \sum_{t=1}^{t^*} \Delta C_{NET,t|PRJ} \quad (26)$$

Where:

$GHG_{NET\|PRJ}$	net greenhouse gas emissions in the project scenario since the start of the project activity, tCO_2^e
$\Delta C_{NET,t\|PRJ}$	net greenhouse gas emissions in the project scenario in year t, tCO_2^e; and
t	1, 2, 3, t* years elapsed since start of the project activity.

3.2.4 Net Impact (CL2.2)

The project will Sequester greenhouse gas and mitigate climate change, and the anticipated net climate impact of the project is predicted to be positive.

3.3 Offsite Climate Impacts (Leakage)

3.3.1 Types of Expected Leakage (CL3.1)

3.3.1.1 Activity shifting leakage

The project does not involve in the activity shifting leakage .In China, the forest timber harvest is strictly controlled by the authority. Also, the China Forest Law also clearly stipulates the punishment for the illegal logging, which not only requires 5-10 times compensation of replanting, but also 2-10 times economic penalty. in China, the timber harvest is tightly controlled by the forestry authority, the illegal logging is severely punished.

Therefore, for the project activity, the PP have no right to harvest more in other parcels outside the project activity and the project does not involve in the activity shifting leakage .

3.3.1.2 Market leakage

Leakage due to market effects is equal to the net emissions from planned timber harvest activities in the baseline scenario multiplied by an appropriate leakage factor:

$$GHG_{LK|LtPF} = LF_{me} * GHG_{NET|BSL,t*} \quad (27)$$

Where:

$GHG_{LK\|LtPF}$	is total market leakage as a result of IFM LtPF activities, tCO_2^e;
LF_{ME}	is the dimensionless leakage factor for market-effects calculations;
$GHG_{NET\|BSL,t*}$	net greenhouse gas emissions in the baseline scenario in the year t* since the start of the project activity, tCO_2^e.

The leakage factor is determined by considering where in the country logging will be increased as a result of the decreased timber supply caused by the project.

Leakage factor calculation

The leakage factor is determined by considering where in the country logging will be increased as a result of the decreased supply of the timber caused by the project. If the areas liable to be logged have a higher ratio of merchantable biomass to total biomass higher than the project area it is likely that the proportional leakage is higher and vice versa.

Therefore,

LF_{ME} = 0

If it can be demonstrated that no market-effects leakage will occur within national boundaries, that is if no new concessions are being assigned AND annual extracted volumes cannot be increased within existing national concessions AND illegal logging is absent (or de minimis) in the host country.

3.3.2 Quantity of Expected Leakage (CL3.1, 3.3)

The project was implemented by manual operation, rather than mechanical operation.

This project forbids artificial burning of biomass such as land preparation and forest burning. Therefore, the increase of greenhouse gas emissions within the project boundary only considers the greenhouse gas emissions caused by forest fires.

For the project,

- According to the 13th Five-year Forest Harvest Limit issued by State Council (Guohan [2016] No.32)[19], the total harvest volume limit from 2016 to 2020 is 25,403.6*10^4 m^3, and the planned harvest volume of the project is196.6*10^4 m^3, accounting 0.77% of the national harvest volume, which will not result in the significant national concession and illegal logging;

- The annual extracted volume is unlikely increase within existing national concessions AND illegal logging is strictly forbidden and will be severely punished by the law.

In summary,

LF_{ME} = 0

Therefore, leakage is zero for the proposed project. The actual value will be monitored when verification.

3.3.3 Leakage Mitigation (CL3.2)

N/A

3.4 Climate Impact Monitoring

3.4.1 Climate Monitoring Plan (CL4.1)

3.4.1.1 Data and Parameters Available at Validation

Data / Parameter:	$V_{l,j,i,sp}$
Data unit:	m^3
Description:	Merchantable volume for tree l of species j in sample plot sp in stratum i

[19] http://www.gov.cn/zhengce/content/2016-02/16/content_5041486.html

Source of data:	Calculated from volume tables or equations linking diameter at breast height (DBH, at typically 1.3 m aboveground level), and merchantable height (MH), to commercial (merchantable) volume of trees in the sample plots above the minimum DBH set in the timber harvest plan. If locally derived equations or yield tables are not available use relevant regional, national or default equations from IPCC literature, national inventory reports or published peer-reviewed studies– such as those provided in Tables 4.A.1 to 4.A.3 of the GPG-LULUCF (IPCC 2003).
Value applied:	See the detailed excel spreadsheet
Justification of choice of data or description of measurement methods and procedures applied:	It is necessary to verify the applicability of equations used. Allometric equations can be verified by both: 1. Verification of equation conditions Justification should be provided for the applicability of the equation to the project locations. Such justification should include identification of climatic, edaphic, geographical and taxonomic similarities between the project location and the location in which the equation was derived. Any equation used should have an r2 value of greater than 0.5 (50%) and a p value that is significant (<0.05 at the 95% confidence level). 2. Additional field verification The following limited measures method must be used for field verification: select at least 10 trees per species distributed across the age range (but excluding trees less than 15 years old for which there is rarely a great relative inaccuracy in equations) ; measure DBH, and height to a 10 cm diameter top or to the first branch; calculate stem volume from measurements; and plot the estimated volume of all the measured trees along with the curve of volume against diameter as predicted by the allometric equation. If the estimated volume of the measured trees are distributed both above and below the curve (as predicted by the allometric equation) the equation may be used. The equation may also be used if the measured individuals have a volume consistently higher than predicted by the equation. The equation may not be used if >75% of the measured trees have a volume lower than the predicted curve. In this instance another equation must be selected.
Purpose of Data	Calculation of baseline emissions
Comments:	N/A

