# ASSESSMENT OF FOOD FOR CARBON FREE PROJECT

**Case study in Oinbit village, Timor Tengah Utara District**
**West Timor – Indonesia**

**MSc Minor Thesis by Yulius PK Suni**

**July 2012**

Land Degradation & Development Group

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Master minor thesis Land Degradation and Development Group submitted in partial fulfillment of the degree of Master of Science in International Land and Water Management at Wageningen University, the Netherlands

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**Supervisor(s):**
Dr. Aad Kessler
Land Degradation and Development Group
Wageningen University, The Netherlands

Dr. Ir. Susilawati C. Laurentia, MscHE
Civil Engineering Department
Catholic University of Widya Mandira Kupang, Indonesia

**Examinator:**
Prof.dr.ir. L. Stroosnijder

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Wageningen University, Land Degradation and Development Group

## Abstract

The study presented in this paper assesses the performance and impact of the Food for Carbon Free project in West Timor, Indonesia. This assessment is considered as the lessons learnt which will be used as the basis for providing recommendation to district government. It focused on status of introduced soil and water conservation measures and impact of the project to communities' food security and their capacity to adopt and adapt. Data was obtained via 29 informal-interviews and field observations. Results from the study area showed that in total, area and plants required by the project are achieved but the size of the plot and the numbers of the plants for each family are varied. There is no regular maintenance on terraces structure to minimize sediment cover in the long run. Provision of few times of trainings was considered not enough to boost adoption rate especially on other plots. In the short-term the project contributes partially to the improvement of food security in the forms of food availability and accessibility while food utilization and sovereignty are not addressed by this project. Therefore, more emphasis on educational programmes helps farmers to recognize land degradation problems and in the long run farmers have willingness to adopt the measures in tackling the problems. However, totally relying on educational messages is too optimistic and the conservation measures will never be executed. Incentives are still needed to accelerate the execution and to achieve acceptance phase of adoption. Adoption is important because the introduced measures can improve farmers' livelihood. Further research is needed on influencing adoption factors such as socio-economic, personal, institutional, physical, political, and technological aspects.



**Keywords:** soil and water conservation, food security, adoption, incentives, West Timor

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# 1. Introduction

## 1.1. Problem description

Land degradation can be defined as the decline in land quality either gradually or permanently (FAO, 2004). It refers to biophysical processes which are triggered by socio-economic, physical, political, technological and other aspects (Lal, 2001). The influencing factors indicate a complex interaction. This complex interaction has been a challenge for interest parties involved in facing and addressing land degradation problems. Technical ways such as soil and water conservation measures alone cannot solve the difficulties. Gisladottir and Stocking (2005) argue that there is a need to synergize soil and water conservation measures with appropriate policies. This will be more effective in the condition that the appropriate policies and technical measures are linked to development issues such as poverty and food insecurity (Gisladottir & Stocking, 2005).

In the name of land degradation, poverty and food insecurty issues, numerous of soil and water conservation measures have been implemented as projects worldwide. Soil and water conservation measures are applied as a means of improving agricultural land productivity, conserving natural resourses and enhacing the quality of agro-ecosystem (Mausbach & Dedrick, 2004). Most of soil and water conservation programs apply a top down approach within a short period (Noordwijk & Verbist, 2004) and use direct insentives such as food to support the implementation process. Intention of the project and food stimulant is to minimize land degradation as well as to address poverty and food security. Facilitating agencies in general are the government and non governmental organisations (NGOs).

Incentive based soil and water conservation projects are not free from problems. It is proven in Bolivia that the absence of facilitating agency and food incentive led to the failure of the project (Middleton et al., 2003, cited by Graaff & Kessler, 2010). This describes that target of beneficiaries is food incentives only and not the importance of introduced soil and water conservation techniques. Another problem is program approach of NGO and the government. In practice, NGO and the government have different approach. NGOs which usually execute small scale projects and apply bottom up approach get some success stories but they are isolated within the community and project site. There is no replication mechanism provided by NGO to enhance the benefits of the projects to more people and more coverage areas (Lovell, et al., 2003). Furthermore, the project is not linked to the government strategic plan. The government has large scale projects and applies top down approach but the government's projects cannot be easily implemented in ground level.

Based on previous explanation, there is a need to scale up NGO's small projects. In general scaling up means "enhancing impact at a wider scale" (Graaff & Kessler, 2010, pp. 12-1). A definition of scaling-up by IIRR (2000) is "bring more quality benefits, to more people over a wider geographical area, more quickly, more equitably, and more lastingly" (IIRR, 2000, p. 13). Scaling-up can be seen in vertical and horizontal movements. Vertical scaling-up means "involving other sectors/stakeholder groups in the process of expansion –from the level of grass roots organizations to policymakers, donors, development institutions and investors at international levels" (IIRR, 2000, p. 10). And horizontal scaling-up is"geographical spread to cover more people and communities and involves expansion within same sector or stakeholder group" (IIRR, 2000, p. 10) through "replication and adaptation" (Graaff & Kessler, 2010, pp. 12-1).

## 1.2. Research question

The main research question is

**RQ:** *To what extent can lessons learnt and critical views of the **Food for Carbon Free** project be considered in the district government policies and regulation for **scaling up** the project?*

In order to answer the main question, several sub questions are presented as follows:

**SQ1:** *What is the **performance rate** of the project according to the project proposal indicators?*

**SQ2**: *What are the lessons learnt derived from appraisal of the project and critical views?*

## 1.3. Concepts

### Food security

WFP and FAO define food security as a condition which "exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (WFP & FAO, 2009, p. 8). Food security has three pillars namely availability, accessibility and utilization (WHO, n.d.). Availability refers to "sufficient quantities of food available on a consistent basis" (WHO, n.d., p. 1). Accessibility means "having sufficient resources to obtain appropriate foods for a nutritious diet" (WHO, n.d., p. 1). And utilization is "appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation" (WHO, n.d., p. 1).

### Incentives

Graaff and Kessler (2010) group incentives into two categories: direct and indirect incentives. Direct incentives can be in cash such as subsidies, cost sharing, credits and wages; or in kind such as food aid, provision of inputs, tools and allocation of farming plots (Graaff & Kessler, 2010). While indirect incentives cover fiscal in the forms of fiscal facilities, market prices and land tenure security; services such as technical assistance, improvement of road, accessibility to water supply and use of machinery; and education in terms of training, extension and social services (Graaff & Kessler, 2010).

### Soil and water conservation

Soil and water conservation measures are the management strategies a farmer applies to control or prevent soil erosion and to maintain soil fertility (Stocking, et al., 1989). These include physical or mechanical measures such as terracing; biological or agronomic measures such as tree planting; and soil management practices for example minimum tillage.

### Adoption

Adoption is crucial because the introduced soil and water conservation measures can improve farmers' livelihood (Demeke, 2003). "Adoption is not an action (yes/no), it is a process in which decision making is crucial from acceptance to continued use" (Kessler, 2010, p. 28). In terms of soil and water conservation measures adoption, Graaff and Kessler (2010) group eight steps of acceptance phases:

Step 1: Are erosion symptoms recognised?
Step 2: Are erosion effect recognised?
Step 3: Is erosion taken serious?
Step 4: Is the farmer aware of adequate measures?
Step 5: Is farmer able to undertake measures?

Step 6: Is farmer willing to undertake measures?
Step 7: Is farmer ready to undertake measures?
Step 8: (Final) acceptance of measures.

## 1.4. Research model

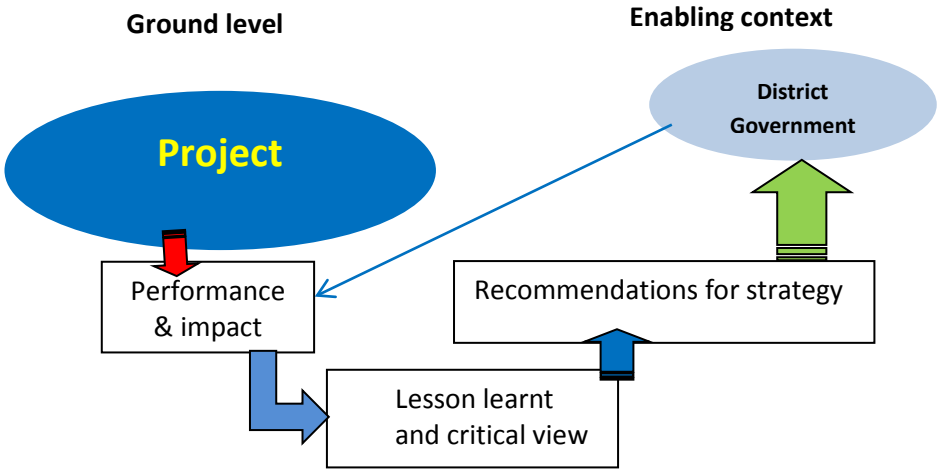


Figure 1-1 Research model

The model shows the flow of conducting this research. As we can see from the figure above, project is placed at ground level. Base on the expected output of the project listed in the WFP proposal, a project appraisal was conducted to assess and scale the current performance state and impacts of the project (performance rate). Performance rate is measured in different levels of objective hierarchy namely goal, purpose and output (Krimmel, et al., 1990). However, in this research the focus is on purpose and output objectives. The assessment of the project performance and impact are considered as lessons learnt. Some critical views based on academic literatures are added to the lessons learnt.

