AG: GCP/RAF/390/GER (KEN/URT)
Terminal Report

Conservation Agriculture for SARD and Food Security in Southern and Eastern Africa

(Kenya and Tanzania)

June 2004 to August 2006

PROJECT FINDINGS AND RECOMMENDATIONS

Nairobi, December 2006

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS ROME, 2006

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LIST OF ABBREVIATIONS

ACT	African Conservation Tillage Network
AGSF	Agricultural Management and Finance Service of FAO
AGST	Agricultural and Food Engineering Technology Service of FAO
ASDP	Agricultural Sector Development Programme
ASDS	Agricultural Sector Development Strategy
BMELV	Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz (Germany)
BMVEL	Bundesministerium für Verbraucherschutz, Ernährung und Landwirtschaft (former designation)
CA	Conservation Agriculture
CA-FFS	Conservation Agriculture Farmer Field Schools
CIRAD	Centre de Cooperation Internationale en Recherché Agronomique pour le Development
DALDO	District Agriculture and Livestock Development Officer
DAP	Draught Animal Power
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field School
GEF	Global Environment Facility
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
HQ	Headquarters
ICRAF	International Centre for Research in Agro-forestry
IFAD	International Fund for Agricultural Development
IIIWCCA	Third World Congress on Conservation Agriculture
IIRR	International Institute of Regional Reconstruction
KARI	Kenya Agricultural Research Institute
KEN	Republic of Kenya
LTU	Lead Technical Unit
MAFS	Ministry of Agriculture and Food Security (Tanzania)
MOA	Ministry of Agriculture (Kenya)
MoU	Memorandum of Understanding
NGO	Non-Governmental Organization
NPO	National Professional Officer
OiC	Officer-in-Charge
PBE	Office of Programme, Budget and Evaluation
RAF	Regional Office for Africa
RELMA	Regional Land Management Unit
RP	Regular Programme (FAO)
SARD	Sustainable Agriculture and Rural Development
SARI	Selian Agricultural Research Institute
SIDA	Swedish International Development Agency
SLM	Sustainable Land Management
SPFS	Special Programme for Food Security (of FAO)
SSA	Sub Sahara Africa
SWOT	Strengths, Weaknesses, Opportunities, Threats
TCAP	Field Programme Development Service (FAO)
TCDC	Technical Cooperation among Developing Countries
TCP	Technical Cooperation Programme (of FAO)
TF	Trust Fund
TOR	Terms of Reference
UNEDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
URT	United Republic of Tanzania

1. INTRODUCTION

1.1 Project background

Land degradation is increasingly a key factors affecting agricultural productivity in SSA in general and East Africa in particular. Despite general global advancements in farming technologies, from hybrid seed through to fertilizers and mechanisation, much of SSA's farming systems - in the last 1-2 decades – have recorded at best stagnation in agricultural productivity and agricultural growth. Whiles as problems are many, complex and varied from community to community, and when the common problems of financial and physical accessibility are taken care of, land degradation is coming out as primary limitation to enhancing and sustaining productivity and agricultural growth. Whiles this is affecting both small and big farmers, SSA's smallholder-subsistence farmers are worse affected with drastic and immediate impact on food security and poverty levels.

FAO and many governments in SSA including those of Kenyan and Tanzania have made commitments to pursue development, food security, poverty alleviation and environmental sustainability objectives with due attention to the principles and objectives of Sustainable Agriculture and Rural Development (SARD). Components of the SARD were defined in Chapter 14 of Agenda 21.

Therefore, in supporting Kenya and Tanzania governments in their efforts to promotion agricultural growth as key basis for development and economic growth in general and poverty alleviation and enhanced food security, this project interventions were designed and implemented to address key barriers to better, higher and sustainable farm productivity especially in Kenya and Tanzania's pilot districts targeting smallholder-subsistence farming communities. Additional to adaptation of technologies for sustainable farming (conservation agriculture), the project also paid particular attention to issues of farm labour, knowledge generation and sharing, farmer organisation and dissemination approaches.