Data / Parameter:	CF_j
Data unit:	$tC \cdot td.m.^{-1}$
Description:	Carbon fraction of dry matter for species j
Source of data:	According to VM0010 version 1.3, the default value 0.5 $tC \cdot t\ d.m.^{-1}$ is used and the same value is used in all instances where this parameter is used.
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data	Calculation of baseline emissions
Comments:	N/A

Data / Parameter:	D_j
Data unit:	t d.m. m^{-3}
Description:	Basic wood density of species j in t d.m. m^{-3}
Source of data:	According to VM0010 version 1.3, it must be chosen with priority from higher to lower preference as follows: National species-specific or group of species-specific values (eg, from National GHG inventory); Species-specific or group of species-specific values from neighboring countries with similar conditions. When species-specific data from neighboring countries is of higher quality, being more representative of the species in the project scenario, it may be preferable to use these values than lower quality national data; Global species-specific or group of species-specific (eg, IPCC 2006 AFOLU Chapter 4 Tables 4.13 and 4.14). Species-specific wood densities may not always be available, and may be difficult to apply with certainty in the typically species rich forests of the humid tropics, hence it is acceptable practice to use wood densities developed for forest types or plant families or species groups. "Land Use Change and Forestry GHG Inventory(2013)" of "Second National Information Notification on China Climate Change" matches the first choice.
Value applied:	<table><tr><th>Tree species</th><th>D_j</th></tr><tr><td>Oak</td><td>0.676</td></tr><tr><td>Masson Pine</td><td>0.38</td></tr><tr><td>Broad-Leaved Mixed</td><td>0.482</td></tr><tr><td>Coniferous and Broad-Leaved Mixed</td><td>0.486</td></tr></table>
Justification of choice of	N/A

data or description of measurement methods and procedures applied:	
Purpose of Data	Calculation of baseline emissions
Comments:	N/A

Data / Parameter:	$f_j(X, Y…)$
Data unit:	t d.m. $tree^{-1}$
Description:	Allometric equation(s) for species j linking measured tree variable(s) to aboveground biomass of living trees
Source of data:	Equations must have been derived using a wide range of measured variables (eg, DBH, Height, etc.) based on datasets that comprise at least 30 trees. Equations must be based on statistically significant regressions and must have an r2 that is ≥ 0.8. The source of equation(s) must be chosen with priority from higher to lower preference, as available, as follows: a) National species-, genus-, family-specific; b) Species-, genus-, family-specific from neighbouring countries with similar conditions (ie, broad continental regions); c) National forest-type specific; d) Forest-type specific from neighbouring countries with similar conditions (ie, broad continental regions); e) Forest type-specific such as those provided Tables 4.A.1 to 4.A.3 of the GPG-LULUCF (IPCC 2003); or in Pearson, T., Walker, S. and Brown, S. 2005. Sourcebook for Land Use, Land-Use Change and Forestry Projects. Winrock International and the World Bank Biocarbon Fund. 57pp.; or in Chave, J., C. Andalo, S. Brown, M. A. Cairns, J. Q. Chambers, D. Eamus, H. Folster, F. Fromard, N. Higuchi, T. Kira, J.-P. Lescure, B. W. Nelson, H. Ogawa, H. Puig, B. Riera, T. Yamakura. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. Oecologia 145: 87-99. Species-, genus- and family-specific allometric equations may not always be available, and may be difficult to apply with certainty in the typically species rich forests of the humid tropics. Hence it is acceptable practice to use equations developed for regional forest types, provided that their accuracy has been validated with direct site-specific data following guidance given below. If a forest-type specific equation is used, it should not be used in combination with species-specific equation(s) (ie, it must be used for all tree species).
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data	Calculation of baseline emissions
Comments:	It is necessary to validate the applicability of equations used. Source data from which equation(s) was derived should be reviewed and confirmed to be representative of the forest

