Up Scaling CSA in Farming's Systems to Mitigate Climate Change and to Improve Food Security in the Mid-West and South East of Madagascar

MANITATRA Project

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Summary

The main objective of the MANITATRA project is to support up scaling of CSA in Madagascar in order to mitigate climate change and to improve food security. It is implemented in two regions of the Country with two different challenges: *(i)* the Mid-West of the Vakinankaratra area from 800 to 1100 m above sea level, having limited paddy fields, but high potential for upland crop productions although being subject to erratic rainfall and Striga prone areas; *(ii)*the South East of Madagascar, one of the most vulnerable region to climate change (floods, erosion, but also drought from time to time) and used to be one of the most populated area of Madagascar and where population are the most vulnerable to food insecurity. In the two regions and in the Mid- West in particular, recurrent bush firings and cattle free grazing are among the sources of land degradation causing spectacular gully erosion and siltation in the lowlands. Also, uncontrolled cattle grazing are not in favor of biomass conservation and crop residues for good CA. Target beneficiaries in the Mid-West are estimated in the project document to 1000 small scale and medium farmers of which 200 are women.

By the end of the Manitatra project, beneficiaries in the Mid-West is 3355 farmers (335% of the target) of which 20% are women. Target beneficiaries in the South East are estimated to 1400 food insecure small scale farmers of which 900 are women. In the Southeast, total beneficiaries is 3138 farmers (224% of the target) of which 42% are women. The trainings on vegetable crops and on orange flesh sweet potatoes increased significantly the number of women reached by the MANITATRA project in the South East.
In the two regions confounded, total number of direct beneficiaries of the MANITATRA project is 6.493 farmers of which 30% are women. Taking in account the number of persons per family (5.6 persons per family in the Mid-West and 9.0 persons per family in the South East,), total number of project beneficiaries is about 47.030 of which 50.9% are women.

The project is adopting a holistic vision of land degradation addressing erosions and siltation in the lowlands, bush firings, sources of energy for cooking, agroforestry, forestry, livestock, and livelihood of the rural population and in particular children and gender

issues. The main project components are therefore, *(i)* up scaling CSA *(ii*) training of farmers' organizations and lead farmers, *(iii)* study on sources of incomes, sources of energy and impact on deforestation and gender issues, *(iv*)advocacy of CSA at national, regional and local levels.

The most adopted CSA systems in the Middle West based on number of adopters are *(i)* the forestation using the legume tree *Acacia mangium*, *(ii)*Conservation Agriculture using Stylosanthes based system in this Striga prone area,*(iii)*organic matter management, especially composting and *(iv)* and market gardening. In the South East, CSA systems the most adopted are those responding to food security: *(i)* the orange flesh sweet potatoes which is highly demanded for its short cycle but also for its ability to be grown anytime as long as water is available, *(ii)* basket compost for the good yield in cassava, *(iii)* forestation using *Acacia mangium* mainly for bee-keeping and *(iv)* market gardening interesting mainly for women. CA and Agroforestry are less demanded by farmers because they will not give impact in the short term.