Conservation tillage practices in combination with the utilization of cover crops and soil cover minimize soil disturbance, enhance vegetative cover and contribute to the sustained use of agricultural land. The organic matter content of the soil and the beneficial decomposition and mixing processes by soil organisms are also enhanced. In the context of rainfed agriculture as practised in sub-Saharan Africa, the poorest of the poor suffer from decreasing soil productivity exacerbated by inadequate soil moisture and increasingly sporadic rainfall. The restoration of organic matter may be essential to help stabilise production. By suppressing weed growth through the reduction of tillage operations and the controlled and managed use of a permanent soil cover, conservation agricultural practices can significantly reduce labour inputs. This is particularly important in the view of severe labour shortages, which are arising from the impact of HIV/AIDS.

1.2 Objectives of the project

Presented below are the project objectives as agreed by stakeholders at project kick-off workshop (May, 2004, Arusha):

Development objective: Improve food security and rural livelihoods and build a foundation for the expansion of conservation agriculture (CA) to contribute to Sustainable Agriculture and Rural Development (SARD).

Immediate objective: The adoption of profitable conservation agriculture practices by small farmers in at least three districts in two countries.

Set project outputs: The project was implemented in both Tanzania and Kenya with the similar range of activities set to achieve the following core project outputs:

1. Farmers apply conservation agriculture practices
2. Owners of draught animal power (DAP) and tractors are able to offer hire-services in CA practices to others
3. Extension staff trained to organise, facilitate and provide on-going support to conservation agriculture farmer field schools (CA-FFS)
4. Local manufacturers and retail sector able to supply tools and equipment suitable for conservation agriculture practices to farmers
5. Knowledge networks for exchanging experiences established at local, national and regional levels
6. Technical and operational support to the project including national and international procurement

1.3 Project management and operations

The project was managed by specially set-up National Coordination Offices (one in each country) with staff (coordinators) specially contracted and assigned to the tasks by the country FAOR offices in liaison with the Governments. FAO's AGST unit (in Rome) provided both technical and administrative support in the management of the Project. The budget holder at the FAO regional office in Accra, Ghana with the in-country Tanzania and Kenya FAOR offices supporting and facilitating mainly financial management and liaising between the National coordination office and the FAO Accra based budget holder.

The project started its activities officially in June 2004.

In Tanzania, the Selian Agricultural Research Institute (SARI) in Arusha hosted the project with two dedicated assistant national coordinators. The Ministry Head of the Agriculture Mechanisation Section (under which conservation agriculture come within the Ministry) was also the Project National Coordinator. The National Coordinator was based in Dar es Salaam. In Tanzania, the Project was implemented in three districts (namely Arumeru, Karatu and Bukoba) with each district operations undertaken by a team of resident facilitator under the leadership of a district facilitator.

In Kenya, the project was implemented under the Ministry of Agriculture (MOA) with the Kenya Agricultural Research Institute (KARI) in Nairobi hosting the national Project offices. In Kenya, the Project had five target districts with each district team of facilitators headed by a District Coordinator often assigned to the Project (at about 50% of their time) from the District Ministry of Agriculture offices. The districts involved were Siaya, Bungoma, Nakuru, Mbeere and Laikipia.

The Africa Conservation Tillage Network (ACT), through a LoA with FAO, provided technical regional coordination between the two project countries, staff (facilitators) training and backstopping support in CA and development and management of the project integral learning and impact assessment M&E process. ACT roles and responsibilities in both technical backstopping and management grew overtime to level than was envisaged in the original Project design.

With only two cases of the group facilitators coming from local NGOs, all the field level staff (district and group facilitators) involved in Project implementation were local/resident government agricultural extension service staff assigned to the Project.

2. ACHIEVEMENTS AND RESULTS

2.1 **Output 1:** Farmers apply conservation agriculture practices

Project Performance Indicators/interim results	
i)	Information on key parameters giving of "year 1" baseline of project areas compiled
ii)	Balanced group of farmers selected;
iii)	No. of CA-FFS established; enhanced knowledge on CA practices
iv)	List of attendance
v)	No. of individual farmers who have started to apply CA in their own field
vi)	Participatory qualitative assessment records
vii)	CA-FFS training curriculum circulated and comments received
viii)	Technical support communicated to National project teams

2.1.1 Adaptation and adoption of CA practices

Conservation Agriculture Farmer Field Schools (CA-FFS) Groups: With project support 101 CA-FFS groups were established – 48 groups in Kenya and 31 in Tanzania. This was spread in the project's eight (8) target districts (See Table 1). Ninety percent of the groups were established during the project's first year. Most of the rest have come up towards the end of the project and mainly at farmers' own initiative; i.e. includes groups established and facilitated by fellow farmers from the older groups.

