

**Community Carbon
Accounting Action Research
Project - Indonesia
FY2011 Summary Report**



This report is made available to share information on the Community Carbon Accounting Action Research Project launched by IGES in May 2010.

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1. Introduction

The purpose of the Community Carbon Accounting (CCA) Action Research in Indonesia Project is to elaborate and demonstrate approaches to engage communities in Indonesia in forest carbon stock estimation and monitoring. The key Project partners are:

- Institute for Global Environmental Strategies (IGES), Japan
- National Forestry Council of Indonesia (DKN)
- ARuPA (an Indonesian NGO with forestry and community development expertise)

The Research Team are:

- Principal Researcher: Agus Setyarso (DKN)
- Assistant Researchers : Ardian, Anik Sulistyowati, and Krisnawati (DKN)
- Field Facilitators: Central Java and Yogyakarta – Suryanto and Dwi Nugroho; South Sumatra – Krisnawati and Dadan.

The Project was launched in 2010. The Research Team studied the feasibility of CCA action research in the districts of Gunung Kidul in the province of Yogyakarta, Wonosobo in the province of Central Java, and Musi Banyuasin in the province of South Sumatra. Semoyo Village in Gunung Kidul and Burat Village in Wonosobo District were selected as the main sites for the action research; Musi Banyuasin was not selected as it lacked strong community institutions for forest management.

The activities conducted in Semoyo Village included: consultations with local authorities and communities; meetings to design the research and prepare research equipment/instruments; training of key persons/field crew leaders (Training of Trainers (ToT)); training of the community by the trainers; forest measurement; data entry and processing; research reporting. The action research activities in Burat Village centred on socialisation, consultation with the village leaders, and ToT.

Measurement was conducted on dryland farms and in home gardens, using 20 m X 20 m square plots and linear plots for trees planted on property borders. At Semoyo Village, 100 plots were established. Carbon calculations were undertaken for main stem, branches and leaves. The results were:

- Dryland average: 32.1 ± 22.5 (S.D.) t/C ha
- Home garden average: 34.2 ± 20.6 (S.D.) tC/ha

2. Activities conducted in FY2011

The activities conducted in FY2011 were (1) further capacity building and remeasurement, at Semoyo (2) continuation of CCA activities at Burat Village, (3) introducing the Project to Terong Village, (4) a CCA workshop in Gunung Kidul district, and (5) introducing the Project to Telang Tembago Village, Jambi. See Table 1 for the activities schedule.

Table 1: CCA activities schedule, FY2011

Activity	Description	Timetable							
		June – Aug 11	Sep11	Oct 11	Nov 11	Dec 11	Jan12	Feb12	Mar12
Preparation	Administration, site selection sites, finding local assistant	Terong, & Talang Tembago							
Preliminary consultation	Consultation to local authorities & communities		Terong, & Talang Tembago						
Designing capacity building	Intensive consultations, Meetings for research design, preparing research equipment/instruments		Terong, & Talang Tembago						
Training of trainers	Training to key persons/field crew leaders			Terong, & Talang Tembago		Semoyo			
Training	Training by trainers to members of communities			Terong					
Field work	Measurement			Burat	Terong				
Data compilation	Data entry, data & processing				Burat	Terong			
CCA Local Workshop	Planning, executing and reporting of CCA workshop					Semoyo,	Yogyakarta		
Reporting	Financial reporting & substantial reporting							All sites	All sites

a. Semoyo Village, Gunung Kidul District

Consolidation of CCA: A training workshop to consolidate the CCA activities undertaken in 2010 Semoyo Village was held. The workshop emphasized the need for carbon monitoring and refreshed the skills of the villagers on CCA. 25 people attended. Their filing system for field sheets and training materials were improved. Training was also provided to build skills on using MS Excel. 21 people participated.

Maintaining the CCA plots: Plots were maintained, including re-marking of plot boundaries.

Re-measurement of wood carbon stock: The plots were re-measured, though not all data have been keyed into the spread sheet.

Measurement of litter and non-wood carbon stock: Litter and above ground non-wood carbon stocks (e.g. banana, grass, herbs), were included as additional pools and measured.