	type/species and conditions in the project and covering the range of potential independent variable values. Allometric equations can be validated either by: 1. Limited Measurements select at least 30 trees (if validating forest type-specific equation, selection should be representative of the species composition in the project area, ie, species representation in roughly in proportion to relative basal area). Minimum diameter of measured trees must be 20cm and maximum diameter must reflect the largest trees present or potentially present in the future in the project area (and/or leakage belt); measure DBH, and height to a 10 cm diameter top or to the first branch; calculate stem volume from measurements and multiplying by species-specific density to gain biomass of bole; apply a biomass expansion factor to estimate total aboveground biomass from stem biomass37; and plot the estimated biomass of all the measured trees along with the curve of biomass against diameter as predicted by the allometric equation. If the estimated volume of the measured trees are distributed both above and below the curve (as predicted by the allometric equation) the equation may be used. The equation may also be used if the measured individuals have a biomass consistently higher than predicted by the equation. If >75% of the measured trees have a biomass lower than the predicted curve, destructive sampling must be undertaken or another equation must be selected. 2. Destructive Sampling select at least 5 trees (if validating forest type-specific equation, selection should be representative of the species composition in the project area, ie, species representation in roughly in proportion to relative basal area) at the upper end of the range of independent variable values existing in the project area; measure DBH and commercial height and calculate volume using the same procedures/equations used to generate commercial volumes to which BCEFs will be applied; fell and weigh the aboveground biomass to determine the total (wet) mass of the stem, branch, twig, leaves, etc. Extract and immediately weigh subsamples from each of the wet stem and branch components, followed by oven drying at 70 degrees C to determine dry biomass; determine the total dry weight of each tree from the wet weights and the averaged ratios of wet and dry weights of the stem and branch components; and

	plot the estimated biomass of all the measured trees along with the curve of biomass against diameter as predicted by the allometric equation. If the estimated volume of the measured trees are distributed both above and below the curve (as predicted by the allometric equation) the equation may be used. The equation may also be used if the measured individuals have a biomass consistently higher than predicted by the equation. If >75% of the measured trees have a biomass lower than the predicted curve another equation must be selected. Details of destructive sampling measurements are given in: Brown, S. 1997. Estimating biomass and biomass change of tropical forests: a primer. FAO Forestry Paper 134, Rome, Italy. Available at http://www.fao.org/docrep/W4095E/W4095E00.htm If using species-specific equations, and new species are encountered in the course of monitoring, new allometric equations must be sourced from the literature and validated, if necessary, as per requirements and procedures above. Default values must be updated whenever new guidelines are produced by the IPCC

Data / Parameter:	$BCEF_R$
Data unit:	t d.m. m^{-3}
Description:	Biomass conversion and expansion factor applicable to wood removals in the project area
Source of data:	The source of data must be chosen with priority from higher to lower preference as follows: Existing local forest type-specific; National forest type-specific or eco-region-specific (eg, from national GHG inventory); Forest type-specific or eco-region-specific from neighboring countries with similar conditions. Sometimes (c) might be preferable to (b); Global forest type or eco-region-specific (eg, IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.5). Alternatively: BCEFR = BEFR * D Where BCEF values are not directly available, they can be calculated as Biomass Expansion Factor (BEF)* basic wood density (D). Application of this equation requires caution because basic wood density and biomass expansion factors tend to be correlated. If the same sample of trees was used to determine D, BEF or BCEF, conversion will not introduce error, therefore, it is acceptable to use this equation. If, however, basic wood density is not known with certainty, transforming one into the other might introduce error, as BCEF implies a specific but unknown basic wood density, therefore,

<table>
<tr><td></td><td>all conversion and expansion factors must be derived or their applicability checked locally.
"Land Use Change and Forestry GHG Inventory(2013)" of "Second National Information Notification on China Climate Change" matches the second choice.</td></tr>
<tr><td>Value applied:</td><td>
<table>
<tr><th>Tree species</th><th>$BCEF_R$</th></tr>
<tr><td>Oak</td><td>0.916</td></tr>
<tr><td>Masson Pine</td><td>0.559</td></tr>
<tr><td>Broad-Leaved Mixed</td><td>0.73</td></tr>
<tr><td>Coniferous and Broad-Leaved Mixed</td><td>0.805</td></tr>
</table>
</td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied:</td><td>N/A</td></tr>
<tr><td>Purpose of Data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Comments:</td><td>The combustion factor is a measure of the proportion of the fuel that is actually combusted, which varies as a function of the size and architecture of the fuel lcad (ie, a smaller proportion of large, coarse fuel such as tree stems will be burnt compared to fine fuels, such as grass leaves), the moisture content of the fuel and the type of fire (ie, intensity and rate of spread).
Default values must be updated whenever new guidelines are produced by the IPCC</td></tr>
</table>

Data / Parameter:	G_{gi}
Data unit:	g kg^{-1} dry matter burnt
Description:	Emission factor for stratum i for gas g
Source of data:	Defaults can be found in Volume 4, Chapter 2, of the IPCC 2006 Inventory Guidelines in table 2.5
Value applied:	Please refer to the spreadsheet
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data	Calculation of baseline emissions
Comments:	Default values shall be updated whenever new guidelines are produced by the IPCC

