SUMMARY

THE FEASIBILITY STUDY

ON

CLEAN DEVELOPMENT MECHANISM

TO

PARTICIPATORY AND ENVIRONMENTAL REFORESTATION PROJECT

AT

LOMBOK ISLAND,　REPUBLIC OF INDONESIA

MARCH　２００４

JAPAN INTERNATIONAL FORESTRY PROMOTION & COOPERATION CENTER

1 Objective of the Study

Japan International Forestry Promotion & Cooperation Center(JIFPRO) has been implementing an afforestation project at Lombok Island in Indonesia since 1996, based upon the Minutes of Understanding with the Director Genral of Land Rehabilitation and Social Forestry, Ministry of Forestry. This feasibility study intends to get various information necessary for realization of AR-CDM project through case study of project design document on the afforestation project.

COP9 held on December 2003 reached an agreement on small-scale AR-CDM, however the simplified modalities and procedures are to be discussed and negotiated at COP10 held on December 2004. In this context, farther study will be needed based upon the simplified rule.

2 Outline of the Afforestation Project

The project, located in the Sekaroh national protection forest(State of the West Nusa Tenggara, Republic of Indonesia) started in July 1996 aiming to rehabilitate the degraded bareland. The first phase(350 ha) ended in 2000 and the second phase began in August 2002 with the plan of 85 ha within 5 years.

More than ten species of various trees were introduced covering industry tree,fuel wood,fruit tree and so called multi purpose trees, ie., Azadirachata indica, Cassia siamea, Leucaena leucocephala, Tamarindus indica, Anacardium occidentale, etc. with the spaceing of 3m x 3m. In order to facilitate participation of local people to the project, cash crops such as bean, castor, chili,etc.were also introduced besides the multi purpose trees.

3 Baseline methodology

We propose a new methodology for accounting "Baseline net GHG removals by sinks" and the other pre-project carbon use by human being as potential "leakage". The procedure is as follows;

a. Select series of secondary plant communities that have been almost undisturbed after establishment in areas where land use patterns and vegetations have been almost the same as the pre-project status. Measure community age, community height, and carbon stock in the necessary carbon pools and then determine the equation between community age and community height (1) and the equation between community height and carbon stock in the necessary carbon pools (2).

b. In the same areas, select ordinary secondary plant communities and monitor their community heights.

c. For each selected ordinary plant community, estimate community age using the community height and the equation (1). Add n years to the estimated community age and predict community height after n years.

d. For each selected ordinary plant community, estimate the present carbon stock using the present community height and the equation (2), predict future carbon stock using n-added community age and the equation (2), and then calculate the rate of carbon stock change in the n years. It is recommended to select the project period for n to directly estimate the sum of "Baseline net GHG removals by sinks" and pre-project carbon use by human being.

e. Monitor the selected ordinary community heights to know the actual chrono-sequential rate of carbon stock change as "Baseline net GHG removals by sinks". Separate the "Baseline net GHG removals by sinks" and the other carbon stock change. The later is equivalent to the pre-project carbon use by human being and is considered a potential amount of "leakage".

4 Monitoring Plan

a. Estimation and measurement of the actual net greenhouse gas

Type of GHGs	Existence of GHGs	Monitoring method
HFCs	×	—
Nox	×	—
CH4	△	Number of cattle
CO2	◎	5 carbon pools + emission by operation

Note: × not existed, △ may exist, ◎ exist, — not measured

b. carbon pools to be measured and methods for measurement

Carbon pools	Monitoring plots	Methods for measurement	Default calibration

? Biomass pools in forestation sites			
Above ground	12 plots	Morikawa's method	Biomass amount×0.5×44/12 = CO2t/ha
Under ground	12 plots	-ibid-	Biomass amount×0.5×44/12 = CO2t/ha
Undergrowth	2 plots, 4 sites	-ibid-	Biomass amount×0.5×44/12 = CO2t/ha
Forest litter	6 plots, 18 sites	Ohta's method	Biomass amount×0.5×44/12 = CO2t/ha
Snags	12 plots	Morikawa's method	Biomass amount×0.5×44/12 = CO2t/ha
Soil biomass C	6 plots, 12 sites	Ohta's method	Biomass amount in 400cc soil core of 0-30cm in depth ×0.5×44/12=CO2t/ha
? Emission by operation			
Vehicles for operation	Whole area by host organization	Vehicle operation record	Amount of fuel /year /whole area
Bulldozer for road maintenance	Whole area by host organization	Management operation record	Amount of fuel /year /whole area
? Products use by local community			
Fuel woods	Whole area	Hearing by host organization	Biomass amount×0.5×44/12 = CO2t/ha
Multi-purpose use of products	Whole area	Hearing by host organization	Biomass amount×0.5×44/12 = CO2t/ha
Fruit collection	Whole area	Hearing by host organization	Biomass amount×0.5×44/12 = CO2t/ha

Cattle	Whole area	Hearing by host organization	Number×period×coefficient×21(CH4)
? Risk management			
Environmental disasters	Whole area	Regular survey by host organization	Biomass amount×0.5×44/12 = CO2t/ha
Pests	Whole area	Regular survey by host organization	Biomass amount×0.5×44/12 = CO2t/ha
Forest fire	Whole area	Regular survey by host organization	Biomass amount×0.5×44/12 = CO2t/ha

