Ministry of the Environment, Japan
CDM/JI FS Project

Feasibility Study on Afforestation CDM for community development in extensive grazing lands in Uruguay

— Final Report (summary) —

March, 2008

Japan Overseas Plantation Center for Pulpwood

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（1） General information about the Project

① Government Structure for CDM projects in Uruguay

（a） Designated National Authority (DNA)

Uruguay is a non-Annex I country; it ratified the UNFCCC in 1994 and the Kyoto Protocol in 2000. The country's National Directorate of Environment（Direccion National de Medio Ambiente, DINAMA）, part of the Ministry of Territorial Housing Arrangement and Environment （Ministerio de Vivienda Ordenamiento Territorial y Medio Ambiente, MVOTMA）, serves as its Designated National Authority (DNA)

A Climate Change Unit（Unidad de Cambio Climatico, UCC） was set up under the DINAMA in 1994 to organize, administer and implement activities related to the Kyoto Protocol; its role was expanded to cover CDM activities in 2001. The Committee for Technical Consultation for Environmental Protection（Comision Tecnico Asesora de Proteccion del Medio Ambiente, COTAMA）, which includes representatives from relevant ministries, industries and non-governmental organizations (NGOs) holds meetings regularly to decide the laws regulating the environment and development. COTAMA complements DNA technically and the items related to the environment and the sustainable development are evaluated in COTAMA in the process for the host country's approval of CDM project activities.

（b） Process for the host country's approval of CDM projects

The process involved in obtaining the host country's approval for CDM projects is presented in Figure 1.

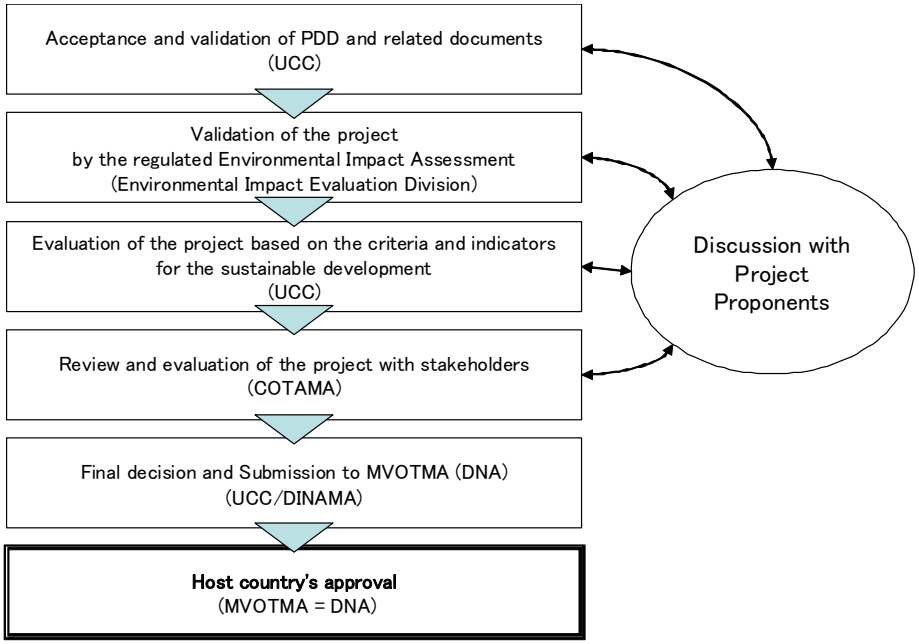

Figure 1. Process for the host country's approval

（c） Land eligible for A/R CDM in Uruguay

In Uruguay, approximately 80% of the land area is used for grazing; this land does not meet the criteria to be defined as forestland. Accordingly, much land is suitable for developing A/R CDM projects.

However, in Uruguay, grazing activities are an integral part of the culture and lifestyle. Based on these cultural constraints, it appears that the A/R CDM project could be implemented in low productivity grassland or extensive grazing lands (Figure 2).