Based on these lessons learnt and critical views, the study provides some recommendations as the insight for the actors in enabling context to develop vertical scaling up of the project. Vertically scaling up is providing space for other actors to take part actively in expanding benefits of the project to more people and more coverage area (IIRR, 2000). The actors in enabling context consist of the government in national, province and district levels, World Food Programme (WFP), Carbon Free Consulting Japan (CFC) and Yayasan Bina Swadaya (YBS) as the NGO. The proposed recommendations are dedicated mainly to the district government since decentralization policy transfers autonomy to district and municipality government to plan and execute the program (Resosudarmo, 2004). Involvement of the district government can influence the project performance and impact.

## 1.5. Purpose of Research

This research aims to provide some recommendations for the district government who has the power in terms of financial support and authority (Resosudarmo, 2004) for scaling up the project.

Bewket (2007) categorizes some influencing factors of soil and water conservation measures adoption or adaptation namely personal, physical, socioeconomic, institutional and technological factors (Bewket, 2007). However, the recommendations will be limited on identification of physical appraisal which influences the farmers to adopt, manage and sustain the measures introduced by the project. An analysis of project performance or physical appraisal can be considered as the lessons learnt and critical views. The lessons learnt and critical views help in formulating the recommendations for the actors involved in soil and water conservation projects.

## 1.6. Research Methodologies

In order to answer the sub research questions stated before the following methodologies are applied; field observation, informal interview techniques and literature review.

### Field observation

Field observation was conducted on 29 farming plots of the project. This method was used to assess achievement of project outputs and their current performance such as plot size, survival of cashew nut trees, availability of jatropha along plot borders, availability of leguminous trees along terrace lines, application of intercropping, usage of low tech drip irrigation, status of terraces and their maintenance.

Main aspects to be observed are (for detail see annex 1):

- What size of the plot is owned by the farmers?
- What are SWCMs applied in the plot?
- What is the status of SWCMs (maintenance)?
- How many survival trees are on the plot?
- Does farmer have survival jatropha along the plot's border with interval 1m?
- Does plot have survival legume trees along the terrace line?

### Interview

A semi-structured interview was prepared but during execution farmers hesitated to speak openly when they are seeing me wrote what they told. On the next day onward, informal interviews were applied. However, points of discussion with farmers still relied on questions on semi-structured questionnaire. This was done during field observation to gain farmers' perception and experience about the project. Total respondents were 29 farmers.

Main questions for interview are listed below (for detail see annex 1):

- What is the food farmer secures from the project? Does the yield increase every year starting from 2009 to 2011?
- What are the crops farmer sales to the market? Does the yield increase every year starting from 2009 to 2011?
- What type of technical assistance is provided by YBS and the government to the farmer?
- What is the status of plot's ownership (is it legalised by the government?)
- What are SWCMs applied in the plot?
- Does farmer have willingness to replant non survival trees?
- Did farmer apply simple drip irrigation in the 1st year of planting during peak of dry season?
- Does farmer sale and use jatropha fruits?
- Does farmer use legume leaves for organic fertilizer and animal fodder?

In relation to adoption process of terrace, the questions are:

- Are erosion symptoms recognised?
- Are erosion effect recognised?
- Is erosion taken serious?

- Is the farmer aware of adequate measures?
- Is farmer able to undertake measures?
- Is farmer willing to undertake measures?
- Is farmer ready to undertake measures?

### Studying policies on soil and water conservation

Only one program of the district government related to soil and water conservation program and food for work is available. Name of this program is *Gerakan Cinta Petani* (Loving Farmer Movement), collaboration between agriculture department and local NGOs to assist farmers in whole district area to apply appropriate soil and water conservation measures in farming practices.

## 1.7. Research area

West Timor is part of East Nusa Tenggara province of Indonesia. It consists of four districts and one municipality namely Kupang, Timor Tengah Selatan, Timor Tengah Utara and Belu district and Kupang municipality. This study will be held in Timor Tengah Utara (TTU) district (see figure 1.2).


Source: www.geology.com


Source: www.en.wikipedia.org


**Oinbit village, Insana, TTU**

Timor Tengah Utara district map

Source: www.ciptakarya.go.id

**Figure 1-2 Map of esearch area**

TTU district with total area 2,669.7 $km^2$ (BPS-TTU, 2008) consists of 24 sub districts (BPS-TTU, 2009). One of sub districts is Insana. Total area of Insana sub district, covers 13 villages (BPS-TTU, 2009), is 333.08 $km^2$ (BPS-TTU, 2008).The research was focused on Food for Carbon Free project in Oinbit village, Insana sub district, Timor Tengah Utara district, West Timor (see figure 1.2). Total area of this village is 81 $km^2$ (BPS-TTU, 2008). It is located about 257 km from Kupang, province capital of Nusa Tenggara Timur and about 40 km from Kefamenanu, the capital city of Timor Tengah Utara district. This village is home to 340 households who totally depend on rain-fed agriculture and poor agriculture practices. WFP Indonesia only has one Food for Carbon Free project which is implemented in Oinbit village.

# 2. Strategy of the Project

## 2.1. Background of the project

Climate in TTU is categorised in dry and wet season. In general dry season lasts for between eight to nine months of the year. Wet season period is three to four months but currently rainfall patterns during wet season become erratic in terms of volume and frequency (Inoue, 2009). These conditions make this area is known to be a drought prone area. This area indicates mountainous topography. Slope range below 40 % covers 77 % of the area while the rest has the slope more than 40 % (BPS-TTU, 2008). Farmlands, generally located in slope area are vulnerable to soil erosion.

Despite natural condition mentioned above, agriculture practices in this area contribute to land degradation. Most of the people in TTU mainly rely on agriculture sector for their livelihoods. This sector absorbs 67.7 % of labour force (BPS-TTU, 2009). Primarily farmers depend on rain-fed agriculture. Farmers generally apply slash and burning practices in cultivating their farmlands. Cutting off trees and bushes then burning them are common practices in this area. Farmlands, generally slope area, are cultivated for a variety of subsistence crops such as maize, cassava, vegetables and some rice (Russell-Smith, et al., 2007). Slash and burning practice in combination with steep topography, fragile and mobile soil and abuse of fire intensively accelerates land degradation and deforestation (McWilliam, 2000).

Climatic condition, land degradation and agriculture practices lead to food crop failure every year in this region. Food crops contribution to local revenue has decreased from 53.7 % in the late 1960s to 21 % in 2006 (Lassa, 2009). And this region contains the poorest in Indonesia. These conditions attracted the government and international donors for developing programs on how to deal with land degradation and its associated problems such as food insecurity and malnutrition.

In 2008, the United Nation World Food Programme (WFP) in collaboration with Carbon Free Consulting Corporation (CFC) Japan, a local NGO namely Yayasan Bina Swadaya (YBS) and the local government initiated a pilot project of Food for Carbon Free in Oinbit village, Insana sub district, Timor Tengah Utara district, West Timor, Indonesia. I was involved as WFP staff (Programme Assistant) for conducting assessment, site and NGO selection, coordination with government (provincial and district level), and monitoring of the project.

## 2.2. Parties

There are four parties involved in the project namely WFP, CFC Japan, local government and its extension services, and villagers. Each party plays important roles in providing incentives for the project. WFP as an institution takes part in facilitating CFC to invest on the project in West Timor and supervising YBS and community to implement the project in light of WFP Food for Work (FFW) procedure. CFC is the funding agency for project implementation and monitoring. YBS sets up farmer groups and provides technical assistance and regular monitoring. Community is the target group which has the responsibility to execute and maintain the project in the village for 20 years which will be explained later in project phases. Number of participants is 340 household. Local government has the role to assist the NGO and conduct regular monitoring.

## 2.3. Food for work procedures

The project is called Food for Carbon Free project because it used WFP food for work (FFW) procedure in introducing soil and water conservation measures to the farmers. In general WFP FFW procedure has two phases, preparation and implementation (WFP, 2005). Three main steps are in preparation phase. First, NGO and community discuss and prioritize activities. In this sense, the chosen activity is farmland development with good soil and water conservation measures. A proposal was sent to WFP. Second, WFP reviews the proposal and conducts field survey. During this step, WFP, NGO and community make some adjustments in terms of the amount of food requirement, chosen items of work to be paid with food incentive and to be worked without food (community contribution), and project duration. Final step is WFP appraises the project based on proposal review and field findings then makes a contract between WFP, NGO, and community representative is made.

Implementation phase consists of three main points namely project activities, food management and distribution, and monitoring and evaluation. Descriptions of each point are depicted in table 2.1 which is adapted from WFP FFW manual (WFP, 2005).