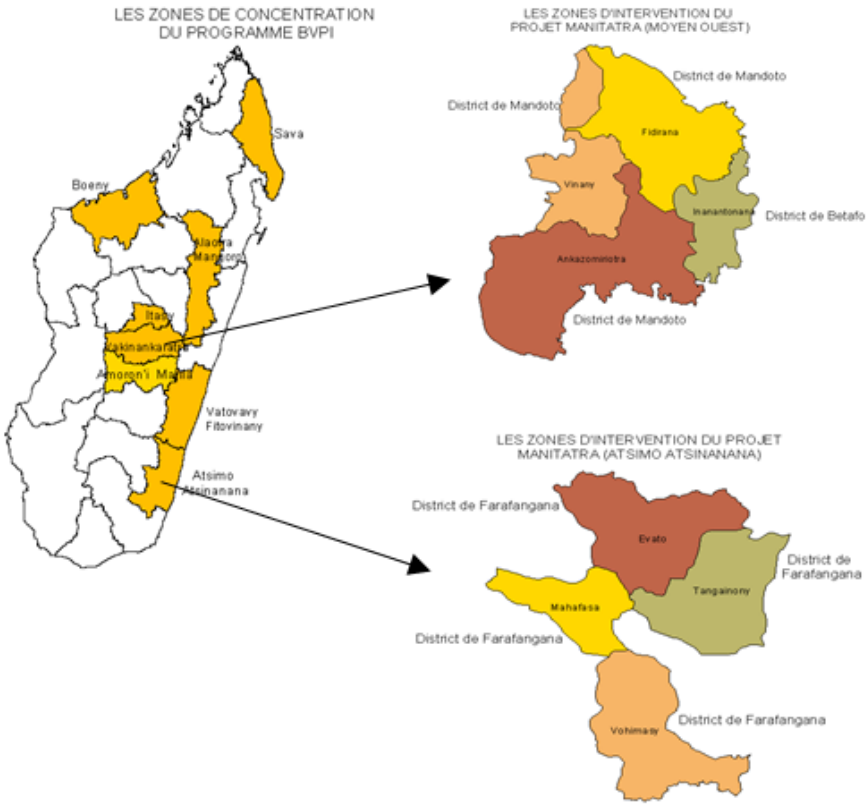
Most of project targets were achieved but the most outstanding results data concerns the achievements on some best practices like lombricompost and use of bio-pesticides added to compost which innovations were brought by the Manitatra project. Also, the high dissemination of yellow flesh sweet potatoes among women farmers in the food insecure region of the South East is worth noting as well as the use of farm manure which is a breakthrough in extension work because farm manure still remains a taboo among some tribes of this region (the Zafisoro tribes).

Introduction

The MANITATRA project is a subgrant agreement between the COMMON MARKET FOR EASTERN AND SOUTHERN AFRICA (COMESA) and GSDM, Professionnel de l'Agroécologie (GSDM) for a total amount of US $ 250,000 initially for a period of 12 months, later authorized for a no cost extension for 14 months.

The MANITATRA project was implemented in two regions of Madagascar, one in the Highlands, in 4 communes of the Mid-West of the Vakinankaratra region and the 2nd in 4 communes of the South East in the coastal areas, the Atsimo Atsinanana region. These two regions are facing climate change but present differences as described below. These two regions have been part of a watershed project known as BVPI-SEHP (Bassins Versants Périmètres Irrigués Sud Est Hauts Plateaux) which was completed in 2013 (**BVPI - SEHP, 2013)**.

Figure 1 : Sites of the MANITATRA Project in the Mid-West and the South East



The Mid West of Madagascar, between 800 and 1100 m asl, has high potential for crop production in terms of available land. However, a strong threat for *Striga asiatica* impact cereals crops in the region due to the decline of soil organic matter and as a result a decline of soil fertility, which impact the cereal crop (**MICHELLON R, HUSSON O, MOUSSA N, *et al*, 2011**). Due to recurrent bush burning and mining agriculture practices there is a lot of erosion accelerating this decline of fertility and also almost no more trees for fuel in most of households leading to high use of crop residues for fuel and for livestock. The Mid-West of Madagascar was included in a co-designing innovative cropping systems that match biophysical and socio-economic diversity (across-country research involving LAO PDR, CAMBODIA and Madagascar) where the Stylosanthes based cropping systems is the most adopted and the most performant after 4 years (**HUSSON O, QUOC. T H, BOULAKIA S, *et al* (2015**).

According to the baseline study commissioned by the project (**SD MAD, 2015),** the average family size in the Mid-West of Vakinankaratra is 5 persons per family, of which 2.8 of are working. Farm size is 4.9 ha including 3.4 ha hillsides (*tanety*) and 1.7 ha of paddy field. Irrigated rice, rained crops, poultry, pig and cattle farming are the main sources of income and food. As a matter of fact, each household enjoys an average agricultural income of US $ 2507 per year, resulting in US $ 6.87 per day per household, e.g. US $ 2.2 per active person in the family. The majority (91%) of the farmers declare that it is hard to find firewood. The first

recourses when firewood is insufficient are using grasses and crop residues. The most used crop residues are maize residues (34% of the farmers use them).