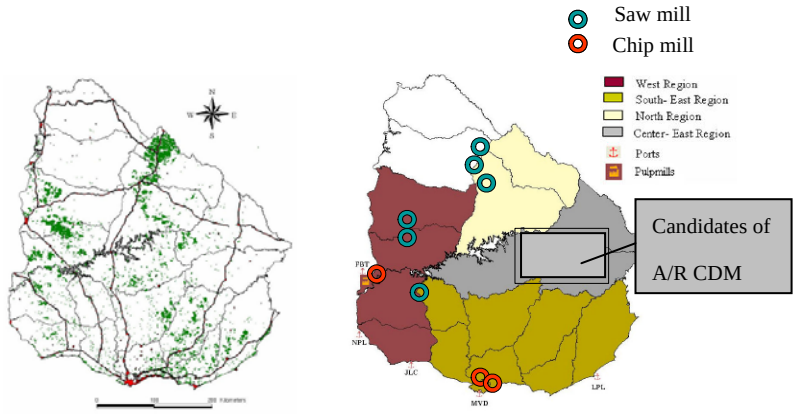

Figure 2 Distributions of plantation (left) and lumber and pulp mills (right) in Uruguay

② Members of the project team

This project is being jointly conducted by the following organizations.

Project management

【Japan Overseas Plantation Center for Pulpwood (JOPP)】

JOPP has overall responsibility for the organization of the project, for conducting research, and for creating the PDD and other documents.

Cooperating organizations and their roles

【Mitsubishi UFJ Research & Consulting (MURC)】

MURC has provided an analysis of approved methodologies and other PDDs, to facilitate creation of the PDD for this project

【CARBOSUR SRL (Uruguay)】

CARBOSUR gathered information about the host country and has provided an analysis of approved methodologies and other PDDs, to facilitate creation of the PDD for this project

（2） Project design

① Details of the project

The project will involve a total of 25,050 ha of land that is currently extensively grazed by beef cattle. Forest plantations will be established on this land, to produce high-value,

long-lived timber products and to sequester large amounts of carbon dioxide from the atmosphere.

Forests will be based on *Eucalyptus grandis* and *E. globulus* plantations in 22-year rotations, managed by pruning (to a minimum height of 12 m) and three to four thinning operations, to obtain knot-free, large-diameter logs suitable for saw-milling and veneer production. Plantation will be completed by year 5 of the project and the forests will be replanted after clear-cut harvests. An Environmental Management System will be implemented, and practices will be compatible with FSC (or similar) standards. Planted forests will remove carbon dioxide (CO_2) from the atmosphere and store it in various carbon pools (living above-ground and below-ground biomass, soil, litter, non-tree vegetation, dead wood and harvested wood products). The changes in the carbon stock of all of these pools will be monitored. The potentially non-permanence of stored carbon will be taken into account by issuing temporary carbon credits (as stated in the "Modalities and Procedures for Afforestation and Reforestation Projects under the CDM"), and because a significant proportion of the sequestered carbon will be stored in long-lived products.

The baseline study determined that, without this project, continued extensive grazing is the most likely use of the land. Additionality is demonstrated through the fact that the expected internal rate of return for the proposed project activity, ignoring carbon finance, will be lower than the benchmark internal rate of returns on this type of investment in Uruguay. Barrier and common practice analyses showed that afforestation is not likely to occur in the area of the proposed project without intervention.

The project will result in a significant contribution to the sustainable development of Uruguay. Its main benefits (*inter alia*) will be: i) increasing the level and quality of employment; ii) increasing job opportunities for women; iii) rural development (decentralization); iv) increasing the gross value of production; v) improving the fiscal balance; vi) preserving biodiversity; and vii) improving the beauty of the landscape.

The project statistics are as follows:

- Project area: Trenta y Tres and Cerro Largo in Central Uruguay
- Planted area: 25,050 ha
- Planted tree species: *Eucalyptus grandis*、*E. globulus* (with small amounts of *E. dunni* and *E. tereticornis*)
- Rotation period: 22 years
- Project period: over 60 years
- Crediting period: 60 years (2 times regenerations)