**Table 2.1 Implementation phase description**

| Main point | Description |
|---|---|
| Project activities | • Project execution by NGO and community.<br>• Project activities are conducted by the community with the necessary technical assistance and supervision from the NGO partner and other cooperating partners (e.g. Department of Agriculture, etc.).<br>• A Community Project Committee (CPC) is established to manage the project implementation at village level.<br>• NGO socializes the beneficiary community on work norms, project input/output and food entitlements, to ensure complete transparency at the beneficiary level.<br>• NGO trains the CPC on all recording, reporting and implementation procedures.<br>• NGO staff assists the CPC to develop the monthly work plans, undertake at least weekly visits to check performance and progress, measure the work outputs and facilitate the CPC management.<br>• NGO maintains all necessary project records and provide timely reports.<br>• WFP carries out unplanned visits to spot check progress and performance in project implementation. |
| Food management & distribution | • WFP rents a warehouse to store food commodities.<br>• A beneficiary card is given to each FFW household to record household information, work days performed and food received. The cards are filled by the CPC members and NGO's staff. The card should be kept collectively by the CPC.<br>• Food request based on work achievement is prepared by the NGO and submitted to the WFP SO for verification and subsequent release food commodities.<br>• NGO is responsible to safely transport the food commodities to the final distribution site and maintain the necessary documentation. |

| | |
|---|---|
| | • NGO is responsible for the adequate food distribution to all FFW participants based on their work outputs. |
| Monitoring & evaluation | • NGO's field staffs visit the project site once or several times a week to monitor work progress, measure the outputs and check the proper recording of the CPC.<br>• NGO provides WFP with project progress report regularly.<br>• NGO provides WFP with food distribution report.<br>• WFP conducts monitoring independently or jointly with NGO and government staff to assess physical achievement versus work plan, as well as food received and distributed. |

## 2.4. Objective and output indicators

The project goal is to "strengthen resilience of a community on dry & degraded land to negative impacts of climate change on their livelihood, particularly food & energy security status" (Inoue, 2009, p. 1).

### Purpose

Under this main goal, Inoue (2009) sets seven purposes which are listed in table 2.2.

Table 2.2 Purposes of Food for Carbon Free project

| No | Purpose |
|---|---|
| 1 | To improve food security of the local community by farmland development & cash crop production |
| 2 | To improve energy security of the local community by jatropha planting & stove instauration |
| 3 | To issue a carbon credit by tree planting VER and revolve the fund to other half areas/villagers of farmland |
| 4 | To facilitate understanding of climate change and the environmental issues and the function and contribution by the villagers' participation in tree planting & protection activities |
| 5 | To establish a sustainable monitoring, maintenance of village livelihood and the environmental infrastructure |
| 6 | To strengthen the community's knowledge, capability, and skill to grow, rehabilitate and conserve the cashew trees & jatropha trees plantation |
| 7 | To share the economic, social and environmental benefit by villagers over the 20 years period by the carbon free plan & revolving |

Two of seven purposes are chosen for this research. First option, derived from purpose 1, is to improve community's food security. Second option, adapted from purpose 6, is to strengthen community's capacity on soil and water conservation measures. Indicators of each purpose are illustrated in table 2.3.

Table 2.3 Chosen purpose indicator

| Purpose factor | Indicator |
|---|---|
| Improving community's food security | • Farmer secures food from the project (maize, cassava, vegetables, etc.) and increase every year<br>• Farmer generates cash from the project (cassava, peanuts, jatropha, etc.) and increase every year |

| | |
|---|---|
| Strengthening community's capacity on soil and water conservation measures | • Farmer receive technical assistance (training, guidance in the field, etc.) from NGO, the government regularly |

## Outputs

Inoue (2009) lists nine outputs on the following table:

Table 2.4 Outputs of Food for Carbon Free project

| No | Output |
|---|---|
| 1 | A 108.8 ha of land preparation for tree planting & farming is completed with exacerbation and terracing |
| 2 | Cashew nuts trees are planted at a planting density of 200 trees/ha on totally 108.8 ha of the village. |
| 3 | Jatropha trees are planted at a spacing density of 1 m interval as fences (about 500 trees per ha) on 108.8ha where cashew nuts trees planted. |
| 4 | Seeds of cashew nuts trees are distributed at 2nd year rainy season and 3rd year rainy season for 20 % tree number of previous year planting to facilitate supplementary plantings (Non WFP FFW activity). |
| 5 | Legume trees & food species are planted as intercropping (villagers own cost). |
| 6 | One (1) Jatropha stove per household is distributed for 680 participant's households with their promise of 20 years' planted tree protection & accepting periodical monitoring. |
| 7 | Local government (Insana Sub-district) participates & supervise seedling selection and tree planting during FFW activities. |
| 8 | "WFP FOOD FOR CARBON FREE PLAN" is subject to be sold to GHG emitters/ consumers with a 20 years' plantation maintenance & sustainable monitoring system. |
| 9 | Participatory evaluation monitoring is implemented in accordance with WFP regulation |

On output level four of nine outputs will be assessed. The four outputs are applying soil and water conservation measure (output 1), planting cashew nut trees (output 2), planting *jatropha* trees (output 3) and output 5 which is planting legume and food crops as the intercrop (Inoue, 2009). Indicators of chosen output indicators are described in the following paragraphs.

### *Farmland development*

There are two indicators in farmland area, plot size and application of soil and water conservation measures. The government in collaboration with local leaders in the village grants farming plots to the project participants. The plots, owned by local leader, were abandoned land and mainly used for free grazing. Each farmer entitles to 0.32 ha of farming plot. The government legalizes ownership of the plot by issuing certificate to each farm household.

Farmers are required to apply some soil and water conservation measures such as terracing, organized intercropping, low tech drip irrigation, mulching and planting legume trees along the terrace lines in cultivating the plot.

- Terrace: farmers build broad base terrace either using stone or earthen structure to conserve soil and water. Using A-frame to demarcate contour line.
- Organized intercropping: mixing food crops like planting maize, peanuts, green bean, pineapple, papaya and cassava. In addition to food crops, farmers plant cashew nut and jatropha which will be explained in the next paragraphs.
- Low tech drip irrigation: using bamboo and simple shelter on each cashew nut tree. Half part of bamboo is buried close to cashew nut tree. Buried bamboo part has small tiny hole to allow water dripping to ground. It was applied in the first year to water cashew nut during peak dry season.

- Mulching: grass and leaves are put around the planted trees to supplement soil nutrient.

### *Cashew nut*

Participants are required by the project to plant cashew nut with interval 6 – 7 meters within the plots. It means within the given plot of 0.32 ha, each farmer has to grow at least 64 trees. Seedlings, provided by CFC, are selected by NGO and the agriculture department in the district government. Farmers are responsible to replant the trees which are not survived in the next planting season. Seeds and seedlings for replanting are self-contribution of farmers. Farmers have to maintain the trees for 20 years and they can sell the fruit for family income generating.

### *Jatropha*

The project also required farmers to plant jatropha trees along the plot border. Interval between trees is one meter. These trees which are promoted as alternative crops for producing bio-fuel are tropical crops. In this project, the trees have the function to indicate border between plots, to protect the plots from fire and to avoid animal intrusion. Farmer can utilize the fruits as the fuel to jatropha stove provided by the project and if possible can sell it to the market.

### *Leguminous trees*

Types of leguminous trees to be planted in the project are gliricidia (*Gliricidia maculate),* leucaena (*Leucaena leucocephala)* and hummingbird tree *(Sesbania grandiflora*). The first two are planted along the terrace line to support the terrace structure for long term purpose while the last one is planted randomly. Leguminous leaves can improve soil fertility and provide animal fodder.

## 2.5. Project phases and the role of parties

Period of the project is 20 years starting from 2009. Within this period, the project is diveded into three phases, preparation, implementation and monitoring (Inoue, 2009). Preparation phase was done in paralel to FFW preparation phase. Implementation and monitoring phases are in line with FFW implementation phase. In this project monitoring phase is clearly stated for the period of 20 years. Descriptions on the roles of parties in each phase are on the next paragraphs.

### Preparation

A set of preparation was organized a year before project started. Main activities during this phase are socialization to the government, assessing possible NGO partner, site selection, proposal development, and signing project contract. The roles of each party are as follows (Inoue, 2009, pp. 4-6):

WFP:

- Preparation of materials on climate change, carbon credit, technical biological growing methodology of cashew nut trees and jatrophas in consultation with CFC, YBS and researchers to be used for socialization in the village
- Selecting an NGO with capacity on community development and agriculture
- Monitoring of socialization and focus group discussions conducted by NGO and the local government
- Inform all stakeholders of the government at all levels (central, provincial, district, sub-district and village) about the activity
- Verifying site selection in collaboration with NGO, local government and CFC

The local government:

- Supervising socialization held by NGO
- Make sure the full understanding of each villagers about climate change, carbon credit, technical biological growing methodology of cashew trees and jatrophas with NGO

- Verifying site selection

YBS:

- Conducting socialization to the villagers and focus group discussion
- Establising farmer group
- Make sure the full understanding of each villagers about climate change, carbon credit, technical biological growing methodology of cashew trees and jatrophas with NGO

CFC Japan:

- Providing fund for the project
- Verifying site selection of the project

## Implementation

In the first year, food for work was applied for three months in order to farmers to clean the farming plots, build terraces, dig planting holes, prepare organic fertilisers. In the planting season, farmers grow food crops and plant the trees on prepared plots. Farmers have obligation to protect the trees especially cashew nuts and jatropha for 20 years.