Data / Parameter:	OF, SLF,WW

<table>
<tr><td>Data unit:</td><td>Kg kg^{-1}</td></tr>
<tr><td>Description:</td><td>OF = Fraction of wood products that will be emitted to the atmosphere between 3 and 100 years after production;
SLF = Fraction of wood products that will be emitted to the atmosphere within 3 years of production; and
WW = Fraction of extracted biomass effectively emitted to the atmosphere during production
Wood waste fraction(WW):
Winjum et al. 1998indicatethattheproportionofextracted biomass that is oxidized (burning or decaying) from the production of commodities to be equal to19%fordevelopedcountries, 24% for developing countries.
Short-lived fraction (SLF)
Winjumetal1998 give decay rates for proportions of wood products, which were converted to with short-term (<3yr) uses (applicable internationally) as below:
Sawnwood 0.12
Woodbase panels 0.06
Other industrial roundwood 0.18
Paper and Paperboard 0.24
Additional oxidized fraction (OF)
Winjum et al 1998 gives annual oxidation fractions for each class of wood products split by forest region (boreal, temperate and tropical).
This methodology projects these fractions over 95 years to give the additional proportion that is oxidized between the 3rd and the 100th year after initial harvest:
<table>
<tr><th rowspan="2">Wood Product Class</th><th colspan="3">OF</th></tr>
<tr><th>Boreal</th><th>Temperate</th><th>Tropical</th></tr>
<tr><td>Sawnwood</td><td>0.39</td><td>0.62</td><td>0.86</td></tr>
<tr><td>Woodbase panels</td><td>0.62</td><td>0.86</td><td>0.98</td></tr>
<tr><td>Other industrial roundwood</td><td>0.86</td><td>0.98</td><td>0.99</td></tr>
<tr><td>Paper and paperboard</td><td>0.39</td><td>0.62</td><td>0.99</td></tr>
</table>
</td></tr>
<tr><td>Source of data:</td><td>According to VM0010 version 1.3, the default values are chosen.</td></tr>
<tr><td>Value applied:</td><td>
<table>
<tr><th>Parameters</th><th>Species</th><th>Value</th></tr>
<tr><td>OF</td><td>Oak/Masson Pine/Broad-Leaved Mixed/Coniferous and Broad-Leaved Mixed</td><td>0.62</td></tr>
<tr><td>SLF</td><td>Oak/Masson Pine/Broad-Leaved</td><td>0.12</td></tr>
</table>
</td></tr>
</table>

		Mixed/Coniferous and Broad-Leaved Mixed	
	WW	Oak/Masson Pine/Broad-Leaved Mixed/Coniferous and Broad-Leaved Mixed	24%
Justification of choice of data or description of measurement methods and procedures applied:	N/A		
Purpose of Data	Calculation of baseline emissions		
Comments:	N/A		

Data / Parameter:	RGR_i
Data unit:	$tC.ha^{-1}.yr^{-1}$
Description:	Forest regrowth rate post timber harvest for stratum i
Source of data:	Regrowth rate must be calculated from either a) data generated in a reference area using measurements of timber volume in a chronosequence of replicated sample plots; or b) published data on forest growth after timber harvest of the same forest type within the same region as the project; or c) the IPCC default values for aboveground net biomass growth in natural forests.
Value applied:	Species / Value / Uint Oak / 1.5 / $m^3.ha^{-1}.yr^{-1}$ Masson Pine / 1.5 / $m^3.ha^{-1}.yr^{-1}$ Broad-Leaved Mixed / 1.5 / $m^3.ha^{-1}.yr^{-1}$ Coniferous and Broad-Leaved Mixed / 1.5 / $m^3.ha^{-1}.yr^{-1}$
Justification of choice of data or description of measurement methods and procedures applied:	Method b is applied. The average annual regrowth is confirmed by local forest bureau . And the RGRi can therefore be calculated by the biomass expansion factor, density and carbon fraction of the separate species.
Purpose of Data	Calculation of baseline emissions

Comments:	Default values must be updated whenever new guidelines are produced by the IPCC

Data / Parameter:	$V_{EX,j,i\|BSL}$
Data unit:	$m^3.ha^{-1}$
Description:	Mean volume of extracted timber per unit area for species j in stratum i
Source of data:	The timber harvest plan sets the allowable mean extracted volume is equal to the merchantable volume of timber in the forest inventory (Vj,i|BSL), based on legal limits.
Value applied:	please refer to ER sheet
Justification of choice of data or description of measurement methods and procedures applied:	The measurement method is from academic paper and equations developed for regional forest types. Please refer to ER sheet
Purpose of Data	Calculation of baseline emissions
Comments:	N/A

Data / Parameter:	$A_{i,p}$
Data unit:	Ha
Description:	Area covered by stratum i over land parcel p
Source of data:	Geodetic coordinates and/or Remote Sensing data and/or legal parcel records
Value applied:	See the detailed Project Land Form
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data	Calculation of baseline emissions-
Comments:	It must be assumed ex-ante that land parcel boundaries and strata areas must not change through time

Data / Parameter:	$A_{1,i,p}$
Data unit:	Ha
Description:	The area of stratum i in land parcel p that was harvested 1 year ago
Source of data:	Geodetic coordinates, GIS Files or legal parcel records
Value applied:	See the detailed Project Land Form
Justification of choice of data or description of measurement methods and procedures applied:	N/A