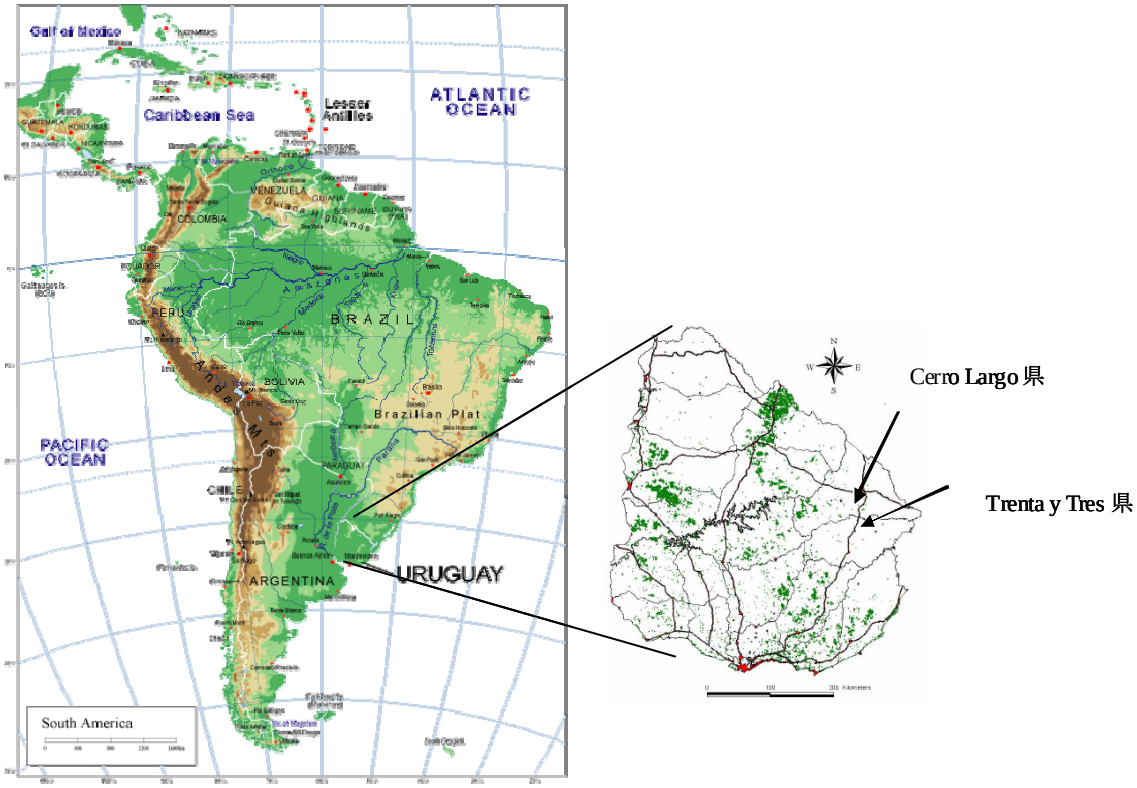

Figure 3. Map showing the location of the host country, Uruguay (left), and forest distribution in Uruguay (right: green areas indicate forest). The Trenta y Tres and Cerro Largo areas are extensively grazed.

② Project methodology

At the outset of this project, there were seven approved methodologies: six applicable only to degraded lands and another (ARAM0007) applicable only to areas where soil carbon change has been neglected. Therefore, we decided to develop a new methodology or revise an approved methodology to include the soil carbon pool. Because of the time required to develop new methodologies, we decided to revise an existing one. The most suitable for our purpose was ARAM0007.

However, a new consolidated methodology (ARACM0001) was approved in March 2008, so we considered this for use in our project. After discussions, the project team judged ARACM0001 to be applicable to our project, because its criteria match those of our target sites. The key points with respect to ARACM0001 are as follows:

（a）Soil organic carbon pool

The project will be implemented on degraded lands, which would be expected to remain in a degraded state in the absence of the project. Evidence is provided here showing that, since grazing activities have been practiced here extensively for more than 300 years, the lands have lost their original vegetation and a fraction of their soil organic matter, an essential component determining land productivity. In addition, frequent periods of overgrazing have caused the

soil to become exposed to erosion (i.e., due to lack of vegetation cover); this, in combination with the moderate slopes that dominate the terrain, has resulted in gully erosion processes affecting most of the land within the project boundaries.

The native vegetation in the project region originally consisted mainly of tall grasses and shrubs. The turnover of plant residues maintained relatively high levels of organic matter in the soil. Introduction of cattle in the 17th Century resulted in degradation of the vegetation, which became dominated by grasses that were kept short by grazing, particularly after the introduction of sheep a few decades later. Extensive grazing by sheep and cattle has prevailed, more or less unchanged, until the present day. Due to its extensive nature, the production system is vulnerable to climate extremes: the relatively frequent droughts that occur in Uruguay (e.g., dry periods every summer, with extreme droughts every 10 years or so) are associated with overgrazing.