With an average size of 25 households in each CA-FFS, over 2,500 farmers directly participated in the project with a cumulative total of about 4,000 acres[1] (of private household land) coming under some form of conservation agriculture[2]. When considered separately, area involved is higher much for cover crops (lablab and mucuna mainly) adoptions than reduced tillage. Application of CA practices in individual private plots ranged from 0.5 to 3 acres per member household.
Membership in the CA-FFS groups was approximately in a 1:1 ratio between men and women in both Kenya and Tanzania.

Table 1: Details on the FFS groups established and their membership.

District	No. of FFS groups	Membership			Facilitators
		Male	Female	Total	
Arumeru	11	145	175	320	6
Karatu	10	150	152	302	5
Bukoba	10	149	83	232	10
SUB-TOTAL	*31*	*444 (52%)*	*410 (48%)*	*854*	*21*
Liakipia	4	89	84	93	1
Bugoma	10	166	107	273	6
Mbeere	10	88	318	406	6
Siaya	10	139	219	358	4
Nakuru	14	130	222	352	6
SUB-TOTAL	48	612 (41%)	950 (64%)	1482	23
TOTAL	**79**	**1,056 (44%)**	**1,360 (56%)**	**2,416**	**44**

[1] Households have converted about 1 to 1.5 acres of their land to CA. Almost in all cases, this is at most 50% of the arable land available to the household. This has increased over the seasons. Farmers have generally started the application on small plots in some corner of the field.
[2] Almost none of the participating farmers had at this stage a "complete" application of the CA principles. Most, especially in Kenya had "entered" at reduced tillage aspect (basins, direct planting with jab planter and planting furrows with draft animal power). In Tanzania, the mucuna/lablab live cover crop was the most attractive entry point, particularly due to the high demand and good price for the bean.

Each CA-FFS group in both Kenya and Tanzania had at least 1 acre of a "group learning plot". The plots were put on a range of CA treatments decided upon at the beginning as part of the possible solutions identified.

Additional to directly project supported groups, in Kenya's Siaya District, CA SARD project has supported the MDG Millennium Village Project (with farmers and facilitators' training, logistical and organisation, CA equipment) in promoting CA in the Bar Sauri Millennium Village. Two CA-FFS groups were already established in Bar Sauri as at the end of July 2006.

2.1.2 Conservation Agricultural practices being adopted

With consideration of both the principles of CA and the productivity problems identified in each group, the groups had from the very beginning decided on a set of treatments (mix of CA options) which their felt would provide the best solutions to the problem of poor yields. Various forms and levels of reduced tillage was the underlining treatment in all cases. Box 1 gives the initial general set of treatments that most groups started with. In most cases, farmers adjusted these treatments. Deviations from the general set of treatments were main across the groups and in some cases quite significant; e.g. in Bukoba, sweet potatoes and groundnuts were also used in the rotation system and for soil cover. Use of CA equipment was also very varied, though it was one of the main determinants of both "to adopt" and "extent of adoption".

Box 1: General set of CA treatments

1. Maize + lablab; No ripping
2. Maize + lablab + ripping
3. Maize + pigeon peas; no ripping
4. Maize + lablab + ripping
5. Farmer Practice

An assessment done April 2006 in Karatu and Arumeru districts showed that 85% of the FFS group members use rippers; 77% are using no-till direct planters and 6% are using the Jab planter. The assessment also revelled that those using jab-planters were mainly those with small fields or have their fields on sloppy areas or had no draft animals and unable to hire. For the poor and marginalised households, including female-headed households indicate the hand-jab planter direct planting system as "saviour".

✓	<u>Main reduced tillage options tried</u>
-	basins (in hand hoe systems). Seed placement done by hand
-	Ripping (with draft animals – Magoye ripper). Seed placement done by hand
-	Jab planter (only typical direct planting option)
✓	<u>Main soil cover options</u>
-	mainly live cover crops (thrust on the exotic crops – lablab and mucuna)
-	Crop residue/biomass output/ controlled use/burning – minimal
-	Crop livestock conflicts – Tanzania, Arumeru
✓	Rotations/Intercropping
-	minimal/systematic focus / many questions-gaps

Lablab crop – growing in popularity in Northern Tanzania as a cash crop with cover crop effects

Farmers, both those in the groups and non-group members in the communities acknowledged general effects/impact both in terms of actual yield increases and for many, even more importantly the stability in yields. This was observed as critical driver behind the interest rapidly spreading even among non-CA FFS members.