YBS in collaboration with project committee is responsible to assist farmers in land preparation, construct terracing, seed and seedling of cashew nut selection, to distribute seeds and seedling, to deliver food incentive to beneficiaries and to make report. WFP is in charge of providing food requirement based on report from YBS and updated work progress in the village. In this period, WFP conducts monitoring to make sure that the participants receive the seedlings and food entitlement. Local government especially from agriculture department is supervising seedling selection.

## Monitoring

CFC, WFP, YBS and the local government conduct joint monitoring in the $2^{nd}$, $3^{rd}$, $4^{th}$, $5^{th}$, $10^{th}$, $15^{th}$ and 20 year. The main purpose of this long time regular monitoring is to ensure the survival rate of cashew nut trees above 70 %.

# 3. Performance and Impact

An impact assessment has been conducted to measure performance rate of the project. Implementing and analysing this assessment refer to objective hierarchy namely goal, purpose and output (Krimmel, et al., 1990). This research limits its focus to purpose and outputs adapted from Inoue (2009). Analysis covers also status of soil and water conservation measures applied in the project.

The results based on farmers' perception and field observations are presented in various formats such as tables and figures. Analysis of fact findings will be explained on next chapter (chapter 4).

## 3.1. Purpose

Inoue (2009) notes that the purposes of the project are: to improve community's food security and to strengthen community's capacity on soil and water conservation measures. Those two points are discussed in the following sections.

### Food security

The following description is a comparison of food and cash crops harvested from the project in the period of 2009 and 2011. There is no baseline data on the harvest in 2009, however, farmers were asked their perception on whether food and cash crops harvest increase or not. Since the project started in 2009, the analysis considers 2009 as the first harvesting year while 2010 and 2011 are second and third harvesting year respectively.

100 % farmers indicated an increasing food production in the first year because they get extra farm plots from the project. On these new plots farmers applied intercrops by planting various types of food crops such as maize, cassava, peanuts and green bean. In contrast to the first year harvest, about 80 % farmers'food crop production decrease, approximately 13 % and 3 % farmers have no difference of production and increasing production respectively from the project in the harvest year of 2011 (see figure 3.1 below).

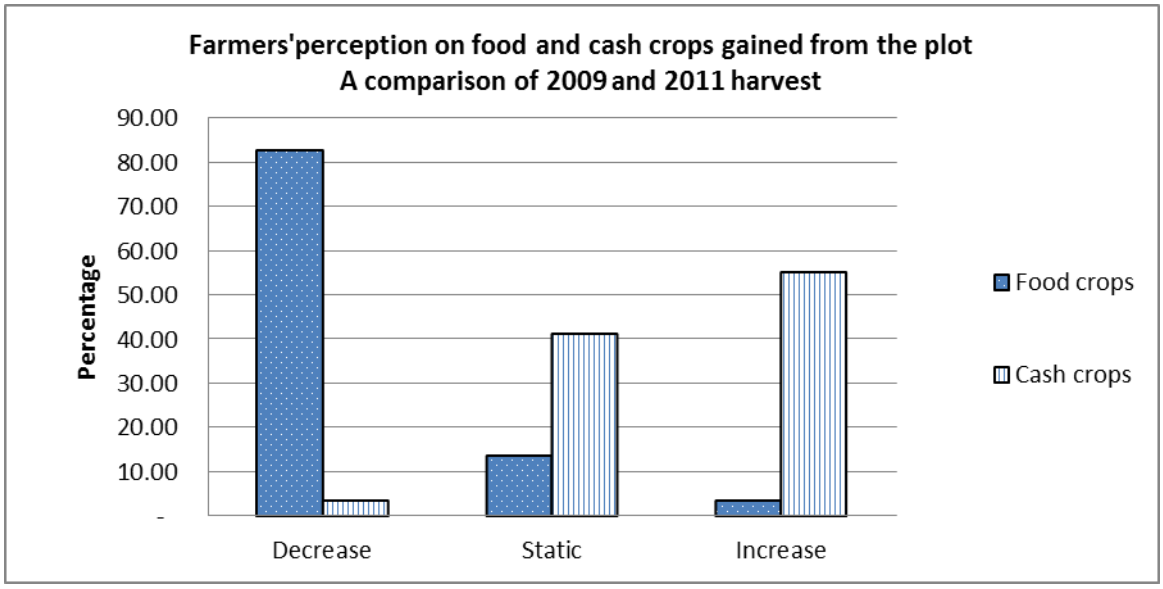


Figure 3-1 Farmers' perception on food and cash crops generated from the project

(A comparison of harvest in 2009 and 2011)
Source: Compile from project performance interview

Obviously, farmers mentioned two main reasons of crops' growing and harvest failures. First, there was extreme rainfall intensity during planting season period of 2010 and 2011. Climatology station of Kupang recorded that rainfall in West Timor reached more than 200 millilitres per day during monsoon (January to March), considered significantly high rainfall intensity, due to la Nina (VAM-WFP, 2011). Over-rain leads to waterlogging worsening crops 'roots and in turn crops fail to grow. Second, farmers were not sure about the plots' fertility. This uncertainty leads farmers to leave the plot fallowed. Fallowing is leaving the plot without seasonal crops such as maize, peanuts and green bean to maintain soil fertility. This practice is common for the application of slash and burning system of farming in semi-arid area. In the meantime, farmers grow food crops especially maize on other inherited farm plots where less or even no introduced soil and water conservation measures are applied.

In terms of cash, about 90 % farmers grew cash crops such as peanuts, green bean, papaya, cassava, and cashew nut in the first year. They performed homogenously in selecting and planting cash crops because of project requirement. From figure 3.1, we can see that 55 % farmers generated more cash by selling papaya and cassava and small amount of peanuts and green been to markets. A market with good price for selling the crops especially cassava and papaya is in Atambua, about 60 km from the village, however, not all farmers have willingness to go that far. This is the reason for about 41 % farmers not selling their crops to the market. Some households did not plant seasonal cash crops such as peanuts and green bean in 2010 onwards when less assistance from YBS staffs. But farmers still can harvest from cassava and papaya, planted once in the first year.

Currently, some farmers get involved in traditional manganese mining, a new possibility for cash income, since the area contains rich of this material and buyers are available in the village as well. However, this new opportunity can be an alarm of land destruction.

Based on previous explanation, it is obvious that food crops harvested from the project decrease currently but farmers still have access to food by selling cash crops, planted in the project, to the market. It means the main purpose of the project to improve communities' food security to some extend is achieved.

### Capacity building

The project realized the importance of capacity building by means of training in order to raise farmers' awareness and to improve their sklill on cultivating farm plots. As a complementary to this training, YBS staffs also provided training for CPC members.

About 93 % households received more than two kinds of training facilitated by YBS (see figure 3.2). The first topic is on soil and water conservation techniques which are technically sound and locally appropriate such terracing and crop planting pattern. The second concern of training is related to cashew nut tree plantation (how to prepare good seeds, to make seedling, to prepare planting hole and organic fertilizer and to water the trees using simple low tech drip irrigation during peak of dry season of the first year). Apparently, there was no training provided by the district government and its extension services. Adoption and adaptation of new farming techniques will be explained on the paragraph of "status of soil and water conservation measures".

Administrative skill training for CPC members, elected based on geographically people distribution and customary practice, was facilitated by YBS staff. The aim of this training was to ensure that all CPC members can fill in documents required by the project. The documents basically were related to regular project reports either weekly or monthly such as work plan,

project achievement, food distribution, and number of beneficiaries. CPC leader stated that by attending administrative skill training CPC members were aware that they are the manager on ground level of the activities instead of workers only.