The change in vegetation due to grazing has reduced the turnover of plant residues and consequently the organic matter content of the soil, causing the land to become degraded. Two recent studies support this assertion. Piñeiro et al (2006) found that 370 years of grazing have caused average losses, at the 11 grassland sites they investigated in Argentina and Uruguay, of 880 kg ha^{-1} (19%) of the soil organic nitrogen content, 21,200 kg ha^{-1} (22%) of the soil organic carbon content and 2,192 kg ha^{-1} (24%) of net primary productivity. The second study (Altesor et al., 1998) focused on the effects of more recent changes due to grazing. Five sample plots on grassland sites in northern Uruguay that had been measured in 1935 were revisited in 1990. It was concluded that continued grazing caused an increase in the frequency of weedy species and reductions in palatable forage species, indicating that degradation is continuing.

A survey of all soils in the project area was conducted with the objective of producing a moderately detailed soil map. In the process, several soil samples were taken to determine various soil physical and chemical properties, including soil organic matter content. The organic matter content of the main soil types at each site were compared with those of representative samples of the same soil types as measured during a national soil survey in the 1960s. The analysis showed that soil organic matter content has consistently declined across all project sites by between 5 and 11%, probably due to losses of topsoil caused by erosion, providing additional evidence of continued soil degradation under the current extensive grazing regime.

（b）Carbon leakage caused by cattle displacement

Implementation of the proposed activities will not cause any carbon leakage as a result of increased use of wooden posts for fencing, since there will be a limited use of these posts, and all posts will originate from sustainably managed forests, without causing any permanent loss of carbon stocks.

There will also be no displacement of pre-project activities. All cattle will remain either within the ‘Guanaré’ property or will be sold on the open market.

Leakage resulting from the use of fossil fuels will be of relatively low significance, and will mostly arise from the transportation of wood products. Some measures to be considered to minimize this source of carbon leakage, including promoting the establishment of wood manufacturing industries near the project areas (which would reduce the transportation distance), the use of biofuels or biofuel mixes and the use of efficient transport equipment.

③ Land Eligibility

The methodological tool "*Procedures to demonstrate the eligibility of lands for A/R CDM project activities*" was used to assess the eligibility of the land. The following details the various steps in the tool that need to be applied.

1. Project participants shall provide evidence that the land within the planned project boundary is eligible for an A/R CDM project activity by following the steps outlined below.

   (a) Demonstrate that the land, at the moment the project starts, does not contain forest by providing transparent information that:

      i. Vegetation on the land is below the forest thresholds (tree crown cover or equivalent stocking level, tree height at maturity *in situ*, minimum land area) adopted for the definition of forest by the host country under decisions 16/CMP.1 and 5/CMP.1 as communicated by the respective DNA; and

      ii. All young natural stands and all plantations on the land are not expected to reach the minimum crown cover and minimum height chosen by the host country to define forest; and

      iii. iii. The land is not temporarily unstocked as a result of human intervention such as harvesting or natural causes.

Uruguay's DNA has adopted the following levels of the parameters used for defining forests:

- Minimum tree height: 3 m
- Minimum crown coverage: 30%
- Minimum land area: 0.5 ha

This definition has been communicated to the CDM Executive Board, and it is consistent with the parameters used by Uruguay for reporting to the FAO.

There are virtually no trees within the project boundaries and, therefore, vegetation on the land cannot be classified as 'forest'. This is evident from the analysis of aerial photographs and satellite images; these have been archived within the project documentation. In addition, there is abundant ground photography, also archived within the project documents, proving the

total absence of forests within the project boundaries.

Since there are no forests in the project area, there are no young natural stands or plantations that may reach the minimum crown cover and minimum height chosen by the host country's DNA.

Finally, since there are no records of forests on this land in the past, as shown below through the analysis of historical remote sensing data, the land cannot be temporarily unstocked as a result of human intervention or natural causes.

④ Boundaries of the project, baseline scenario and additionality assessment

(a) Project boundaries

This project will be conducted in Trenta y Tres and Cerro Largo in Central Uruguay (Figure 4).