In terms actual yield increases, most farmers achieved at least double the yields (from below 0.5 t/ha to an average 1.5 t/ha) in the very few year, especially in cases where farmers started with ripping or basins which appeared to have had significant influence on rainwater harvesting.

One key factor that has driven spontaneous interest in conservation agriculture has been its ability to enable at least some yield even in poor rainfall scenario. During the project period, project sites both in Kenya and Tanzania have suffered severe droughts with adverse impacts on both crops and livestock activities. In Kenya's Laikipia district, farmers that had applied CA (planted in furrows/basins and soil cover) reported a normal cropping season with above-average yields while their neighbours experienced total crop failure. In Tanzania, the 2005 season drought is said to have well helped demonstrate the possible effects/benefits of conservation agriculture as opposed to conventional tillage systems – especially with regard to rainwater harvesting. Farmers applying CA realised an average yield two to three times more as compared to conventional plots. For example, from the 2005/06 season while conventional farmers in Mlangarini village had complete crop failure, CA farmers in Arumeru harvested maize 2 to 3 bags/acre, Amani FFS group harvested 9bags/acre, Kilimo FFS harvested 17 bags/acre; Upendo nyuki FFS Likamba village harvested 20 bags/acre.

Farmers attesting to the benefits of CA have also alluded to indirect effects in improving the general agronomic management levels including timeliness in planting, weeding and other key operations, improved precision in both quantity and placement of fertilizers, etc…

FFS group members diversified into other crops, mainly commercial crops with marked impact on the income (extent band stability) into the households. FFS teamwork helped the group members feel secure to try new crops and practices. For example, farmers in Laikipia (Birisha FFS) are now planting onions as a commercial crop while farmers in Mbeere and Laikipia are growing lablab as a commercial crop getting much of the income from selling cover-crop seed.

2.2 **Output 2:** Owners of draught animal power (DAP) and tractors are able to offer hire-services in CA practices to others

Project Performance Indicator/interim results
i) Trained operators and animals available in each farmer group ii) Training accomplished iii) Training accomplished

2.2.1 Farmers' access to CA equipment and related maintenance services

Farmers' access to appropriate CA equipment has come out as critical decisive factors in decision on adoption for many households. Availability of CA equipment, which remains largely project supplied, greatly influenced extent of actual adoption.

In most project sites, this was linked to availability of operators skilled in the operation and maintenance of the equipment. These operators have been the custodian of the equipment and able to go round providing their services to group members at a small fee. The service was also provided to a growing number of non-CA-FFS members at a slightly higher charge.

CA Equipment mainly introduced or popularised by the CA SARD project include:

- *Zambia's Magoye ripper (also being fabricated by local artisans)*
- *Palabana sub-soiler (also originally from Z*ambia) used also for making planting lines and effecting some level of ripping
- *Jab planter (Brazil model)*

The project had also brought in from Brazil a number of animals and tractor drawn CA equipment. However, many of these, though popular, supply has not gone beyond what the project supplied.

In Kenya, farmers have reported being able to do direct seeding with the Jab Planter of up to 1.5 acres in a day on un-ploughed land. The animal drawn direct seeder can do up to 5 acres while the tractor drawn units can do up to 12 acres in a day. Some hirers have described the animal drawn seeder to be like a *Matatu*[3] at Christmas time – in demand!

Especially in Kenya, the use of the tractor drawn direct seeders has been a challenging one. These units need the support of a well serviced tractors and experienced tractor operators to make good use of them. In Laikipia, farmers have been supported by Farmer Sessions of Lengetia ranch. In Nakuru, the same equipment has worked with problems of breakage of seed that was sold and meant for hand planting (mismatched with the available seed plates). Other problems have been with planting on ploughed land or with poorly adjusted units, (with in-operational hydraulic linkage), where seed ends-up planted too deep or too shallow, hence problems of low germination count. Recent opportunity has been the direct seeders working in combination with a Kenya Maize Programme tractor drawn subsoiler, where excellent results have been reported.