This region is affected by climate change especially in terms of rainfall pattern (short rain, intensive erosion...) (**BVPI - SEHP, 2013**). Agroforestry using fast growing legume trees like *Cajanus cajan*, *Crotalaria sp* and forestation trees using *Acacia mangium*, have been adopted by farmers but need to be up scaled. Rainfall may be erratic in this area and that is the reason why Conservation Agriculture (CA) can contribute to buffer this erratic rainfall. CA based system using *Stylosanthes guianensis* has given a good biomass to inject carbon in the soil and therefore to improve soil fertility and to mitigate the negative effect of *Striga asiatica* (**MICHELLON R, HUSSON O, MOUSSA N, *et al*, 2011**).

The South East is one of the most vulnerable region to climate change (floods, erosion, but also drought from time to time) and used to be one of the most populated area of Madagascar and where population are the most vulnerable to food insecurity (**SD MAD, 2015**). Crop production is not enough for the family all year around: the lean period may vary from 4 to 6 months. This is a high rainfall area (1500 to 2000 mm of rainfall) but due to environment degradation (bush firing, poor soil management) and the high density of population, some period of drought may occur from time to time.

According to the baseline study (**SD MAD, 2015**), the family size in the communes of the project area in the South East is large ones with an average of 9 persons per family living on 2.5 ha of land including 1 ha of paddy fields. Their major activities providing both their income and food are obtained from agriculture and livestock. Their main agriculture incomes are from rice and coffee. Each household's income is estimated at US $ 752.6/year per household, meaning 0. 35 US $ per day per active person. The energy sources for cooking are not a major problem for the time being, considering the vegetation density (woody) of the focus areas (4 communes).
The farmers in these 4 communes are regularly faced with climate disaster problems (recurrent cyclones and floods) and precarious human health conditions. Their recourse consists in selling poultry, decreasing the food intake at the same time and the number of meals/day and/or then borrowing money or food from farmers, which does not improve their situation.

The main objective of the MANITATRA project is to support the up scaling of CSA in Madagascar in order to mitigate climate change and to improve food security.

The Project development goal and Outcome is formulated as follows: CSA and CA techniques and approaches are up scaled as a sustainable way for the agriculture development, in the Mid-West and South East of Madagascar.

Five main outputs are expected from this project:

- CA and CSA up scaled by 80% in the Mid-West of Madagascar
- CA and CSA up scaled by 50% in the South East of Madagascar
- Farmers sensitized and trained in CSA and CA and small scale farmers supported for seeds

- CA and CSA is advocated for Government and stakeholders at both local and regional level
- Monitoring and Evaluation is completed.

Materials and methods

A baseline study was commissioned at the start of the MANITATRA project (**SD MAD, 2015**) and a final evaluation by IDDAC Consulting at the end of the project (**IDDAC Consulting, 2016**).

In terms of advocacy, a starting workshop attended by local authorities was organized in the two regions and one field day was organized in each of the two regions of which the one in the Mid-West was attended by HE the Minister of Agriculture and some donors (African Development Bank, French Embassy, FAO, JICA, …), delegates from COMESA and some project of the World Bank. Local and national journalists, radios and TV were invited at these field days. Two films of 26 minutes each have been produced and thematic films of 6 minutes. All the films can accessed on YouTube in particular the 26 mn one:

Film Mid West :https://www.youtube.com/watch?v=5iLFRpmvWYg

Film South East : https://www.youtube.com/watch?v=UtGB-7G1aiM

The implementation arrangements are as follows in terms of human resources and equipment in the project areas. The dissemination of the technology was using the farmer to farmer approach and based on a good training of the lead farmers who are acting as trainers of their peer farmers. The technicians are only acting as facilitators. Each zone is supervised by one MSc level staff and one technician per commune. Senior agronomists from GSDM office were backstopping the works in the two regions.