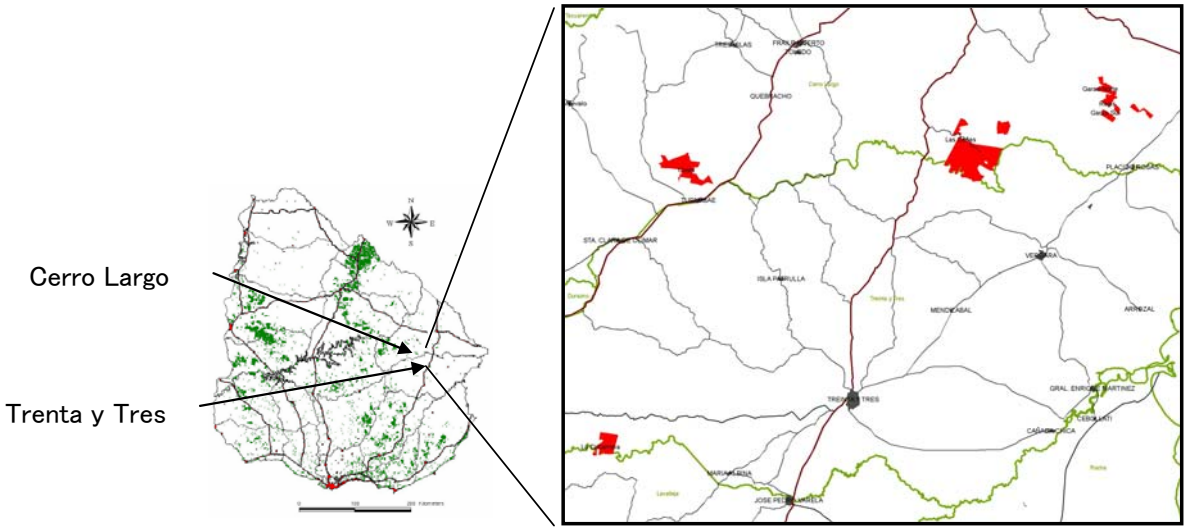

Figure 4. Project sites (area:) in Trenta y Tres and Cerro Largo (total area, 25,050 ha)

(b) Baseline scenario

The baseline scenario was defined using the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities", version 01. Since only one stratum was identified for the baseline scenario, the procedure was only applied once, as described below.

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

The afforestation activity started on September 2006, before the registration date.

The start date occurred after 31 December 1999. This is demonstrated by the evidence obtained from the analysis of remote sensing data (Figures A13 to A16, and respective reports archived with the project documentation).

The incentive from the planned sale of CERs was considered seriously in the decision to proceed with the project. This is clearly recorded in the documentation submitted to the National Forest Agency from the 'Ministerio de Ganaderia, Agricultura y Pesca' prior to the project start date (project documents are prepared and submitted for government approval for each estate just before planting is due to begin). The various documents submitted to the government stated very clearly that carbon sequestration by the forests and the sale of carbon credits were key objectives of the project. Dated copies (signed by a Ministry official) of all the documents that were submitted are kept in the project archives.

Step 1. Identification of an alternative land use scenario to the proposed A/R CDM project activity

The four regions involved in the project have a combined area of nearly 1 million ha. Grassland under extensive grazing (i.e., with no pasture improvement) is the dominant land use in the areas, covering 88% of the land (Table 1).

Table 1. Land use in the project stratum in 2003 (Ministry of Livestock, Agriculture and Fisheries)

Land Use	Management	Area	
		ha	%
Grassland	Extensive grazing	867,280	88.2
	Improved pastures	58,982	6.0
Forest land	Forest plantations	12,016	1.2
	Native forest	34,406	3.5
Cropland	Annual grain crops	4,300	0.4
Other	Settlements, other	6,043	0.6
Total		983,027	100.0

Sub-step 1a. The following realistic and credible alternatives to the proposed project activity were identified:

1. **Continuation of extensive grazing cattle and sheep rearing, with no pasture improvements**

Cattle and sheep production has been the traditional rural activity in the project area and all the surrounding regions since the 17th Century. In areas with low productivity soils, such as those prioritized for forestry in the project area, the main products are wool, sold to the textile industry, and calves, sold for fattening on more fertile soils. A combination of sheep and cattle is the preferred livestock mix. Pasture improvement practices (e.g., fertilizer application) are almost exclusively restricted to the best quality soils; these do not occur within the project boundaries. There is abundant information regarding the economic and financial aspects of this activity. Information from the '*Plan Agropecuario*' has been used to examine the alternatives

considered below.

2. Continuation of the cattle and sheep rearing, combined with pasture improvement in part of the area

This would be a case similar to the one previously described. The fundamental difference is that pastures would be improved by introducing more productive species and adding phosphate fertilizer to some of the land area. This type of system requires more investment and more careful management than alternative 1. However, productivity in terms of meat equivalents would increase by 30%.