Sustained access to CA equipment: This project has made progress in encouraging farmers to use project-supplied CA equipment under a private ownership and hirer schemes. In this arrangement group members agreed to put the equipment on a hire scheme were group members paid a small fee (essentially to pay for the operators' services and for servicing costs). The equipment was also hired to non-group members but a fee hirer than for group members.

[3] A typical Kenya public transport vehicle

The project trained over 15 operators and artisans in Kenya and 8 in Tanzania. A number of Facilitators also underwent training in CA equipment use, adjustment-calibration and maintenance. These operators took charge of the equipment hire schemes and ensured that the equipment was serviced.

Artisans and operators under training at Nandra Agricultural Engineering Co. Moshi, Tanzania (May 2005)

To stimulate and support responses of the private implement manufactures and dealers in supply CA equipment, the CA SARD project deliberately invited and linked farmers to the companies including some of them being smallscale semi-commercial units. The project also developed a database of farm equipment Manufacturers, dealers and equipment support service centres in the two countries. Key ones at industrial commercial level, included Nandra Engineering works, TFA Arusha and Karatu, MUKPAR TZ –Arusha, PANNAR seed (T) Ltd, SATEC- Arusha, Nnko Agrovet- Karatu, Sumari Jacob shop – Kisongo Arusha; East African seed company; Kibo seed company; Mbauda, Kisongo, Ngaramtoni and Karatu open markets.

The developed database (Inventory) listing implement manufacturers, dealers and maintenance/repair services providers, from large-scale commercial to smallholder rural based artisans was made available to FFS groups in hardcopy. This also included a list of artisans, implement hirers who have been trained by the project and expected to offer hire-repair services in their communities.

2.3 **Output 3**: Extension staff and farmer organizations are able to apply participatory extension approaches (PEA) for CA development

Project Performance Indicators/interim results
i) Training conducted and farmers are familiar with FFS methodology ii) Training conducted and principles of CA understood iii) Field visits, interactions, iv) Communication

2.3.1 On-farm learning and the learning tools

All CA-FFS groups had a learning day – on average once in a week. Each CA-FFS group managed a group plot, which was normally demarcated into smaller plots according to the number of treatments decided upon using the EASA checklist farmers reflected on their soil and crop responses with reference to their practices (treatments). The reflections allowed groups members to share and learn from one another. At various occasions, the groups through their facilitators invited expert input through sessions conducted by Specialists. Other activities undertaken to support farmer learning included (i) within the district, inter-

district and one inter-country exchange visits, (ii) a number of expert session presentations on an assortment of subjects including marketing and entrepreneurship development; HIV-Aids, Soil cover and cover crops options, gender and CA; (iii) field days.

The learning process had for most CA FFS groups gone over a cycle of between 1.2 to 2 years (i.e. at the very least two seasons and for many, especially in wetter bimodal areas, up to four seasons). The project has also adapted a curriculum to guide this learning.

Most CA-FFS groups organised own fields days at community level were especially new products/inputs were displayed and often some information exchange and demonstration of these items done. These field days were generally around items/issues such as cover crop seed/plants and CA equipment.

At least 10[4] households per group from this lot were engaged in a systematic monitoring and evaluation process designed to enhance the recognition and capturing of evolving knowledge, on one end, and assessment of impact, on the other. This formed part of the learning as when in the group, the members also reflected on the responses and practices in the private plots.

2.3.2 Facilitators and facilitation competencies

Facilitator training and capacity development support: The project has noted that training and training support to facilitators was far more critical in achieving and sustaining set project impacts that appears the project directly acknowledged at the start. Thirteen (13) from Tanzania and sixteen (16) from Kenya staff, who were essentially serving frontline agricultural extension staff in the government agriculture extension system received an initial 2 x 2 week trainings one in CA and the other in principles and application of the farmer field school approach. This together with the on-the-job training support provided to them turned out critically essential in position and strengthening abilities these staff in undertaking their role and responsibilities as facilitators. These staff come from a training and work experience background were training-and-visit systems was the main extension approach and many of them have within their extension responsibilities also worked as input supply agents.