One trained lead farmers is training 5 to 10 farmers in the neighborhood of his farm e.g. 5 to 10 km around his farm. They are using bicycles for their transport. The lead farmers are selected based on the quality of their CSA systems and their ability to train other farmers. Seeds and plantlets for forestation are provided by the project. Because these lead farmers are from previous project BVPI-SEHP, they have already a good background in CSA but not in the famer to farmer approach which was an approach acquired in the South of the Country by the NGO GRET (**LHERITEAU F,RAKOTONDRAMANANA, RATRIMO A.**, **2014**).

Some specialized services were provided by professionals like the training on lombricompost (quality compost using special worms) and that of orange flesh sweetpotatoes. Basic seeds of cover crops were provided by the National Research on Development (FOFIFA) or CIRAD and Africa Rice.

Table 1 summarizes the implementation of the project in the two regions.

The following activities were undertaken during the period October 2014 to 31st of March 2016:

- Recruitment of the staff and team building
- Invitation to tender for the purchase of equipments

- Contracting with professionals for manufacturing Stylosanthes rollers (for Stylosanthes biomass control)
- Office rent in Ankazomiriotra (Middle West) and in Farafangana (South East)
- Contracting with the best lead farmers from previous project BVPI-SEHP to act as Trainers
- Contracting with the professionals in tree nursery from previous project BVPI-SEHP to provide legumes trees for forestation and agroforestry
- Sensitizing Authorities and Starting Workshops in the Middle West and the South East Region
- Purchase of cover crop seeds from local seed producers and from Research (FOFIFA) for basic seeds
- Conception and impression of training tools and materials for lead farmers
- Conception and impression of vouchers for the payment of seeds and plantlets
- Awareness rising and recruitment of new adopters by the lead farmers
- Team building and training of staff and lead farmers (Training of Trainers)
- Baseline study partly by the staff and partly by consultants
- Contracting with senior CA consultants to backstop and to implement the long term demonstration plot at Ivory (Middle West) and FFS at Iandraina (South East)
- Exchange visits in the Ivory demonstration plots and the Iandraina FFS
- Contracting with one professional for the training of lead farmers on lombricompost
- Contracting with FIFAMANOR for the training of staff and lead farmers on orange flesh sweet-potatoes in the South East
- Field Days for Authorities and donors in the Middle West and the South East Regions
- Monitoring and evaluation mission by COMESA delegation
- Financial audit by auditor commissioned by COMESA (period October to December 2014)
- Final evaluation of the project by the IDACC Consulting

Results and findings

The achievements of the project are summarized in table 2 but the main performance criteria may be the following (**IDDAC Consulting, 2016)**:

- In the Mid-West: the project reached 3355 farmers (335% of the target) of which 20% are women;
- In the South East, the project reached 3138 farmers (224% of the target) of which 42% are women
- The intervention cost per ha is **US $ 371 per ha**
- The average cost per farmer is **US $ 4.9 per farmer**

It appears from in the choice of the farmers that the farmers in the Mid – West are more interested in long terms investments like forestation and Conservation Agriculture whereas those of the South East are more interested in food security like sweetpotatoes, cassava, market gardening (fig.2).

In the South East, the main CSA systems adopted by farmers are (**RAKOTONDRAMANANA, RAHARISON T, RASOLOMANJAKA J *et al,* 2016**):

- Orange flesh Sweet potatoes: non photoperiodic sweet potatoes, early varieties, rich in beta-carotene (a precursor of A vitamin), well suited for undernourished children in the poor region: this in contrast with local varieties which can be grown only once a year;
- Basket compost for food security: this technique has been used for cassava with good results (BVPI - SEHP, , 2013).
- Forestation (*Acacia mangium*): well suited for this area, used also for bee-keeping
- Market gardening for home consumption and for the market and which interest many women.

The impact of the MANITATRA project may be difficult to measure for a project of one year but the following may be expected : At national level there is already integration of CSA in Public Policies in the following documents: Development National Plan (PND), Agriculture Policy letter (LPA), Agriculture, Livestock and Fisheries sector policy (PSAEP/CAADP), National Action Plan combating desertification and land degradation (PAN/CLD). The implementation of the MANITATRA project has been akcnowledged to be in line with public policies by HE the Minister of Agriculture during his speech at the field day in the Mid-West.