Purpose of Data	Calculation of baseline emissions
Comments:	N/A

Data / Parameter:	$A_{2\text{-}10,i,p}$
Data unit:	Ha
Description:	The area of stratum i in land parcel p that was harvested between 2 and 10 year ago
Source of data:	Geodetic coordinates, GIS Files or legal parcel records
Value applied:	See the detailed Project Land Form
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data	Calculation of baseline emissions
Comments:	N/A

Data / Parameter:	$A_{11\text{-}20,i,p}$
Data unit:	Ha
Description:	The area of stratum i in land parcel p that was harvested between 11 and 20 year ago
Source of data:	Geodetic coordinates, GIS Files or legal parcel records
Value applied:	See the detailed Project Land Form
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data	Calculation of baseline emissions
Comments:	N/A

Data / Parameter:	A_{t^*}
Data unit:	Ha
Description:	Cumulative area harvested until time t*
Source of data:	Geodetic coordinates, GIS Files or legal parcel records
Value applied:	See the detailed Project Land Form
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of Data	Calculation of baseline emissions
Comments:	N/A

Data / Parameter:	$A_{s,p}$
Data unit:	Ha
Description:	Area of sample plot sp
Source of data:	Recording and archiving of size of sample plots
Justification of choice of data or description of measurement methods and procedures applied:	Standard procedures for plot delineation in forest timber inventory surveys shall be used
Purpose of Data	Calculation of baseline emissions
Comments:	Ex-ante the size of the plots shall be defined and recorded in the monitoring plan.

3.4.1.2 Data and Parameters Monitored

Data / Parameter:	Illegal Logging PRA Results
Data unit:	Dimensionless
Description:	N/A
Source of data:	PRA
Description of measurement methods and procedures to be applied:	The PRA must evaluate whether timber harvest may be occurring in the project area and shall consist of semi-structured interviews / questionnaires. If ≥ 10% of those interviewed/surveyed believe that illegal logging may be occurring within the project boundary then the limited on-the-ground illegal logging survey shall be triggered. An additional output of the PRA shall be a depth of penetration of illegal logging pressure. A maximum distance shall be recorded for penetration into the forest from access points (such as roads, rivers, already cleared areas) for the purpose of harvesting timber.
Frequency of monitoring/recording:	Every two years
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of Data	Calculation of project emissions
Calculation method:	N/A
Comments:	Ex ante estimation shall be made of illegal logging in the with-project case. If the belief is that zero illegal logging will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent illegal logging.

Data / Parameter:	Result of Limited Illegal Logging Survey
Data unit:	Dimensionless
Description:	N/A
Source of data:	Limited on-the-ground illegal logging survey
Description of measurement methods and procedures to be applied:	Sampled by surveying multiple transects of known length and width across the access-buffer area to check whether new tree stumps are evident or not. The access-buffer area shall be equal in area to at least 1% of $A_{DIST\_IL,i}$
Frequency of monitoring/recording:	Must to be repeated each time the PRA indicates a potential for illegal logging.
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Purpose of Data	Calculation of project emissions
Calculation method:	N/A
Comments:	Ex ante an estimation shall be made of illegal logging in the with-project case. If the belief is that zero illegal logging will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent illegal logging.

Data / Parameter:	$A_{burn,i,t}$
Data unit:	Ha
Description:	Area burnt in stratum i at time t
Source of data:	Geodetic coordinates and / or Remote Sensing data
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Areas burnt must be monitored at least every five years
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of Data	Calculation of project emissions

Calculation method:	N/A
Comments:	Ex ante estimations of areas burned shall be based on historic incidence of fire in the Project region

Data / Parameter:	$A_{dist,i,t}$
Data unit:	Ha
Description:	Area disturbed in stratum i at time t
Source of data:	Geodetic coordinates and / or Remote Sensing data
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	Areas disturbed shall be monitored at least every five years
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of Data	Calculation of project emissions
Calculation method:	N/A
Comments:	Ex ante estimations of areas burned must be based on historic incidence of fire in the Project region

Data / Parameter:	$A_{DIST\_IL,i}$
Data unit:	Ha
Description:	Area potentially impacted by illegal logging in stratum i
Source of data:	GIS delineation and ground truthing
Description of measurement methods and procedures to be applied:	Must be composed of a buffer from all access points (access buffer), such as roads and rivers or previously cleared areas. The width of the buffer shall be determined by the depth of degradation penetration as defined as a PRA output
Frequency of monitoring/recording:	Repeated each time the PRA indicates a potential for degradation
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A

Purpose of Data	Calculation of project emissions
Calculation method:	N/A
Comments:	Ex ante a limited survey can be used to determine a likely depth of degradation penetration