Outreach: Semoyo leaders are preparing an extra curriculum class on environment with climate change as one of the main subjects. They are using radio to disseminate and share lessons from their CCA activities. Monthly meetings of women's groups are also being used to raise awareness on climate change and encourage more women to be involved in the CCA.

b. Burat Village, Wonosobo District

In 2011, the activities undertaken at Burat included:

- A refresher training on carbon assessment –10 participants;
- A shared learning forum, where 10 people of Burat Village and 10 people of Semoyo Village discussed their carbon assessment activities;
- Measurement of carbon in individual plots at Burat Village, which was undertaken by 5 people from each of the 5 sub-villages in Burat.

c. Terong Village, Bantul District

i. Consultation at Terong Village

CCA research at Terong Village was initiated through consultation with the Village Head and several village leaders. The consultations used very informal methods, using forums that are active in the Village. The villagers were interested in acquiring forest management certificates for their forests. When they were told that the adjacent village was involved in CCA, they becoming curious and began exploring the possibility of conducting CCA activities.

ii. Socialisation on climate change, REDD+ and CCA

The Terong village leaders agreed to invite Villagers from Semoyo to learn more about climate change and CCA. The Semoyo CCA "trainers" contributed to an awareness raising program for Terong, which included the following activities:

- Field visit from Terong to Semoyo to raise awareness on how forest measurement can be conducted by local people for the estimation and monitoring of forest carbon stocks: The visit was planned by AruPA but the awareness raising was conducted by the Semoyo CCA trainers. 16 people from Terong Village and 4 trainers from Semoyo Village participated in the training.
- Socialisation on the importance and significance of CCA training for Terong Village: This dialogue was attended by 15 people of Terong Vilalge and 2 trainers of Semoyo Village.
- Shared learning forum: A meeting between village leaders of Terong and Semoyo on how CCA can be implemented on the ground. The forum was attended by 15 people of Terong Village and 15 people of Semoyo Village.

After these 3 meetings, Terong Village made a commitment to proceed with the training of trainers (ToT) for the implementation of CCA in their village.

iii. ToT

10 Terong Village leaders participated in the ToT. The 4-day agenda included the following sessions:

- Introduction to the context of climate change and discussion on various indicators of the change of climate using local cases
- Introduction on CCA: purpose, significance, main components, methods, recording the data and calculating the carbon content
- Field exercise and ground level discussions

iv. Measuring carbon

The Terong ToT participants conducted CCA training for villagers representing 9 sub-villages. 45 participants were listed in the training. The training agenda included:

- Introduction to the context of climate change and discussion on various indicators of the change of climate using local cases
- Introduction on CCA: purpose, significance, main components, measurement techniques, using the tally sheets
- Field exercise and ground level discussions
- All the sessions were undertaken on CCA plots of the 9 sub-villages.

d. Participatory carbon assessment workshop in Gunung Kidul District

Preparation for the workshop at Gunung Kidul consisted of consultation with the District Forestry Office; preparation of the workshop TOR; a sounding of the workshop concept with national stakeholders through group Emails; and sending of invitations. Because of budget constraints, the workshop was a 1-day event held on 07 December. The workshop was attended by the leaders of each village, the district government (heads of forestry and environment) as well as IGES, DKN and ARuPA. The district government of Gunung Kidul has shown strong interest in the action research, and both heads of forestry and environment stated that activities such as this have high priority for the district.



Photo 1: CCA District Level Workshop, Gunung Kidul

The villagers of Semoyo presented the work that has been undertaken in their village including the establishment of 100 permanent sample plots. They also showed a locally produced video (Indonesian with English subtitles) explaining the work on participatory forest carbon accounting and the importance for the community to secure environmental services. During the workshop, DKN raised the possibility of using the data that is being collected to develop a REDD+ project design document to eventually engage in the voluntary carbon market. This proposition is being considered by the villagers and the

district government.

e. Talang Tembago Village, Jambi

Consultations were held with the District Forestry Office, the Ministry of Forestry, in particular the Directorate General of Forestry Planning, which is in charge of establishing permanent Forest Management Units, and with the community. A ToT on CCA was conducted and community representatives participated in national workshops on CCA, MRV and REDD+.

3. Overview of research sites

a. Village briefs

Semoyo Village

The agricultural sector, trade and services, transportation and mining are central to the economic structure of Gunung Kidul District. Forests are important in the agricultural sector in terms of land cover and production. Most of the people work within a household based economy and only a few have formal work. The community forest in Gunung Kidul totals 11,027 ha and the state forest totals 13,221 ha.

Semoyo Village is located in Patuk Sub-District. The village is divided into 5 sub-villages: Salak, Tepus, Semoyo, Wonosari, pugeran, and Brambang. It has a population of 2,742 and 765 households. Semoyo has been declared as a *conservation village* because of the importance of community forestry. The total forested land in Semoyo Village is 521.9 ha, which constantly produces 55 m³ of timber annually

Agriculture/forestry at Semoyo Village is mostly a mixture of traditional food crops, pasture, and trees (teak, mahogany, acacia). All land is owned by individuals (community members). Two types of land ownership were observed, namely dryland farming (*ladang*) and home gardens. The composition of private forest may be classified as: Clustered/continuous and Linear, i.e. trees planted along the border of the land.