2.4 Output 4: Improved capacity among local manufacturing and retail sector for supply of CA inputs and tools

Project Performance Indicator/interim results
i) Suppliers identified and needs articulated ii) Training conducted iii) At least 2 outlets per districts has been trained and supported iv) Database ready and functional

In conjunction with output 2, input and equipment suppliers as well as service providers accessible to the target villages were identified. In both countries, but more in Kenya than Tanzania at least one informal part-time fabricator of CA related equipment was noted in each target district. These are units that are able to fabricate a wide variety of household and farm tools and usually providing repair and maintenance services on an assortment of machinery jobs. Especially in Kenya, the animal drawn ripper is one of the equipment made

[4] Restricted to this (smaller) number simply for purposes of ensuring that there is capacity to handle and process the data collected. The number would be increased with increased and more systematic capacity including more and better trained facilitators.

in these small scale set-ups. At least one manufacturer in Tanzania (Nandra) and one manufacturer in Kenya (Ndume) were, at the end of the Project period, fabricating and supplying the *matraca planter.* Between the two companies, over 200 units of the matraca planters were made and sold in the region (not necessarily into the CA SARD project areas). The matracas fabricated in these cases would still need extensive testing – feedback to the manufacturers would enable them improve in quality and robustness of the product, technical perfection/functionality and overall finish. This is also another area were the next CA SARD Project could help in supporting the building of local CA equipment manufacturing by extensive testing of such equipment and facilitate feedback to the manufacturers.

Cover crop seeds were largely provided by the two agricultural research centres involved (SARI and KARI). Both have started specializing in cover crop seed multiplication. There were however also individual village facilitators and advanced FFS members (Siaya, Karatu) that enrolled in cover crop seed multiplication in order to meet the local demand, especially for *dolicos lablab and mucuna*. Some FFS members that were owners of draught animals became service providers in planting services, some FFS members became service providers for weed management.

It appeared to be challenging to enter with the required CA inputs into established supply chain systems, such as TFA in Tanzania. Established outlets do react on demand. During the first project phase, the key CA related input supply was provided with project support. A growing number of FFS and individual farmers (critical mass) adopting and practicing conservation agriculture practices will be needed for the process to stimulate the scale of demand in order for outlets to react. The next project phase should integrate measures to systematically and concretely take up this challenge; i.e. measures that would stimulate and facilitate more and more private sector outlets and input suppliers joining in on CA equipment manufacturing and supply – with the Project progressively declaring itself redundant on its direct involvement in CA equipment procurement and supply.

No formal training for local suppliers/retailers was conducted. However, many local suppliers/retailers were invited and participated in field days. This stimulated and facilitated dialogue between farmers and the suppliers/retailers. The interaction created substantial awareness and interest among private sector outlet owners and input suppliers (see output 5). In two districts in Tanzania (namely Arumeru, Karatu) new cover crop seed suppliers have evolved in response to the demand for seed expressed by farmers during the field days. A growing number of farmers expended their cover crop (mucuna and lablab seed) encouraged by the good price and ready market for the seed. This for some farmers was also the entry point in practicing CA.

A database of mainly the medium to largescale manufacturers and traders of CA equipment and tools was compiled and distributed to the FFS groups through the district and group facilitators (see Output 2). Most of the companies listed also supply an assortment of other farm inputs. It will be valuable for the next project phase expand this database and information-base by inventorising and including the many formal and semi-formal/informal smallscale local outlets/retailers who are occupy a significant portion in the input-output market chain in these districts.

2.5 Output 5: Knowledge and experiences exchange systems established at local, national and regional levels

Project Performance Indicators/interim results	
i)	Simple checklist developed and in use
ii)	Checklist in use and completed and shared
iii)	Exchange visits conducted
iv)	Compiled information available
v)	Workshop reports
vi)	Publication available
vii)	Framework for database ready and in use
viii)	Two specific posters /sheets developed

2.5.1 Knowledge and experiences sharing at local national and regional levels

Farmer-to-farmer visits: The project stimulated and facilitated intensive farmer-to-farmer sharing in supporting the self-learning process. This was achieved through extended and elaborate farmer-to-farmer exchange visits and field-day competitions. These elements of the methodologies added much to the wealth of knowledge and true experience of the CA/FFS farmers. Over 90% of the participating farmers in both Kenya and Tanzania rated farmer-to-farmer visits within the district or beyond as one of the most effective tools in helping learning from fellow farmers and by seeing. The farmer-to-farmer visits were said to help farmers, both the visiting and the visited, enhance their confidence in themselves and their practices. They gave them opportunity to test out what they knew among their peers; "there was nothing as exciting as showing out your new innovation to your peers" one farmer remarked.