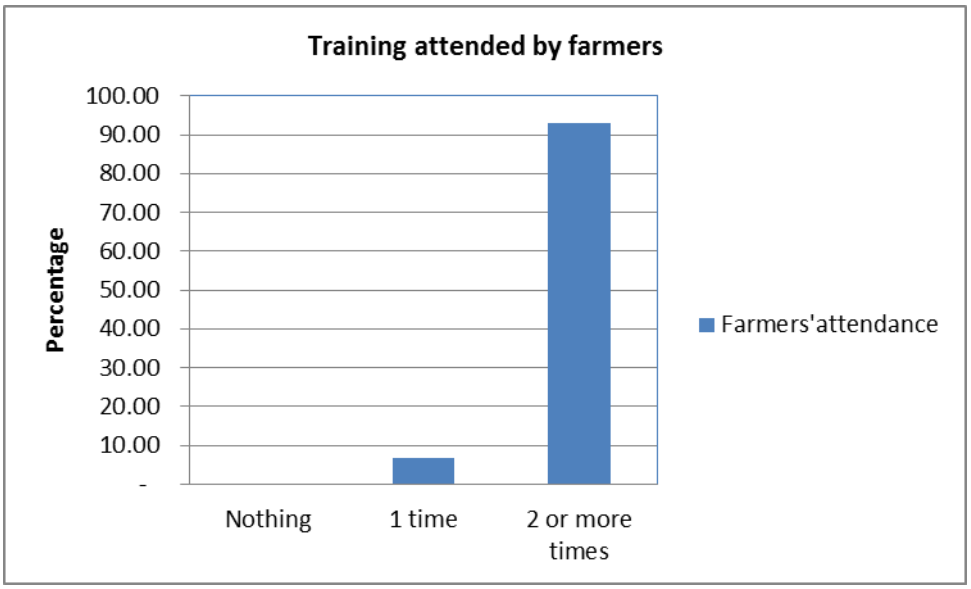


Figure 3-2 Farmers' participation on the given trainings

Source: Compile from project performance interview

Farmers mainly attended the trainings because of food incentives were provided and intensive assistance from NGO staff was still offered. Impacts of the trainings mentioned above will be discussed in paragraph 3.2 (application of introduced measures) and paragraph 3.3 (status of introduced measures and adoption).

## 3.2. Output

As mentioned in paragraph 2.4, there are four chosen outputs on this analysis. Indicators and achievements of the outputs are illustrated in table 3.1 below.

Table 3.1 Outputs indicators and achievements

| | | |
|---|---|---|
| Farmland area | • Each farm household has 0.32 ha of farming plot and ownership is legalised by the government with certificate<br>• Farmer applies SWCM (terraces, intercropping, mulching, drip irrigation) instead of fire-based farming | • < 0.32 ha without certificate: **7%**; ≥ 0.32 ha without certificate: **86%**; ≥ 0.32 ha with certificate: **7%**<br>• apply but no regular maintenance except weeding: **69%**; apply with good maintenance: **31%** |
| Cashew nut trees | • 70% of 64 trees on 0.32 farm plot survive<br>• Farmer has willingness to replant the trees which are not survival<br>• Farmer applied simple drip irrigation during peak of dry season | • <50%: **3%**; 50%-69%: **28%**; ≥70%: **69%**<br>• no: **7%**; yes but not all: **79%**; totally yes: **14%**<br>• no: **0%**; yes but not all: **3%**; totally |

| | | |
|---|---|---|
| | for the 1st year old of the trees | yes: **97%** |
| Jatropha trees | • Jatropha trees planted along the plot's border with interval 1 m are survive<br>• Jatropha fruits are sold and used as the HH kerosene | • available but interval > 1m: **100%**<br>• No: **100%** |
| Legume trees | • Legume trees planted along the terrace lines are survive<br>• Legume leaves are used as the organic fertilizer and animal fodder | • No: **93%**; yes but not all: **7%**<br>• No: **86%**; yes but poor management: **14%** |

Source: Compile from project performance interview

### Farmland area

As stated in the proposal, each farmer is entiteled to farm plot of 0,32 ha. The ownership of the plot is legalised by the government. Based on table 3.1, result shows that only seven % farmers have the farm plot more than or equal to 0.32 ha with certificate issued by the government. There are 86 % farmers having the plot equal to and more than 0.32 ha without certificate. And 7 % farmers have the plots less than the project requirement (between 0.16 – 0.25 ha/farmer) and the mentioned plots are not legalised by the government yet (certificate). All farmers submitted requests for certificate to the district government but no approval currently without any reason. However, farmers mentioned that the ownership is secure since traditional leaders granted the area for the project. Decision to have plot size is influenced by labour availability within family. 7 % farmers with the plot less than project requirement have only one family member who can dedicate fully his/her time on agriculture.

In the first year when the farmers were fully assisted by NGO staffs and provided food incentive, they applied all soil and water conservation measures. At the time of field research, maintenance of the measures varies for each farmer. It was found that 69 % farmers still have all introduced measures but no regular maintenance except weeding while 31% farmers maintain their plot in good management. Explanation on status of each measure will be on paragraph 3.3.

To sum up, most of the participants have the plot size equal or more than 0.32 ha according to the project requirement while few farmers have less than 0.32 ha. Those plots mainly are not legalised yet the ownership by the government, however, farmers mentioned that land tenure is secure. Application of soil and water conservation measures during availability of food incentive was good but the current maintenance is varied in the absence of food incentive.

### Cashew nut trees

Cashew nut trees are the main crop of this project. The trees are counted by CFC in order to issue a carbon credit which is the core of this project. The analysis of the tree covers survival, willingness to replant and application of drip irrigation in the peak of dry season of the first planting year. The results are shown in table 3.1.

The table indicates that 69 % farmers meet the project requirements by having number of survival trees more than 70 %. About 31 % farmers has the trees less than 70 % due to over rain. These numbers are representing the number of trees only without considering minimum trees per plot area (64 trees/0, 32 ha or 200 trees/ha). If the standard planting distance is taken into account then only 24 % of farmers fulfill requirement (planting density is 7 meters). 41 % farmers planted trees with a planting density of 6 meters while 35 % with 5 meters.

Differences of planting distance are influenced by several considerations. Farmers want to ensure that the more planted trees the more survival trees. Another reason is farmers had extra seeds and seedlings, their self-contribution.

Replanting cashew nut trees in the second and third year is part of the farmers' obligation. In case that some trees are not survived, farmers have to replant with the new seeds or seedlings. However, only 14 % farmers want to replant the trees with their own contribution while 79 % farmers said that they only plant new trees as the exchange of unsurvival trees if seeds and seedlings are provided. 7 % farmers mentioned that the soil types in their plots are not suitable for cashew nut. This makes them hesitate to plant new trees on the plot. One hesitated farmer showed me a cashew nut tree planted by the end of 1990s outside project area. He explained that the tree's age is more than 10 years already but no fruits at all. They suggested magohani trees to be planted in the site where cahsew nut trees can not grow well. In figure 3.3, it is obvious that some trees grow very good while some become stunted. But it is not the case for magohani trees, planted by the farmers on their own initiative. They grow well in every type of soil on the project area.

Good cashew nut tree | Stunted cashew nut tree | Mahogany tree

**Figure 3-3 Cashew nut and mahogany trees**

To conclude this part, minimum survival rate of cashew nut trees is in an advance stage of failure (minimum survival rate is 70 % while the current achievement is 69 %). This condition is worsen by unwillingness of most of the farmers to replant died trees by their own contribution. However, this conclusion does not represent the whole picture of the project because the study involves 29 respondents only.

## Jatropha trees

All farmers do have jatropha trees along their farm plots border but the planting density is not 1 meter as stated in the project proposal (see table 3.1). The interval between trees is about 2 – 5 meter. Farmers said that they keep this distance for at least two reasons: First, trees can have more branches and in turn produce more fruits. Second, farmers established wooden fence mixed with leguminous trees to protect the whole project area from animal intrusion. They do not need jatropha fence in every single plot. Function of jatropha trees then is to indicate the border of each plot.

This means jatropha plantation requirement is not accomplished by farmers because of their own reasonable considerations.

### Leguminous trees

Leguminous trees planted in the project include Gliricidia (*Gliricidia maculate),* Leucaena (*Leucaena leucocephala) and* hummingbird tree *(Sesbania grandiflora*). These trees are supposed to be planted along the terrace line since they can improve soil fertility and provide fodder. However, almost all farmers (about 93 %) did not do this(see table 3.1). The trees can only be found along the plot borders and some are scattered irregularly within the plots. Farmers explained that leguminous seeds, part of farmers' contribution, were limited.

## 3.3. Status of soil and water conservation measures

Soil and water conservation measure techniques are comprised obviously of terraces, plantation, simple low tech drip irrigation and mulching. Status and maintenance of each technique will be elaborated in the following paragraphs.

### Terrace

Terracing technique is not new to the farmers. Terracing is known as bata in the Uab Meto language , which is the language spoken in the study area. It has been rarely and disorderly applied for generations using stone and wood block but without contour demarcation. In this project, farmers build broad-base terrace either using stone or earthen structure to conserve soil and water. Broad-base terraces were built on contour lines indicated by farmers and NGO staff using 'A' frame. All farmers still have technically good broad-base terraces. Terraces' structures built using stones are still in good shape while few of earthen broad-base terraces are mostly covered by sediments (see figure 3.4).

Stone broad-base terrace

Earthen broad-base terrace

Figure 3-4 Terraces' status

There was no leguminous trees planted along the terrace line in order to maintain structure's sustainability. The reason as previously mentioned is that the farmers had limited leguminous seeds. This condition indicates vulnerability of terraces' structure in the long run. Since the number of leguminous trees planted in the project is limited, only few farmers (about 14 %) used them for organic fertilser and fodder.