Burat Village

Burat Village of Wonosobo is under Sub-district Kepil administration. The total land area of the village is 997.29 ha and most of it is taken up by agroforestry. The total population is 2,546. The economy centres on household production. The main sources of livelihood are derived from the land and include dry land paddy rice, vegetables, nilam oil, cinamom, and coffee. Agriculture/forestry at Burat Village, Wonosobo, is a mixture of sengon trees, banana, cassava, and medicinal/herbal plants, with rice paddies located on separate pieces of land. Home gardens are not significant as the settlements or houses are close to each other.

Terong Village

Terong Village is one of villages at Dlingo Sub-district of Bantul District at Yogyakarta Special Province. Terong Village is just next to Semoyo Village of Gunung Kidul District, and is characterised by limestone hills that are 325 – 350 metres above sea level.

As in Semoyo Village, there are two dominate land uses around Terong Village, namely home gardens and dryland farming (Table 2).

Table 2: Major land use types, Terong Village

Landuse type	Area (ha)
Dryland and paddy rice	535.56
Settlement and homegarden	

Talang Tembago Village

Talang Tembago was selected for the CCA Project because out of 23 villages in Merang District, Jambi Province, it was considered to be one of the most capable for the management of *Village Forest*.

The Village probably represents the final evolution of village establishment at Sumatra. It originated from Sungai Tenang ethnic group, and it was slowly established from old settlements like the Koto Mutut, Sungai Seluang, Sijori and Durian Malai compounds. In the past, these compounds were mobile as they practiced shifting cultivation. The last settlement was established in 1982. Talang Tembago Village is spread across two locations: (1) agricultural area, where people grow food and other produce, (2) road sides, where people have good access for economic activities.

Talang Tembago has natural mixed Dipterocarpi production and protection forests. Some areas have been logged over by forest concessionaires. Currently, the villages treat some of the surrounding forests as a source of fertile land for their livelihoods and protect the remainder for water supply and electricity generation.

4. Awareness raising and capacity building

a. Training of trainers / foresters

The design and implementation of ToT for CCA was based on the situation that CCA is totally new to everybody at the research sites and on the ill-defined need for CCA as part of community livelihoods. The Outline of the ToT is as follows:

Objective: To enable the training participants to understand the importance of climate change, REDD+ and CCA; to apply carbon measurement; and to apply methods of knowledge transformation in carbon measurement to the community members.

Participants: Participants were selected from the key persons who were active in the discussion/consultations with the research team.

Trainers: The lead trainer is the principal researcher, assisted by a research assistant and field facilitators

Course:

1. Group dynamics: ice breaking, getting most preferable training atmosphere, internal rules in participating in the training, agreement on schedule;
2. Introduction to CCA: climate change phenomena, how community forest may contribute in mitigation, rights to carbon, distribution of benefits when there are carbon incentives, the need for CCA;
3. Workshop on CCA sampling: sampling framework, sampling shape and dimension, sampling size, and the dynamics in applying sampling on the ground;
4. Measurement Techniques: setting sampling boundaries, teamworking, introduction to measurement equipment, using measurement equipment, finding best techniques on the ground;

5. Data recording: introduction to tally sheets, adjusting the tally sheets, practicing in filling in the tally sheets, data entry and saving on the computer

Training was carried out in the villages. The entire course was successfully completed. However, the training schedule must be made flexible. Training could not be executed daily, but depended on the time availability of the participants. The succeeding training session schedule must be agreed upon by the participants. With this intermittent schedule of conducting sessions, the entire course was finished in three weeks.

At Talang Tembago Village, 6 people from different villages that had secured the status of Village Forests by the Government participated in the ToT. The schedule of ToT was:

Day 1	<i>Registration</i>	Carried out at the Village Office
	<i>Opening Session</i>	Participants and a number of local leaders attended
	<i>Self introductions</i>	
	<i>Introduction to Climate Change and REDD+</i>	Presenters: Mahendra Taher and Agus Setyarso
	<i>Introduction to land use and utilisation type</i>	Resource person: Dwi Nugroho
Day 2	In-depth discussion on land use changes	Resource person: Dwi Nugroho.
	Introduction to CCA	Resource person: Dwi Nugroho.
	Introduction to data processing	Using MS Excel
Day 3	Field measurements	
Day 4	Data input and processing	
Day 5	Further data processing; follow up plans for individual participants, closing ceremony	

b. Community capacity building

The design and implementation of training of the community members incorporated the concepts of climate change and REDD+ and reflected the fact that quantitative measurement, including for CCA, is new for the villagers. The main features of the design and implementation of community capacity building/training are:

Objective: To enable the training participants to understand the importance of climate change, carbon emissions, and to apply field measurement for CCA

Participants: Participants were the land owners of the sampled plots. However, the training allowed for other interested community members.