3. Conversion to cropland

The areas suitable for afforestation (e.g., that land defined as being of forest priority by current government policy) are usually marginal lands for crop production. Most of the soils within the project boundaries are too shallow, too susceptible to degradation and/or of too low fertility, to be considered suitable for crop production.

4. Afforestation

This is the proposed project activity. Afforestation for pulpwood (short rotation) is the most common type of afforestation in Uruguay, with nearly 80% of forest plantations being currently used for this purpose. These plantations are normally combined with extensive grazing of forest service areas. The coverage of forest plantations in the regions defined for the project is very low (1.2% of the total area), mostly intended to provide shelter for the cattle. The type of forest management to be applied in the proposed project activity (long rotation with pruning and thinning) is not widespread in Uruguay.

Sub-step 1b. Consistency with relevant enforced mandatory laws and regulations.

All land use alternatives identified above comply with all mandatory regulations in the country. No alternatives could be eliminated on the basis of this criterion.

Step 2. Barrier analysis

Sub-step 2a. List of barriers

Possible barriers to the land-use alternatives identified above include the following:

- Low soil quality
- Lack of access to credit (both short- and long-term)
- Climate risk
- Market risk (price of products)
- Remoteness of the land area

- Land tenure characteristics

Sub-step 2b. Elimination of scenarios prevented by barriers

Alternative 1 is not prevented by any barrier. It is the current land use, and has been practised for more than 300 years.

Alternative 2 would be prevented by several of the barriers mentioned above. Mirroring the successful experiences in New Zealand, a country that has a number of common features with Uruguay, pasture improvement has been promoted by the government through its extension agencies and by many local experts since the 1950s. All attempts to promote these improved systems failed systematically over the years. In particular, this approach has simply not been adopted in areas with soils like the ones in the project area, which are too shallow and/or lack sufficient fertility.

At least three of the barriers listed above would apply to this alternative, but the land tenure is perhaps the most important. More than 70% of the owners of large land units (those covering more than 2,000 ha) in Uruguay live off their farms, and their main income is usually from a source other than their rural properties. Consequently, they are generally reluctant to implement pasture improvement practices because of the more stringent requirements for proper management. In addition, market prices of meat or wool fluctuate frequently, making investments in the improvement and/or intensification of livestock production somewhat risky. Furthermore, climate fluctuations, especially the frequent occurrence of droughts in Uruguay, add to the uncertainty.

An extensively documented report has been produced to demonstrate the impacts of the barriers that prevent alternative 2 from being feasible in the project area. This report has been archived as a project document.

Alternative 3 is prevented by the low soil quality. No cropland has been developed in Uruguay on soils such as those in the project area.

Alternative 4 is prevented by lack of access to credit for long-term investments and the remoteness of the area, which imposes high transportation costs for wood products, particularly for cases where the wood products are low-value commodities, such as pulpwood.

An extensively documented report has been produced to demonstrate the impacts of the barriers that prevent alternative 4 from being feasible in the project area. This report is archived as a project document.

Sub-step 2c. Baseline scenario

Continuation of pre-project activity has been identified as the most plausible scenario in the absence of the proposed project activity.

（c）Additionality assessment

Additionality is demonstrated through application of Steps 0 to 2 above, and Step 4 (in this

section).

Step 4. Common practice analysis

Very limited afforestation activity has occurred in the region around the project areas recently. In the past, forest plantations in the region were almost non-existent, or restricted to cattle shelters on ranch farms. The extensive afforestation process that occurred in Uruguay during the 1990s, with the establishment of forests covering more than 500,000 ha, completely neglected the proposed region. The main reason for this was probably its remote location, away from wood-exporting harbors and from manufacturing industries. Poor site quality (e.g., shallow soils, steep slopes) may have been an additional reason.

Some afforestation activity has started to occur in the area within the last couple of years, simultaneously with the development of the proposed project activity. All these new investments in forest plantations in the project region are aiming at selling carbon credits.

A documented report with an assessment of the current trends in afforestation in the project region has been produced and archived as part of the project documentation.

⑤ Ex-ante estimation

The project is estimated to result in net anthropogenic GHG removals by sinks over the 20 years crediting period of 14,121,031 t CO2-e.

⑥ Monitoring plan

Monitoring in this project will be conducted by ARACM0001.