Farmers applied organic fertiliser during replanting cashew nut but it was not the case for food crops. Small amount of farmers utilised the tree leaves for animal fooder. The others still rely on

free grazing area, close to the project, to feed their livestock especially indigenous Bali cattle. This feeding practice makes the crops planted in the project vulnerable. Servinus Naikofi, committee leader of the project mentioned that there were few cases where cattle, under no watch of herdsmen, invaded the project and destroyed crops. However, a set of rules to protect the project was drawn up by a committee comprising members from the village community and farmers group leader. One of the rule is fine cattle owners whose cattle intrude the project site.

In order to assess the status of adopting terraces on farming practices, eight steps of acceptance phases by Graaff and Kessler (2010) are used.

**Step 1: Are errosion symptoms recognise?**
Genuinely farmers do not see errosion symptoms. Farmers do not blame erosion as an influencing factor on the recurrent crop failure. Farmers often attribute crop failure to either erratic or too much rainfall.

**Step 2: Are erosion effects recognized?**
They see their land not productive as a given fact instead of a continuous process of erosion. To cope with this unproductive land for planting food crops every year, farmers have a coping mechanism, fallowing. Fallowing has been practiced for generations. Farmers only noticed the erosion problem when attending training on soil and water conservation techniques which was facilitated by YBS staff (outsiders).

**Step 3: Is erosion taken seriously?**
Since erosion as a topic was introduced by YBS staff during the trainings, farmers still do not consider it as the main problem on their plots. Thinking about downstream effect of their adverse practice upstream is not taken into account seriously. They constructed terraces when intensive assistance was available.

**Step 4: Is the farmer aware of adequate measures?**
Farmers noticed the benefit of terraces. Crops such as peanuts, green bean, cassava and maize planted close to the terraces are more productive than when they are planted far from the terrace line. But farmers still leave the plots fallow because not the whole area is fertile currently due to terraces.

**Step 5: Is a farmer able to undertake measures?**
Working on terracing requires farmers to invest a high labor input. To build new terraces on other plots farmers have to employ additional labour.

Table 3.2 Labor availability

| | Nothing | 1-2 people | ≥ 3 people |
|---|---|---|---|
| Labor availability within household | - | 72 % | 28 % |
| | Nothing | Available but expensive | Plenty |
| Access to additional labor | - | 45 % | 55 % |

Source: Compile from socio-economic interview

Table 3.2 illustrates that 72 % of farmers have 1 to 2 available labor from within the family while the rest consist of 3 or more people. Construction of terraces needs more workers. This gap was not the problem during building terraces in the project because farmers can rely on other farmers

in their group. Currently farmers group is still available but farmers have to pay for group members work days. It was found that 45 % of farmers cannot afford the price to hire extra labor either from farmers group or from other sources. 55 % of farmers said that they still maintain the group practices like working together for soil tillage, weeding and harvesting but not for constructing new terraces in other plots.

**Step 6: Is a farmer willing to undertake measures?**
In the first year, farmers' willingness to build terraces were driven by food incentive and technical assistance from YBS. Since no farmer want to build new terraces, it means farmers do not want to invest more on agriculture. If we ask their future expectation about their successor, about 93 % prefer their children to go outside the village and work in other sectors. They believe that off-farm sector will easily gain economic benefit rather than agriculture. Farmers compare agricultural production and traditionally manganese mining practiced in the village. From agriculture, farmers only harvest few times in a year and they have to go to market to sale the product. But from traditional manganese mining, the buyers are available in the village with good price.

The previous barriers and constraints clearly explain farmers' readiness to undertake measures **(step 7)** and acceptance of measures **(step 8)** is still far from expected. There is no adoption of these techniques to other plots outside the project until the district government launched a Food for Work program in 2011 through *Gerakan Cinta Petani (Loving Farmers Movement)*.

The absence of adoption by farmers' own initiative and lack of regular maintenance of terraces are obviously stated in step 1 and step 2. Farmers' awareness on soil erosion symptoms and effects is lacking.

## Plantation

Main intention of plantation is applying intercropping. Traditionally farmers mix various types of food crops (maize, pigeon pea, pumpkin and cowpea) in one planting hole. Perennial crops are planted along the plot border to avoid shading food crops. The project introduced new one which is combining food crops and cash crops such as cashew nut, papaya, banana, and pineaples and so on. Standardised plantation is shown in figure 3.5.

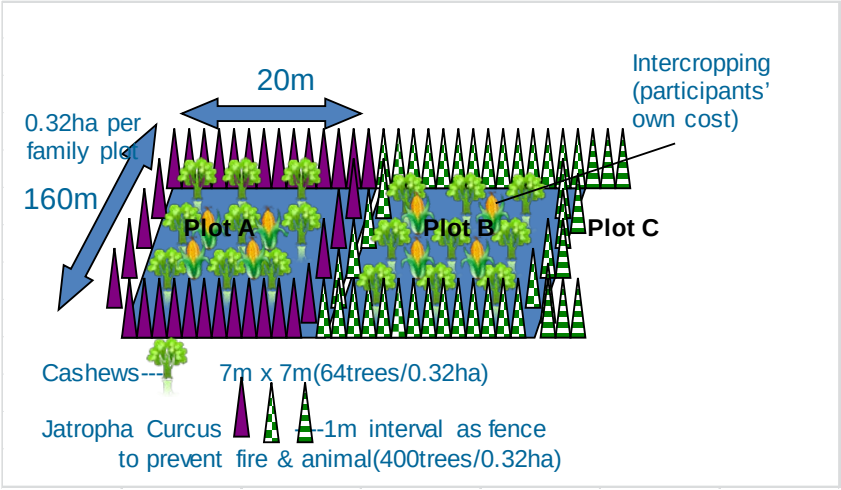


Figure 3-5 Standardized planting pattern Source: (Inoue, 2009)

In the first year, 100 % of farmers prepared planting holes for cashew nut by filling them with organic fertilisers made of leguminous leaves and dung. The preparation also ensured the standardised distance between trees which is 7 meters. However, as explained in the previous part only 24 % of farmers keep this standard planting density while remaining farmers planted the cashew nut at interval of 5 and 6 meters.

Plot borders also have jatropha trees but the interval of each jatropha is more than 1 meter because they have different perception about the function of jatropha. As previously mentioned, the intention to plant jatropha is to indicate plot border only instead of to prevent fire and animal intrusion and to produce substitute kerosene. Currently farmers do not gain any benefit from jatropha trees. Only few trees produced fruits. The idea of using fruits as fuel for jatropha cooking stove, provided by the project, is still far from implementation. The absence and lack of clarity of the market for jatropha make farmers not motivated to plant the trees.

In addition to cashew nut and jatropha, farmers plant some cash crops and food crops. Cassava and papaya, planted in the first year, are harvested since 2010 until now for household (HH) consumption, animal fodder and sale. 93 % of farmers also plant peanuts every year. About 7 % of farmers do not grow maize (main staple food) every year on the plot because of soil fertility consideration. Farmers do not see the benefit of terraces to increase the whole plots' soil fertility for planting maize.

Having those crops both as food and cash crops influenced farmers to maintain the farm clean from weed and free from fire, however, it was found that two interviewed farmers left their plots covered by wild grass. These two farmers were still busy to work on other plots for next planting season.

The aim of applying intercropping is achieved by farmers. Some farmers generate additional income by selling cash crops. A combination of perennial crops and food crops influenced farmers to clean the plot every year.

### Drip irrigation

Another introduced technique is drip irrigation. In this project all farmers used bamboo for watering the plants (cashew nut trees). This technique helped farmers to save their time and water use because they put water once in a week. Almost all farmers (97 %, see table 3.1) applied simple low tech drip irrigation in the peak dry season of first year planting (2009). Having this watering technique in the project location made 100 % survival rate for trees in the second year (2010). Only 3 % of farmers did not treat all young trees with this technology. They did it because the untreated trees grow well; already have several branches indicating that survival was high.

This practice was applied in the first year only. Jack Berelaka, head of YBS, explained that simple low tech drip irrigation is crucial for cashew nut on the age of less than one year old in the peak dry season. After one year cashew nut can survive without regular watering, however, farmers keep using this simple technology during dry season to make sure the trees grow well. It was found that no farmer adopted this technology currently even though some trees' ages were less than one year. They all (97% farmers) only did this when food assistance was still exist.

### Mulching

Participants were aware of the importance of mulching which are to keep the soil moisture around the crops and to increase soil fertility but currently they did not apply it. They did it once

on the cashew nut trees in the first year of planting when NGO staff were still conducting day-to-day monitoring and food incentive was provided.

Materials for mulching are wild grass, small amount of leguminous leaves and harvest residual. Farmers hesitate to spread the wild grass during dry season because they are afraid of wild fire which can be harmful to trees and food crops on the plots. In order to prevent unintentionally wild fire, farmers usually localize the grass and burn it. This indicates that no application of mulching on the plots. They apply the same pattern to harvest residual. Farmers cannot rely on leguminous leaves for mulching because the trees are limited.

## 3.4. Summary

Based on previous explanation we can make some conclusions on the performance of the project for further discussion on part of critical point of view and lessons learned.