Trainers: Key persons who participated in the ToT, supported by research assistants and field facilitators.

Course: Same as for the ToT

Implementation:

Training was carried out in the village. One session was conducted inside, others involved fieldwork coaching. General coaching was carried out by taking a plot as training case. Other sessions were carried out sequentially, moving from one sample plot to another. In other words, measurement session of the training was organised for every plot. Coaching on measurement was given at every plot and then the measurement was conducted. This approach was considered the most effective and acceptable by the training participants.

5. Sampling design

a. Number of sample plots

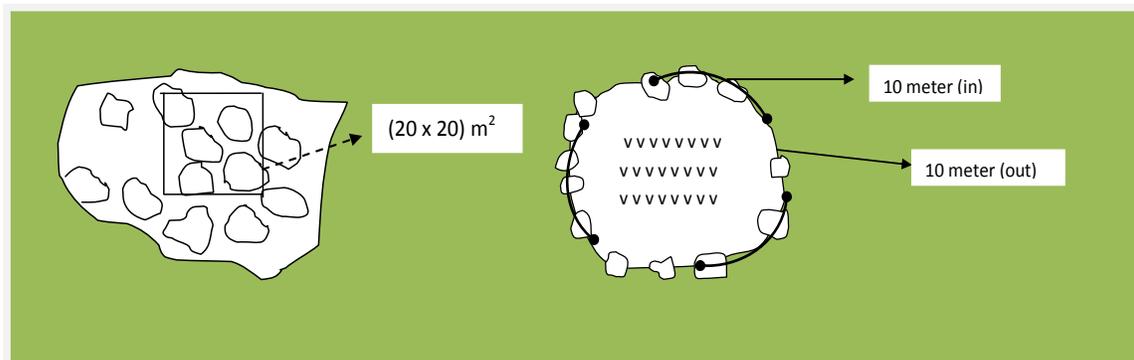
For Semoyo, Burat and Terong Villages, the sampling unit was determined as a unit of land owned by community members. This was found effective since the sampling frame can be easily mapped from the statistical data at the Village Office. In FY2010, through a series of discussions the number of the total sample units in Semoyo Village was determined as 100. The number of plots was obtained after the selection of 10 households in each sub-village ($10 \times 5 = 50$), where every household is represented by dryland and home garden ($50 \times 2 = 100$). In FY2011, it was determined that this number was also appropriate for Burat and Terong Villages.

At Talang Tembago Village, 2 sample plots were aimed to be established for training purposes. The design is systematic sampling with a random start.

b. Plot shapes and dimensions

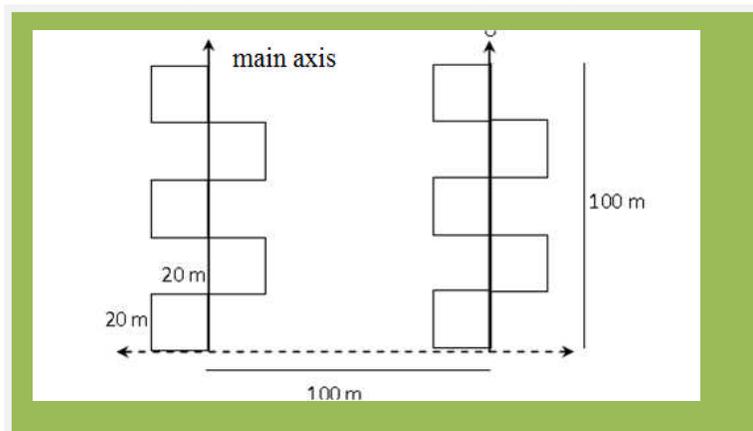
Plot shape and size reflects the spatial distribution of trees. For trees planted together, 20 m X 20 m square plots are used, while linear plots are used for trees planted on property borders (Fig. 1).

Figure 1: Plot dimensions for trees planted in groups (left) and along property borders (right)



For Talang Tembago, i.e. natural tropical forest, 20 m x20 m plots established on strips across the slope was felt to be the most appropriate approach (Fig. 2).