Data / Parameter:	$C_{DIST\_IL,i,t\|PRJ}$
Data unit:	$tCO_{2\text{-}e}$
Description:	biomass carbon of trees cut and removed through illegal logging in stratum i at time t
Source of data:	Field measurements in sample plots
Description of measurement methods and procedures to be applied:	The sampling plan must be designed using plots systematically placed over the buffer zone so that they sample at least 3% of the area of the buffer zone (ADIST_IL,i). The diameter of all tree stumps will be measured and conservatively assumed to be the same as the DBH. Where the stump is a large buttress, several individuals of the same species nearby shall be located and a ratio of the diameter at DBH to the diameter of buttress at the same height above ground as the measured stumps shall be determined. This ratio will be applied to the measured stumps to estimate the likely DBH of the cut tree.The aboveground carbon stock of each harvested tree will be estimated using the allometric regression equations chosen for forest growth in the project scenario. The mean aboveground carbon stock of the harvested trees is conservatively estimated to be the total emissions and to all enter the atmosphere
Frequency of monitoring/recording:	Repeated each time limited sampling of ADIST_IL, indicates illegal logging
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of Data	Calculation of project emissions
Calculation method:	N/A
Comments:	If species-specific equations are used and species cannot be identified from stumps then it shall be assumed that the harvested species is the species most commonly harvested. A PRA shall be used to determine the most commonly harvested species.

Data / Parameter:	AP_i
Data unit:	Ha
Description:	Total area of illegal logging sample plots in stratum i

Source of data:	Ground measurement
Description of measurement methods and procedures to be applied:	A sampling plan must be designed using multiple sample plots systematically placed across the buffer zone so that they sample at least 3% of the area of the buffer zone.
Frequency of monitoring/recording:	Not more than five years
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of Data	Calculation of project emissions
Calculation method:	N/A
Comments:	Ex ante estimation should be made of area of plots. This should be set to exactly 3% of the buffer zone ADIST_IL,i

Data / Parameter:	PMP_i
Data unit:	%
Description:	Merchantable biomass as a proportion of total aboveground tree biomass for stratum i within the project boundaries
Source of data:	Within each stratum divide the summed merchantable biomass (defined as total gross biomass of a tree 15cm DBH or larger) by the summed total of aboveground tree biomass.
Description of measurement methods and procedures to be applied:	A sampling plan must be designed using multiple sample plots systematically placed across the buffer zone so that they sample at least 3% of the area of the buffer zone.
Frequency of monitoring/recording:	Not more than five years
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of Data	Calculation of project emissions

Calculation method:	N/A
Comments:	Ex-ante a time zero measurement shall be made of this factor. The timber harvest plan sets the allowable mean extracted volume from the merchantable volume of timber in the forest inventory (Vj,i|BSL), based on legal limits.

Data / Parameter:	A_i
Data unit:	Ha
Description	Area covered by stratum i
Source of data	Geodetic coordinates and/or Remote Sensing data and/or legal parcel records
Description of measurement methods and procedures to be applied	The stratum is from the second class forestry inventory
Frequency of monitoring/recording:	Every ten years.
Value applied:	
Monitoring Equipment:	Tape Measure
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.

Serial number of strata	Area (ha)	Tree species
1	7415.59	Oak
2	3087.63	Masson Pine
3	7244.29	Broad-Leaved Mixed
4	6021.91	Coniferous and Broad-Leaved Mixed
Total	23769.42	

Purpose of Data	For the calculation of the baseline and project emissions.
Calculation method:	N/A
Comments	In the baseline scenario strata areas must not change through time. In the project scenario it must be assumed ex-ante that stand boundaries and strata areas must not change through time. Ex post adjustments of the project scenario strata may be needed if unexpected disturbances occur during the project crediting period, severely affecting different parts of an originally homogenous stratum. This disturbance will be delineate as a separate stratum for the purpose of monitoring the carbon stock changes.

Data / Parameter:	DBH
Data unit:	cm
Description	Diameter at breast height of tree
Source of data	On site measuring on the sample spot.
Description of measurement methods and procedures to be applied	The National Forest Resource Continuous Investigation Technical Regulation issued by the State Forestry Bureau has detailed requirement of the measurement method.
Frequency of monitoring/recording:	Not more than five years
Value applied:	N/A
Monitoring Equipment:	Tape Measure
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of Data	Calculation of tree volume, then to carbon stock change further to the project emissions.
Calculation method:	N/A
Comments	As for the project tree species, there are no allometric equation applied in the project area, the average annual growth and biomass expansion method is adopted for the estimated calculation of carbon stock change. Based on the DBH.and local volume table, the volume can be calculated, combined by the BCEF and CF, the carbon stock can be obtained.

All data collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the project crediting period. All measurements will be conducted according to relevant standards.

Data archiving shall take electronic or paper forms, and copies of all data shall be provided to each project participant.

All electronic data and reports shall also be copied on durable media such as CDs and copies of the CDs are to be stored in multiple locations.

The archives shall include:

- Copies of all original field measurement data, laboratory data, data analysis spreadsheets will be recorded and archived;
- Estimates of the carbon stock changes in all pools and non-CO2 GHG and corresponding calculation spreadsheets;
- GIS products;
- Copies of the measuring and monitoring reports.

Monitoring frequency

Periodic verification will take place every 3-5 years, and quantitative monitoring of the project will take place before every verification event.

See details in the PD&MR report.

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

The monitoring plan and its results will be presented to the community representative and will be published on the internet for each verification process that is carried out.