Farmer interaction with private sector: Field days brought a cross section of CA stakeholders together – from farmers through government department (research, extension, policy, etc…) representatives and many interest and collaborating players from the NGOs. Critical group attending the day fields had been the private sector – many suppliers and manufactures of agricultural inputs (fertilizers, seed, chemicals) and dealers/manufacturers of farm equipment. Farmers were able to interact directly with the private sector both in expressing their needs offering feedback on some products already supplied or in the market.

2.5.2 Monitoring and evaluation system

The Monitoring and Evaluation (M&E) systems developed, as an integral element in the project's on-farm experimentation and innovation/adaptation systems has been one of the project novelty outputs. Adapted from ACT similar works in Southern Africa, the M&E undertaken at farmer level through a set of simple data and information collection (capturing and recording) checklists has come out as a value tool in supporting the self/social learning principles of the FFS approach.

The M&E enabled farmers to "in-situ" and in "real time" to observer and critical analysis, how the crop and the land (soil and water dynamics) were responding to their treatments. This enabled farmers explain the implications of their actions (treatments) and able to decide on possible adjustments to their practices. The M&E process also enabled farmers keep track of effects and impact parameters from implications on labour demands to actual yields including on and off farm effects such as erosion.

Additional to the M&E system, the project facilitated other exercises such as the Visual soil assessment exercise and the AESA to strengthen and increase opportunities for farmers to

capture/generate learning information/data, which was also noted as useful in decision making.

Farmers were also encouraged to write “stories of my group” which were shared at various fora.	

3. CONCLUSIONS AND KEY LESSONS

3.1 Adoption and related impact

i. Adoption

The CA SARD project approach to allow and place increased emphasis on private plots within the learning and experimentation process enabled farmers to try out in free in-situ environment from the very beginning. This has enhanced the level and extent of real (more than just experimenting) adoption. Over 85% of the 2416 farmers participating (1482 in Kenya and 854 in Tanzania) are noted to have at least 0.25 hectares under some elements of CA practices. Most households had started the application of CA practices (those starting with reduced tillage started on smaller, e.g. 20 x 20 plots while those starting with e.g. live cover crops (*dolicos lablab* or *mucuna*) were starting with slightly larger plots) on smaller plots, averaging below 20 x 20 meters. In the 3-4 seasons, this has for majority expanded to at least 0.25 hectares.

Adoption has been, characteristically, households taking up particular CA elements (options) in varying combinations. Farmers consistently practicing a combination of CA practices that took on board all the principles of CA were still very few in all the Project sites. Evidence show that depending on the varying local circumstances, communities/ households innovated on the most feasible and attractive "entry points" in terms of which practices were tried/adopted first. In Kenya, especially in drier areas, options related to reduced tillage (basins, jab planting, ripping) were most popular, while in Tanzania, the good markets and price for lablab seed provided good incentive for farmers to "enter" along the soil cover/live cover crop (lablab) option.

Over 60% of the farmers participating also singled out "planting basins" as an attractive and feasible "entry point" due to its limited dependence on external inputs (essentially a factor of family labour) and hence also attract to even the poorer and disadvantaged households. Even though direct planting in hand-made basins is not completely new, but has often been stigmatised as a practice for the lazy and poor. It also reflected poor planning and disorganisation on the part of the household. However, link of the practice to conservation agriculture (which is regard as modern) has removed the social stigma with many households openly and willingly able to try it. Ten percent (10%) of the farmers adopting CA used no external inputs in the first season of adoption, which could be interpreted as limited faith in the new practices or simply inability to afford the inputs.

Over the 3-4 seasons, 70% of the participating farmers already with access to organic fertilizers (mainly kraal manure) decided to be more systematic and serious in the use of the manure (previously the common practice was mostly left to the kids to randomly "throw" the manure in the field). All the participating farmers expressed knowledge of the value of organic fertilizers even when they were able to use mineral fertilizers. For most of them the issue, however, remain on availability of sufficient organic manure for effective impact. Access to kraal manure, mainly linked to ownership of livestock, varied widely across the Project sites. Making of composite manure for field crops is not common in the Project areas.