Figure 2: Plot shape and dimensions for Talang Tembago



6. Carbon stock calculations

The process of recording the data in the field, input into an MS Excel spreadsheet and processing is explained in the FY2010 report on this Project. For the three villages in Java, carbon calculations were undertaken for main stem, branches and leaves using the following equations:

- Main stem/trunk (C_b) = $0.4078 * D^{1.6847}$
- Branches (C_c) = $0.1086 * D^{1.8273}$
- Leaves (C_d) = $0.0305 * D^{1.5843}$

Carbon calculations were obtained by applying regression estimates produced by Brawijaya University on carbon measurements in home gardens and community dryland forests.

For Talang Tembago Village, we are considering four regression estimates for carbon calculations, namely:

Source	Application	Equation
Kettering (2001)	Secondary forest in Jambi	$BP = 0.11 \times \rho (D^{2.62})$
Mudiyarso (2004)	peat forests	$BP = 0.19 \times \rho (D^{2.37})$
Brow (1997)	Lowland tropical forest with precipitation between 1.500 – 4.000 mm/year	$BP = 0.118 \times (D^{2.58})$
Samalca (2007)	Mixed tropical forest in East Kalimantan	$BP = 0.2902 \times (D^{2.313})$

Where :

BP is tree biomass in kilogram (Kg)

D is Diameter at breast height (cm)

ρ is weight index

7. Outcomes, findings, lessons learned

a. Semoyo Village

Farmers at Semoyo Village are familiar with the CCA and the refresher training was not as difficult as the initiation of the project in January 2010. Data on trees have been collected and entered into an MS Excel spreadsheet. Data processing is ongoing. The community agreed that monitoring will be undertaken once a year in January.

The next period of research must address whether the communities need to report their timber harvesting. They are currently compiling this data at household level.

The CCA activities at Semoyo are being disseminated outside the village. The concept of CCA has been introduced at district, province and even at national forums. CCA has also been explained through community radio.

Semoyo now has 6 people recognised as CCA trainers and they are often invited to attend relevant workshops.

b. Terong Village

CCA was relatively easy to introduce because of the support of the local leaders. However, explaining carbon and carbon accounting was challenging. Local illustrations are needed. The most difficult task is in finding how conserving carbon stocks can benefit people's lives in the village.

The ToT at Terong was quite effective. The Semoyo "trainers" used the local idioms and these were the most acceptable methods for the villagers.

As happened in Semoyo at the beginning phase, people at Terong found some difficulties in using the measurement tools and protocols. Self-learning by reading of manuals cannot be expected. More field exercises were needed before they acquired the knowledge and skills for CCA. Calculating carbon stock from the physical measurement on trees was another challenge for the ToT and the training of farmers.

The co-benefits of building capacity on CCA includes confidence in timber sales and producing better individual plans on harvesting the trees.

Participation in the training was high, however, the timing of training needs further consideration. Farmers are not always available for full day training activities.

c. Burat Village

In Burat, the role of local leaders was also found to be vital for action research. Burat has been intensively promoting woman roles in improving the community income and the CCA work used

the woman initiatives as an entry and this proved effective. However, the villagers view CCA mostly as a means to generate income, rather than as an instrument for conservation, which makes explaining the benefits of CCA difficult.

d. CCA regional Workshop at Gunung Kidul

The participants observed that CCA can be implemented at the village level, provided that the methodology is adjusted to the level of capacity and knowledge of the communities. Local language and illustrations are needed to explain technical terms. It was also noted that CCA has generated new information on village resources and has encouraged villagers to strengthen their local institutions.

e. Talang Tembago Village

It was difficult for the participants to understand climate change and the concept of carbon and greenhouse gasses. These are completely new issues for them. Two-days were not sufficient to explain and discuss the issues.

A number of terms on climate change and REDD+ need to be transformed into local expressions. The training facilitator and resource persons were not sufficiently prepared for this. As the villagers benefit from their protection of water for consumption and hydropower generation, this could be one entry point to explain protection of carbon stocks for climate change mitigation.

Another difficulty was introducing the participants to the use of maps, GPS, and other measurement tools. The concept of measuring tree diameter and height took a lot of time for the participants to understand. Introduction to the use of measurement tools may be best conducted in the field, and even home gardens can be used for practising measurement. Training people on the use of spread sheets will also pose a significant challenge.

The most difficult training session was on carbon calculations. More practical sessions are recommended for future trainings, and the trainers themselves need to be prepared with step-by-step and practical exercises before they are sent to train the community members.