3.5 Optional Criterion: Climate Change Adaptation Benefits

3.5.1 Regional Climate Change Scenarios (GL1.1)

N/A

3.5.2 Climate Change Impacts (GL1.2)

N/A

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

N/A

4 COMMUNITY

4.1 Without-Project Community Scenario

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

The rural population in project zone accounts for 86.21%. Agriculture is the main income of the local communities in the project zone.

Based on the baseline survey, there are no aboriginal people living in the project zone. Consequently, no damage to non-replicable cultural property will occur under the project activities.

To maximize the socio-economic benefit, the project design was prepared with a participatory approach. PRA methods were adopted in interviewing and consulting with farmer households in the project areas to understand the local farmers/communities' preferences, wishes and concerns, so that the proposed project activity would better respond to their desires for livelihood development.

PRA is applied to obtain necessary information from various groups. Specific PRA method includes:

Semi-Structure Interview with key persons, farmer households, villages, town/township governments, local forest posts and forestry bureau and nature reserves.

Hold Seminar of farmers' representatives.

Employment and income generation The proposed project activity will create over 54000 person-days of temporary employment opportunities. Most employment opportunities will be taken by the local farmers/communities involved in the proposed project activity and beyond (whose lands do not fall within the project boundary).

Strengthening social cohesion Individual farmer households/communities are too weak to successfully manipulate the chain from investment, production to market. In addition, the lack of organizational project activity will entail close interaction between individuals, communities, companies and government, with intensified communication among them and supporting networks for social and productive services. Without this project, there will be a lack of social cohesion between the local people and local communities, resulting in a bad economic development.

Technical training and demonstration Interview with local communities indicated that local farmers/communities are usually short of preventing trees from being subject to fire, pest and disease attack. In the proposed project activity, the local government as well as companies/farms will organize the training for local communities on forest management and integrated pest management. This project provides experience for people to manage forests.

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

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

4.1.3 High Conservation Values (CM1.2)

No HCVs are identified, which means that there will not be negative affection by the project.

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

Agriculture is the main income sources of the communities. The communities continue to log trees according to the logging plan approved by the forestry bureau. Continuation of the project land use as the timber harvest plan will have no effect on the livelihood and well-being conditions of the local communities and community groups under the without-project land use scenario.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

Community Group	Local residents
Impact(s)	Improve living conditions and environment
Type of Benefit/Cost/Risk	Predicted indirect benefits
Change in Well-being	Improve living conditions and environment

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

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

4.2.2 Negative Community Impact Mitigation (CM2.2)

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

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

The main source of income for communities associated with the agricultural project zone. Their production methods are backward, and agricultural production is also low. The project will benefit economically, environmentally and socially.

1) Income improvement: During the project period, the net income generated by the project includes employment and labor income as well as carbon trading income.

2) Job creation: The project will provide permanent and temporary employment opportunities. Most of the work will belong to local farmers involved in the project.

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

4) Technical training and demonstration: The community generally lacks fire protection, forest pest control, forest management. The project is organized by the local forestry bureau to help farmers understand and evaluate problems in the implementation of the project, such as forest management, land preparation model, pest control.

5) The project transforms the ecological benefits into the benefits of the people's livelihood.

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

4.2.4 High Conservation Values Protected (CM2.4)

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

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

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

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

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

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

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

4.4 Community Impact Monitoring

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

To in-depth track the social-economic changes resulted from the project activities in the rural communities and households, and understand issues raised and difficulties encountered during the project implementation, as well as their opinions and comments on the project activities, so as to adjust and improve the project activities in a timely manner, a PRA process will be conducted once every five years after initial monitoring, as described below.

Procedures:

1) Establishing PRA team: The teams will be set up to conduct the PRA process, which consists of project officers, local government officials and technical staff with various background (forestry, sociology and ecology) from county forest bureau;

2) Developing SOPs for the field PRA process;

3) Training: A training workshop will be held for discussing and training of PRA teams in order to ensure all PRA members fully understand the purposes, contents, procedures and specific methods of the PRA field survey;

4) Preparation: Developing detail PRA field survey plan including responsibility of each member of PRA team; and contacting with relevant project counties, nature reserves, forestry farms, towns/townships and local NGOs and informing them PRA plan.

5) PRA survey: conducting PRA survey following SOPs.

Methods:

A. Village meeting: A meeting of farmer representatives will hold in villages sampled. The general agenda are:

a.Introducing PRA team members and the purpose, procedures, methods and time schedules of the PRA process;

b.Explaining the way of villagers′ participation;

c.Collecting information regarding the project progress, social-economic and environmental benefits shared from the projects, existing problems/difficulties encountered by local communities during the project implementation, as well as comments and suggestions on improvement of the project.

B.Semi-structured interviews: Interview with key persons,This includes VIP interview, farmer household interview and group interview

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

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

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

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

4.4.2 Monitoring Plan Dissemination (CM4.3)

The monitoring plan and results of every verification will be published on VCS and CCB website which can be easily download by stakeholders. Hard copies of the monitoring plan will be distributed among local stakeholders by implementation entity, local forest bureau. At the same time, public notice boards will be used to publicize information regarding how to access to the monitoring plan through internet. Technical staff from PP will also explain the monitoring plan to local farmers, especially to illiterate or under-educated farmers. Also, a contact person with phone numbers will be published in case any stakeholders want to directly contact the project proponent and raise opinions.