At regional level, the field days have been good awareness rising for local authorities along with local radio brodcasting and press release on the MANITATRA project. The high increase of upland rice in the Mid-West, 30% increase from 2013/2014 to 2014/2015 cropping season is also a good indicator of regional development and may be partly attributed to the MANITATRA project. Also the high involvement of women in the project, especially in the South East is part of the achievement of the project.

The forestation achieved in the Mid-West is contributing to the decrease of bush firing and therefore to the safeguard of biomass. Il will increase the availability of wood fuel in the long run. At the farm level, the project is allowing a better livelihood by providing food security in South East (cassava in basket compost, sweetpotatoes all year around) and more rice and maize in the Mid-West. Resilience of the two regions in climate change will be increased.

Discussions/interpretation and conclusions

The MANITATRA project is in line with public policies and was targeting two contrasted situation in Madagascar. In the two situations, climate change is a real concern. The achievement of the project is very high in terms of beneficiaries and in terms of farmers strategies. The efficiency of the grant is very high compared to other projects of the same type. It is important to stress that the beneficiaries of the project in the two regions are still very low and therefore most of the farmers are still under conventional tillage. Although, most of cropping systems are giving immediate results, Stylosanthes based CA system give significant impact only after 3 to 5 years. Therefore, to have an impact for CA system, there is a need of minimum support during this period of time, otherwise, farmers may go back to conventional tillage. It is highly recommended to support CSA in Madagascar to face the high soil degradation due to climate change and to the high rate of population growth (3.8%), one of the highest in Africa.

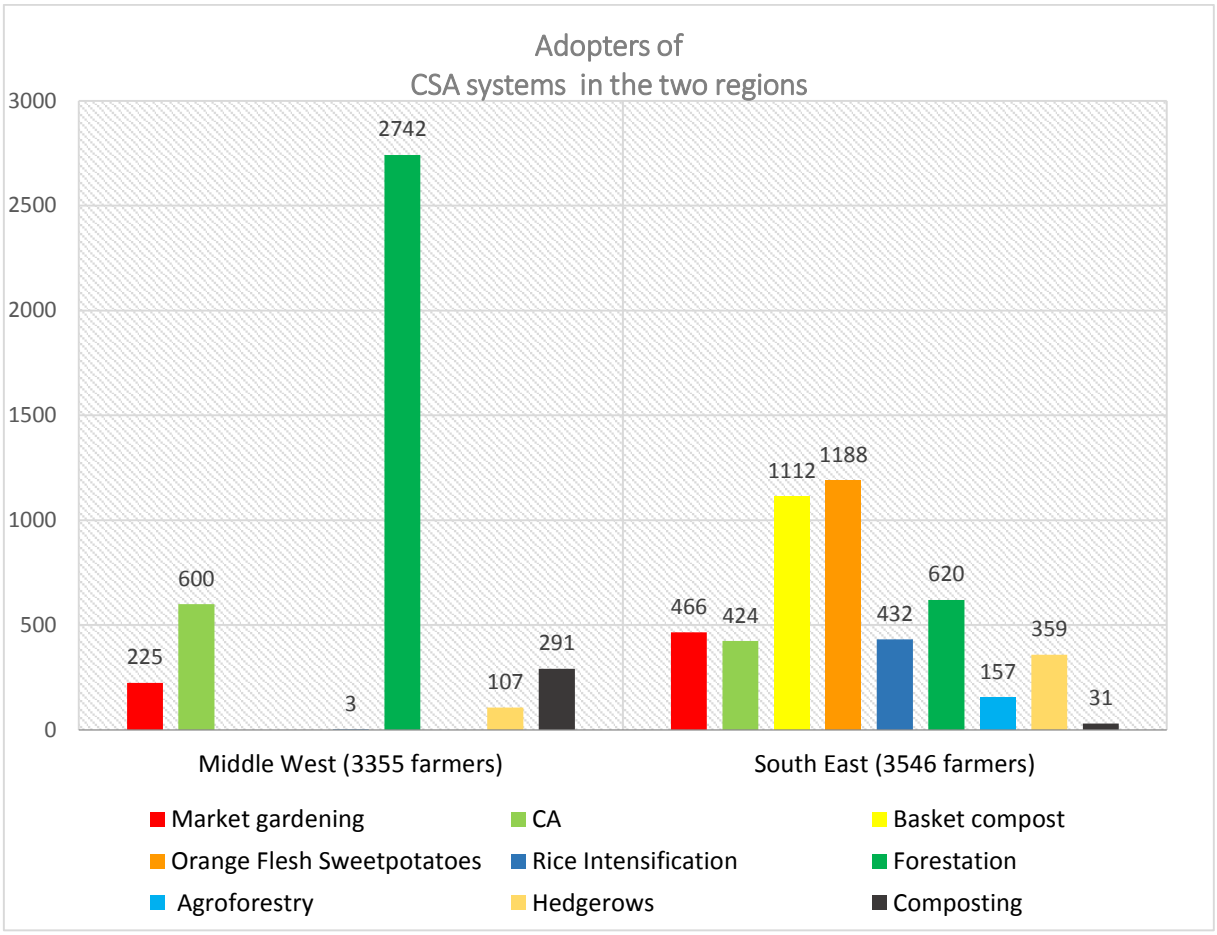
Table 1: Implementation of the MANITATRA project in the Mid West and the South East