In addition to monitoring of carbon pools listed above, following environmental impacts and socio-economic impacts are monitored in and out of the project boundary; ? Changes of biological diversity, ? Hydrological operation, ? Changes of conditions on soil conservation, ? Mitigation of micro-environment, ? Impacts to local community, and? Evaluation by stakeholders

Literature cited:

Morikawa, Y.: Biomass measurement method for planted forests (in Japanese), Report on development of the technology for stimulation of CDM forestation, pp.10-26, JIFPRO, 2003

Ohta, S.: Measurement method of carbon of forest litter and soil biomass for planted forests (in Japanese), pp.27-35), Report on development of the technology for stimulation of CDM forestation, pp.10-26, JIFPRO, 2003

C. Frequency of monitoring

Monitoring items	Frequency	File management	Note
Carbon pools	Every 5 years	Additionality file	Every carbon pool
Emission by operation	Annual	Operation records	

Product use	Annual	Product use file	Hearing notes
Risk management	Annual	Risk management file	Survey notes
Environment impacts	Every 5 years	Environment file	Every items
Socio-economic impacts	Every 5 years	Local community hearing & stakeholder hearing files	Hearing notes -Questionnaire records-

5. Leakage

JIFPRO I attracted not the people living in the neighboring areas, but the people who live in the remote area as Central Lombok or East Lombok. The activities of local people to use fuel wood and materials for house construction brought the negative impacts to forests inside the project sites or surrounding areas, as well as leakage. Furthermore, those who did not participate in the project tried to find the places to gather fuel wood and pasture outside of the project. Eventually, these activities affected the surrounding vegetations and brought leakage. The fact that those who participated in JIFPROI dwelled the area illegally and population with new comers continuously increased after JIFPROI also contributed to leakage. During JIFPROII, because people have already occupied the project site and the surrounding area previously, new spaces for new comers could not be found. Therefore, even if plantation projects are continuously carried out, it is considered that the possibility of leakage may be low. However, if the protection forests are covered with planted trees in the future, those who use the area will be forced to find alternative places and the human activities outside the project site will be accelerated. On the other hand, if there are no alternative places nearby, they have to find other remote areas to meet their daily needs. These two alternatives have the potential to cause leakage if the vegetation is recovered and people are excluded from the area.

6 Accounting "Net anthropogenic greenhouse gas removals by sinks"

According to the definitions in Appendix B of FCCC/SBSTA/2003/L.27 of COP9, "Net anthropogenic greenhouse gas removals by sinks" = "Actual net greenhouse gas removals by sinks" - "Baseline net GHG removals by sinks" - "leakage". And each term is defined as follows;

"Actual net GHG removals by sinks" = "the verifiable changes in carbon stocks in the carbon pools within the project boundary" - "the increase in emissions of the GHG measured in CO_2 equivalents by the sources that are increased as a result of the implementation of the afforestation or reforestation project activities, within the project boundary, attributable to AR-CDM"
"Baseline net GHG removals by sinks" = "the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of the afforestation or reforestation project activity under CDM"
"leakage" = "the increase in GHG emissions by sources which occurs outside the boundary of AR-CDM which is measurable and attributable to the afforestation or reforestation activity"

We considered only the carbon stock in the planted forest/the stand age, 4.17±0.89 (mean and 95% confidence interval), as "Actual net GHG removals by sinks". Re-measurement of the study community heights is necessary in the next year or later for "Baseline net GHG removals by sinks" and "leakage", and therefore, we cannot estimate them at present.

7 Evaluation of Environmental Impacts

Following environmental impacts were preliminarily listed up in and out of the Project:

（1） Present conditions of biological diversity
（2） Present conditions of ecological conditions
（3） Present conditions of hydrology
（4） Present conditions of soil conservation
（5） Risk management for controlling forest fires
（6） Risk management for controlling forest pests

Present conditions and future possibility were analyzed.
These subjects would be monitored under the monitoring plan in every 5 years.
From results of the preliminary investigation, there are various positive impacts to local environments by the Project, but no negative impacts were observed.
Evaluation of environmental impacts would be determined by criteria regulated by Indonesian Government if the Project creates strong negative impacts to local environment. However, as the criteria are not supposed by the Government, these impacts were not suitably evaluated.

8. Socio-economic

Many people had favorable impression about the project because they could get the opportunity for labor and benefits from lands. Furthermore, they hold the negative opinion to cut down trees and agreed to plant trees. Thus, people's participation in the project contributed to the increase of benefits for people and attitudes of conservation.

On the other hand, most people considered that it is indispensable for the success of the project to involve people in the process of making plans and to increase the opportunity of the labor.

When the project practitioners carry out the project, they are encouraged to explore seriously who are the real persons to participate in the project, including the surrounding local people, and what kinds of benefits can the project distribute for the people.

9 Farther Study

The study has not fully made clear the base line and the leakage, the fundamental concepts of AR-CDM due to the limited time and budget.

Besides the above, organization of local people, low-cost measurement method and cost/benefit analysis are indispensable for especially small scale AR-CDM.