4.5 Optional Criterion: Exceptional Community Benefits

4.5.1 Exceptional Community Criteria (GL2.1)

N/A.

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

N/A.

4.5.3 Community Participation Risks (GL2.3)

N/A.

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

N/A.

4.5.5 Net Impacts on Women (GL2.5)

N/A.

4.5.6 Benefit Sharing Mechanisms (GL2.6)

N/A.

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

N/A.

4.5.8 Governance and Implementation Structures (GL2.8)

N/A.

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

N/A.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

Before the implementation of the project activity, the trees are logged based on government-approved timber management plan for harvesting the project area. The town where the project located due to long-term logging, ecological structure of most project sites is destroyed, with low biodiversity in recent years.

5.1.2 High Conservation Values (B1.2)

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

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

As mentioned above, the without-project land use scenario is continuing logging forest which will have effect on the biodiversity conditions.

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

Biodiversity Element	Species of plants
Estimated Change	Increase
Justification of Change	When the forest is protected instead of logging, project sites will gradually become ecological community with the domain species of tall trees, which will improve the biodiversity.

Biodiversity Element	Species of animals
Estimated Change	Increase
Justification of Change	Scientific and rational forest management projects can adjust the hydrological cycle, reduce drought and flood risk; promote soil nutrient cycle, improve local micro-climate and other ecological environment. Therefore the species of animals could be increased due to the better environment of habitat.

5.2.2 Mitigation Measures (B2.3)

Forest management projects can protect the establishment of forest cover, through scientific and reasonable method with no burning and slash, and protect the existing vegetation as much as possible. Therefore, implementation of this project will not decrease biodiversity of project sites.

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

The revegetation of project sites will facilitate biodiversity protection of the whole town.

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

Animals	Plants
Ocelot	Metasequoia glyptostroboides
Badger	Ginkgo biloba
Ring necked Pheasant	Catalpa bungei
Streptopelia chinensis	Eucommia ulmoides
Rana nigromaculata	Magnolia officinalis
Typhlopidae	Zelkova schneideriana
Rana temporaria	Five-leaved pine

5.2.4 High Conservation Values Protected (B2.4)

No HCVs was identified related to biodiversity in the project zone thus no HCVs related to biodiversity are negatively affected by the project.

5.2.5 Species Used (B2.5)

The project will mainly use native species for the productive activities, such as Oak, Masson Pine, Broad-Leaved Mixed Forest and Coniferous and Broad-Leaved Mixed Forest.

5.2.6 Invasive Species (B2.5)

N/A

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

N/A

5.2.8 GMO Exclusion (B2.7)

N/A

5.2.9 Inputs Justification (B2.8)

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

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

5.2.10 Waste Products (B2.9)

The waste products resulting from the project activities may include:

1) Rubbish

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

2) Human waste

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

5.3 Offsite Biodiversity Impacts

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

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

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

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

5.4 Biodiversity Impact Monitoring

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

As mentioned in Section 2.1.8, according to Theory of Change, the main objective of the project is to peotect forest instesd of logging. And based on the analysis in Section 2.1.12, the risks of fire, diseases and insects, pesticide and frost might threat the aim of the project and need to be intervened.

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

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

Indicator type	Description	Monitoring indicator	Indicator unit	Monitoring method	Monitoring frequency
State variables	The quantity and quality of forest in the project area	Forest cover	ha	Measure sample spots set during monitoring of Climate as described in Section 3.4	Before every verification
		Species of	/	Measure sample	Before every

		vegetation		spots set during monitoring of Climate as described in Section 3.4	verification
Pressure variables	The frequency or intensity of anthropogenic impacts that are directly harmful to biodiversity in the project zone	Number of fires occurred	/	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Effected forest area suffered insects and disease	ha	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
Response variables	The frequency or intensity of project interventions relevant to biodiversity	Forest area under prevention control from fires	ha	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Forest area under prevention control from insects and diseases	ha	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		recovered from fire, insects or diseases	ha	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year
		Number of trees replanted	/	Recorded by forest rangers and confirmed by local Forest Bureau	Once every year

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

The monitoring plan and results of every verification will be published on VCS and CCB website which can be easily download by stakeholders. Hard copies of the monitoring plan will be distributed among local stakeholders by implementation entity, local forest bureau. At the same time, public notice boards will be used to publicize information regarding how to access to the monitoring plan through internet. PP will also explain the monitoring plan to local farmers, especially to illiterate or under-educated farmers. Also, a contact person with phone numbers will be published in case any stakeholders want to directly contact the project proponent and raise opinions.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

N/A

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

N/A

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

N/A

APPENDICIES

Appendix 1: Stakeholder Identification Table

See details in 2.1.7

Appendix 2: Project Activities and Theory of Change Table

See details in 2.1.8

Appendix 3: Project Risks Table

See details in 2.1.12