- The project contributes to improving community's **food security** by the application of intercropping. The fact that food crops harvested from the project decreased currently but farmers still have access to food by selling cash crops, planted in the project, to the market.
- Food for work project implemented in a short period has established some soil and water conservation measures on the project. However, it was found that not all measures required by the project are fulfilled by farmers. Farmers attended the training because they were interested in **food incentive** not the importance of the message delivered from the trainings. This is proven from the absence of adoption and adaptation of the measures introduced in the trainings but in some cases farmers are aware of the importance of the introduced measures.
- Due to **secure land tenure and acknowledgement of local knowledge and technologies**, farmers keep maintaining the existing cash crops such as cashew nut and some seasonal crops (peanuts, papaya, and green bean) and they also keep their plot free from weeds.
- Awareness of farmers to some extent does not mean farmers have willingness to adopt the measures by their own motivation. They execute the same measures on other plot outside of the project when the district government launched another food for work program in the area. It means **adoption** still depend on direct incentives.

# 4. Critical insight and lessons learned

## 4.1. To what extent does the project improve food security?

Farmers in the area are practiced subsistence farming, i.e. they totally depend on food crops harvested from their rain-fed plots for home consumption. This dependency in combination with poor agriculture practices make farmers vulnerable to food insecurity when food crops fail to grow. Application of intercropping (food crops and cash crops) on the project at least contributes to availability of food resource of family. Is this condition considered as an improvement of household food security? Answering this question will be based on three main food security pillars: availability, accessibility and utilization (WHO, n.d.).

Amartya Sen emphasizes food security as the "individual's capacity to maintain access to sufficient food to maintain good nutrition, and thereby good health" (Barrett, et al., 2002, p. 2). In line with Sen, WFP and FAO define food security as a condition which "exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (WFP & FAO, 2009, p. 8). As mentioned in the previous chapter, most of the farmers failed to grow seasonal food crops on the project due to climatic condition; however, in the short term they still can generate income by selling cash crops such as cassava, peanuts and papaya. The cash gained by farmers is then converted to household needs such as food. This is obvious that in the circumstance of lack of food crop production, in the short term and from an economic perspective, farmers still have access to exchange their cash crops for staple food especially rice from the market. Intercropping innovation counters the current believe in the region that harvest failures, lead to food insecurity, are influenced by ecological argumentation such as given poor soil nutrient on the farming plots and erratic rainfall in this semi-arid area. This innovation supports food availability and accessibility, two pillars of food security (WHO, n.d.), of the farmers. The question will be on the willingness of farmers to preserve this practice since the assessment was conducted when the project lasted just three (3) years.

Food availability and accessibility alone cannot guarantee food security. In reference to Sen's and WFP & FAO paradigm, the ultimate necessity of sufficient food is to have good health. This means utilization of diversified food is crucial. Utilization means families prepare properly the food they access to meet nutritional needs of family members (Barrett, 2010). This issue was not addressed in the study but in order to measure family's food security, utilization need to be taken into account. To come to the answer of project contribution to food security, further research on food utilization which has impact on family's nutritional status is desirable.

Recently, issue of food security has been shifted to food sovereignty, "...the right of each nation or region to maintain and develop their capacity to produce basic food crops with the corresponding productive and cultural diversity" (Altieri, 2009, p. 104). This shift is central because the government at the national level creates the idea of using rice as the main staple food while in this region farmers basically cultivate maize and cassava for carbohydrate sources (Lassa, 2009). In terms of food production in the region, maize and cassava are higher than rice however, farmers prefer to spend most of carbohydrate need on rice (Muslimatun & Fanggidae, 2009). Furthermore, Muslimatun & Fanggidae (2009) explain that the preference for rice is mainly due to prestige. This way of thinking leads farmers in the study area selling cassava to the market then buying rice for their daily dietary needs. This is clear that effort on improving family's food security cannot rely on a single measure but it requires an interdisciplinary approach. Blaming the project to increase family's ability on food security is a fallacy.

## 4.2. Incentives

The project was started with heavily incentive-based approach. Incentives are used to encourage farmers to implement the new techniques of soil and water conservation measures. Central to the application of incentives is to enhance the improvement of land productivity through implementation of new soil and water conservation measures.

It is obvious that the project relied on both direct and indirect incentives. Direct incentives to the project are food aid through food for work, provision of cashew nut seedlings and jatropha seeds, and allocation of farming plot to each farmer. Indirect incentives are secure land tenure, technical assistance from YBS staffs, regular monitoring from YBS, WFP, CFC and the government, and trainings. Provision of incentives mobilized farmers to work massively on establishing new techniques of farming on the project. Introduction of the new techniques was delivered by YBS staff to farmers by means of trainings and practice on the field. Core questions for discussion: are incentives, either direct or indirect, really needed in this project? Can incentives effectively facilitate farmers to invest on the project, to innovate and to maintain the introduced measures?

“Essentially, incentives are needed when the adoption of conservation measures are not profitable to the landusers” (Graaff & Kessler, 2010, pp. 11-4). Contrary to this statement, this project is totally dedicated to benefit farmers. Farmers get extra farming plots for free and they can consume and sell all food and cash crops available on the plots for their own purposes. Graaff and Kessler (2010) emphasize that when the problem of land degradation is on site and the application of measures are profitable to farmers directly, only extension and suitable information needed. This means direct incentives, in this context food, seedling, seeds and additional farm plots, are not required on this project. However, only relying on educational messages is over optimistic (Napier & Forster, 1982, cited by Graaff & Kessler, 2010). The project will never be executed. Then, what is the intention for direct incentives?

Farmers are not aware of erosion symptoms as previously mentioned. Direct incentives were used to shake farmers’ awareness on land degradation as well as to accelerate the implementation of new conservation techniques. Farmers have been practicing for generations poor agricultural practices such as slash and burn which triggers land degradation. Farmers are required to shift their farming practices from traditional slash and burn to new ways which are considered sustainable practices. In the long run, CFC Japan also gets benefit from the project by carbon trade. In order to compensate farmers’ effort on maintaining the trees (cashew nut and jatropha) CFC Japan provided direct incentives for farmers. Incentives exist due to mutual dependency between farmers and CFC Japan.

Thanks to incentives applied in the project because 108 ha of abandoned land have been changed to considerably productive farmland areas. The farm plots attached with conservation measures are still kept free from destructive farming practices until now in the absence of direct incentives and day to day monitoring from YBS staff. This at least counters the belief that after the withdrawal of direct incentives, the project tends to fail as the case of food for work project in Bolivia (Middleton et al., 2003, cited by Graaff & Kessler, 2010). Despite its contribution to physical measures positively, incentives also contribute to social aspects such as encouraging collective work to strengthen community ties and enhancing development of local leaders (Barrett, et al., 2002). Some farmers mentioned that they can still ask group members to work together on other plots without any payment except that lunch is provided. However, this continued collective work is taken as the accelerator of usual farming practice works instead of adopting introduced conservation measures. The project also stimulates local leaders’ development by establishing project committee. Currently only committee leader is active but his

role in the village is of high importance. Committee leader's influence makes the village elders setting the rule of protecting the project from animal intrusion and wild fire. Animal owners are fined when their animals intrude and destroy crops in the project site. The same case is applied to person who sets fire on the vegetation at the project site.

Incentives solely cannot guarantee farmers to apply the all conservation measures. Farmers have their own decision not to plant jatropha and legume trees even in the time that incentives still exist. It is hardly to find any regular maintenance of terrace structure which some are almost covered by sediment transport except weeding. This can be an alarm to agree with the statement that "the imposed models look good at first, and then fade away" (Pretty & Shah, 1997, p. 44). No evidence of adaptation on other plots exists currently until the new food for work program funded by the government came into being. This supports the finding of the case in Cusco, Perú that incentives barely have positive influence on farmers' intrinsic motivation for adoption and adaptation of the introduced measures (Vries, 2011).

## 4.3. Secure land tenure and local value

Secure land tenure is of high importance for conservation. Insecure land tenure leads to farmers' hesitation to invest on sustainable conservation measures such as tree planting and terraces (Pretty & Shah, 1997). For the context of this project, land tenure is secure even though the ownership of most of the plots is not legalized by the district government. This opportunity makes 86 % of farmers cultivating more than 0.32 ha of farming plot. Some long term investments proven in this project are maintaining cashew nut and planting other trees such as mahogany and teakwood along the border. These additional trees are by farmers own initiative planted in order to complement jatropha.

Other key factor to support the success of conservation measures is making use of local knowledge and existing local institution (Pretty & Shah, 1997; Demeke, 2003). Ignorance of knowledge practiced for generation to some extent can increase soil erosion, so there is a need to combine local and introduced conservation measures as the case in Ethiopia (Demeke, 2003). This project takes into account local knowledge such as intercropping and *bata* (terracing in Uab Meto local language). Intercropping application offers short-term on site benefit such as harvesting seasonal food and cash crops. This condition can make farmers aware that the conservation measures are profitable. However, this short-term benefit and adoption of local technology are not enough to stimulate farmers applying the same measures on other plots.