Item	Mid West (MW)	South East (SE)	Comments
Area supervisor	1	1	Project offices in Ankazomiriotra and Farafangana
Technicians	3	2	An average of one technician per commune
Motorbikes	4	3	Area supervisors and technicians are equipped with off road motorbikes
Lead Farmers	12	10	One lead farmer trains from 5 to 10 farmers in their neighborhood of his farm (5 to 10km); MW 4 women, SE 2 women
Bicycles	12	10	Lead farmers are equipped with bicycles
Nurserymen/women	19	6	They are all nurserymen/women who have been trained by BVPI-SEHP project
Stylosanthes biomass rollers	10		Built by private firm in Antsirabe and provided to group of farmers based on payment of 25% of the cost.

Table 2 : Project activity performance

Performance Area	Monitoring areas	Targets	Achievement	Unit
Adoption of Climate Smart Agriculture (Conservation Agriculture)	**M1:**Number of farmers practicing CSA	**2400** MW: 1000 SE: 1400	**6 493** **(30% women)** MW: 3355 (20% W) SE : 3138 (42% W)	Farmers
	M2: Number of total project beneficiaries (by gender)	**14 400**	**47 030** (50,9% women)	Person
	M3: Acreage under CA	**600**	**420**	ha
	M4: Total yield (per crop cultivated)	60% increase to conventional system **MW : Rice (1.76), Maize (1.28), Groundnut (1.6) and Cassava (4.8)** **SE : Sweet potato (8) Rice (1.5)**	**MW : Rice (2.6), Maize (2.0), Groundnut (n.a) and Cassava (n.a)** **SE : Orange flesh Sweet potato (12) Rice (3.46 for SRA system and 4.06 for SRI system)**	T/ha
	M5: Number of trees planted	**900,000**	**632 245** MW: 514 968 SE 117 277	trees
	M6: Acreage under agro-forestry and hedgerows	**500**	**151**	ha

Figure 2: Adopters of CSA in the Mid-West and the South East of Madagascar, MANITATRA Project


Adopters of
CSA systems in the two regions
3000
2500
2000
1500
1000
500
0
225
600
3
2742
107
291
466
424
1112
1188
432
620
157
359
31
Middle West (3355 farmers)
South East (3546 farmers)
Market gardening
CA
Basket compost
Orange Flesh Sweetpotatoes
Rice Intensification
Forestation
Agroforestry
Hedgerows
Composting

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Also available on website:

- http://gsdm-mg.org/wp-content/files/Rapport_de_capitalisation_GSDM.pdf
- http://gsdm-mg.org/wp-content/files/Rapport_capitalisation_zone_Sud_Est_projet_BVPI_SEHP.pdf
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