Where local value contributes to the success of the project can be seen in Australia. Community groups can manage to handle environmental problem because the groups are linked to the existing institution (Pretty & Shah, 1997). At the initial stage of this project, farmer groups were formed based on geographical inhabitant distribution which represents sub village government boundary. The advantage of this pattern is that project committee can easily manage the group and works. Some working groups still exist until now. Delivering responsibility to local people in the form of project committee helps in monitoring the project closely and sustainably without too much dependency on external parties. Involvement of the village and sub district government in regular monitoring enhances more parties' participation to maintain the project for long.

## 4.4. Adoption

The absence of adoption of introduced conservation measures on other plots is clearly defined previously due to ignorance of erosion symptom and effects. At the first stage, farmers are required to recognize the symptom and effect before introduction of new farming measures of

tackling land degradation (Ellis-Jones & Mason, 1999 cited by Kessler, 2006). In order to raise awareness on land degradation, it needs more emphasis on educational programmes in the forms of training, public campaign, media. The trainings provided by YBS staff have shaken farmers' awareness on erosion problem and the importance of measures to minimize land degradation process. To achieve acceptance phase of adoption process (Graff, et al., 2008), one or two trainings alone as performed by the project is not enough. It requires a comprehensive and continuous process with various forms of educational programmes.

However, Kessler (2006) argues that farmers' awareness on land degradation problem and its alternative solutions cannot guarantee that adoption will take place. There are various factors influencing farmers to adopt the introduced measures. In addition to effort of delivering educational messages to shake farmers 'awareness, it needs to consider other influencing factors to be integrated in soil conservation plan and execution since the problem of land degradation is a complex interaction process. Those factors can be socio-economic factors (Tenge, et al., 2004; Kessler, 2006). In a broader context, Lal (2001) and Bewket (2007) suggest that soil conservation measures not only refer to socio-economic aspects but also personal, institutional, physical, political, technological aspects. In reference to political aspect, Gisladottir and Stocking (2005) argue that there is a need to synergize soil and water conservation measures with appropriate policy. These factors are not addressed in this study; however, further research is needed. Adoption is important because the introduced measures can improve farmers' livelihood (Demeke, 2003) and in fact execution of conservation measures is disappointing (Kessler, 2006). However, adaptation could be the option in tackling land degradation issues since the farmers can learn from the introduced measures and then can be adjusted based on their ability and local context (Kessler, 2010).

# 5. Conclusions and Recommendations

## 5.1. Conclusions

Based on the assessment of the project performance along with critical review and lessons learned, some conclusions are formulated.

- In the short-term the project contributes partially to the improvement of food security in the forms of food availability and accessibility while food utilization and sovereignty are not addressed by this project.
- Capacity building specified as the educational programme has shaken farmers 'awareness on land degradation and its possible solutions. However, this project at the initial stage of implementation provided few times of trainings which are considered not enough to boost adoption rate especially on other plots.
- Size of farming plots is varied each farmer. This difference is not influenced by the limited of plots but farmers 'personal reason such as labour availability and time dedicated to manage the plots. Most of the plots are not legalized the ownership by the government, however, land tenure is secure because local leaders (not government official) agreed to allocate the plots to farmers who are willing to cultivate. This secure land tenure makes farmers want to invest in sustainable conservation measures such as terracing and planting crops and trees.
- In fact, some adverse alarm can be recognised. There is no regular maintenance on terraces to minimise sediment cover in the long run. Minimum survival rate of cashew nut trees is in an advance stage of failure (minimum survival rate is 70 % while the current achievement is 69 %). This condition is worsen by unwillingness of most of the farmers to replant died trees by their own contribution. However, this conclusion does not represent the whole picture of the project because the study involves small numbers of farmers only. Jatropha plantation requirement is not fulfilled by farmers since the market for this tree is vague. Leguminous trees which can be used to strengthen terraces, increase soil fertility and provide animal fodder are not planted in a regular pattern but scattered.
- Involvement of local people in terms of project committee in managing the project helps to some degree sustainability of the project. The study found that the committee set up the rule of protecting the project from destructive action. This rule is obeyed by all people in the village and approved by the village government.
- Incentives are given due to mutual dependency between farmers and CFC Japan. On one hand, farmers get benefit from the farming plots attached with conservation measures and food incentive stimulates application of those measures. On the other hand, maintaining the cashew nut trees by farmers for the period of 20 year can be used by CFC Japan for carbon trade. However, it is proven in this project that incentives alone cannot guarantee farmers to apply all measures required by the project.
- Farmers' awareness on land degradation symptom and effects is lacking. This leads to incomplete adoption of introduced conservation measures on the project and the absence of adoption of those measures to other farming plots outside the project.

## 5.2. Recommendations

In order to scale up the benefit of project to more people in a wider geographical area, the district government who is currently running food for work program in the area needs to consider the following recommendations.

- In terms of food availability it is recommended to apply intercropping, a combination of food and cash crops, in order to enhance short-term benefits of introduced conservation measures as well as to provide access to food.

- The government, in charge of regulating cash crops transaction, is requested to make sure that price of cash crops is profitable and market is accessible. Utilization of food is crucial since the ultimate need of food is good health. In doing so, synergizing effort to increase food availability and accessibility with food utilization is called for. The integration of these whole aspects of food security will makes the project more beneficial.
- The community is encourage to freely choose their carbohydrate needs derived from their own farm production (maize and cassava) instead of primarily relying on central government induced carbohydrate source, rice which is not grown by most of the farmers in this region.
- More emphasis on educational programmes helps farmers to recognize land degradation problems and in the long run farmers have willingness to adopt the measures in tackling the problems. However, totally relying on educational messages is too optimistic and the conservation measures will never be executed. Incentives in the forms of food aid and trainings are still needed to accelerate the execution.
- Adoption is important because the introduced measures can improve farmers' livelihood and in fact execution of conservation measures is disappointing. Further research is needed on influencing adoption factors such as socio-economic, personal, institutional, physical, political, and technological aspects. Land degradation is a complex interaction problem; therefore a single approach cannot serve for all.

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# Annex 1. Performance project assessment

| Objective hierarchy | Factor | Indicator | Question | Assessment category |
|---|---|---|---|---|
| Purpose | Improving community's food security | • Farmer secures food from the project (maize, cassava, vegetables, etc) and increase every year<br>• Farmer generates cash from the project (cassava, peanuts, jatropha, etc) and increase every year | • What is the food farmer secures from the project? Does the yield increase every year starting from 2009 to 2011?<br>• What are the crops farmer sales to the market? Does the yield increase every year starting from 2009 to 2011? | 1: Nothing, 2: 1- 2 type, 3: more than 2 types<br>1: decrease or no , 2: static, 3: increase |
| | Strengthening community's capacity on soil and water conservation measures | • Farmer receive technical assistance (training, guidance in the field, etc) from NGO, the government regularly | • What type of technical assistance is provided by YBS and the government to the farmer? | 1: Nothing, 2: 1 type either from YBS or the government, 3: more than 1 type from YBS and the gov. |
| Output | Farmland area | • Each farm household has 0.32 ha of farming plot and ownership is legalised by the government with certificate<br>• Farmer applies SWCM (terraces, intercropping, mulching, drip irrigation) instead of fire-based farming | • What size of the plot is legalised its ownership by the gov.?<br>• What are SWCMs applied in the plot? | 1: < 0.32 ha without certificate, 2: 0.32 ha without certificate, 3: ≥ 0.32 ha with certificate<br>1: Nothing, 2: apply but no regular maintenance except weeding, 3: apply with good maintenance |
| | Cashew nut trees | • 70% of 64 trees on 0.32 farm plot survive<br>• Farmer has willingness to replant the trees which are not survival<br>• Farmer applied simple drip irrigation during peak of dry season for the 1st year old of the trees | • How many survival trees are on the plot?<br>• Does farmer have willingness to replant non survival trees?<br>• Did farmer apply simple drip irrigation in the 1st year of planting during peak of dry season? | 1: <50%, 2: 50%-69%, 3: ≥70%<br>1: no, 2: yes but not all, 3: totally yes<br>1: no, 2: yes but not all, 3: totally yes |
| | Jatropha trees | • Jatropha trees planted along the plot's border with interval 1 m are survive<br>• Jatropha fruits are sold and used as the HH kerosene | • Does farmer have survival jatropha along the plot's border with interval 1m?<br>• Does farmer sale and use jatropha fruits? | 1: Nothing, 2: available but interval > 1m, 3: available with interval 1m<br>1: No, 2: either sale or use, 3: both sale and use |
| | Legume trees | • Legume trees planted along the terrace lines are survive<br>• Legume leaves are used as the organic fertilizer and animal fodder | • Does plot have survival legume trees along the terrace line?<br>• Does farmer use legume leaves for organic fertilizer and animal fodder? | 1: No, 2: yes but not all, 3: totally yes<br>1: No, 2: yes but poor management, 3: yes and good management |

***NB: 1= Bad; 2: Moderate; 3: Good***