Many farmers were adapting to leaving as much of the crop residue as possible in the field to support organic matter replenishment. Although still a source of social conflicts in many communities, all the participating farmers were engaging themselves and their communities on avoiding the burning of crop residue and managing better/more controlled livestock grazing. Challenges remain, but communities such as Likamba Village in Arumeru, Tanzania, have shown practical example were the local traditional leadership is lobbied and supports a community-collective process to agreeing on social regulations restricting burning of bushes

and in particular crop residue and on livestock management even in dry season when traditionally households left their livestock to graze freely.

All the groups that started with the project were still active at the end of the project. However, within the groups membership has dropped an average of 20 to 30% with most of this experienced within the first six months. During the last year of the Project period, evidently groups become generally more consolidated and articulate in following the CA FFS learning process. Membership in small groups grew – three groups in Tanzania had to slit into group groups to accommodate the growing number but still remain sizeable for learning purposes. A number of groups were also actively involved in supporting new groups – by providing their lead farmers as resource persons/facilitators for the new groups. Both Kenya and Tanzania had at the end of the Project at least 10 new groups that had come up spontaneously (i.e. without project intervention) with support only from lead farmers in the existing CA FFS groups.

ii. Effects and impact

Whiles the two-and-half year project period may not be sufficient to conclusively gauge sustainable impact on food security and other livelihood parameters, participating farmers have shown through subjective statements and especially yield figures that the trend and potential was positive. Most farmers indicated stabilisation of yields even in below-normal rainfall seasons, as a key incentive to adopt (even more than the factor of actual yield increase).

In critical water stressed environments or on fields one would suspect to have serious compaction problems (definite assessment of compaction or plough pans was not done), the change in grain yield was noted as more significant. Farmers in these scenarios obtained even as from the very first year of adoption at least double the yields. This in most cases translated from below 0.5 t/ha to an average 1.5 t/ha of maize grain. Intercropping with cowpeas, pumpkins and other mostly indigenous crops and in some cases, the exotic lablab or mucuna enhanced overall productivity of the land and even more critically for soil fertility provided increased source of biomass. **Note**: *most farmers who were adopting large scale production of lablab or mucuna grew them as pure stands within a kind of rotation sequence*.

Effects on input factors such as labour has been one of the key discussion points especially between the FFS group members and the non-members. The situation was observed as more dramatic in cases were adopting farmers were using planting basins. Analysed labour profile figures from a small number of households practising “planting basins” showed very minimal change in overall persons-hours committed to crop production over a twelve-month period. However, what was more significant was the reduction in the peaks – these households showed cropping activity over more months in the year and especially the “ploughing and planting” labour demand peak was greatly diminished. Farmers not practicing CA have, in many cases, used this as one of the main reasons for not adoption – high labour intensive practices. There is need to follow up this situation on a wide scale for more conclusive interpretation. The assessment has also to be put in a more holistic context with parameters such as “local value placed on labour”/ labour opportunity cost, etc…

Figures from Tanzania also demonstrated effect on “time” – time required for planting maize in one acre dropped from 2 days (by hand) to 2 hours when an animal drawn direct planter was used.

The project provided some support inputs (fertilizer, seed for new crops) for the group learning plots. Nothing was provided for the farmers’ own private plots. Therefore, one can conclude that much of the changes recorded were more about change in crop management practices than from increased or new/different inputs.

3.2 Technical and socio-cultural factors influencing CA adaptation/adoption

Local factors that seem to have generally influenced which options were picked up in the adoption included:

i. **Access to knowledge and information about the option/s**: It was evident that farmers in all the project site communities were clear and appreciated land degradation and fertility loss as problem impinging on farm productivity. However, many farmers only sighted use of more fertilizers as a key reaction to address the declining soil quality issue. Many farmers are not aware of concrete practices such as was offered under CA. Active knowledge base was also enhanced in CA FFS groups through the social learning and knowledge sharing feature of the FFS methodology. It is, however, important to recognise the role played in this by consistent and supportive facilitation given by the project local facilitators both in technical and organisational aspects. Weak and less committed facilitation translated in poor performance even when group members were interested and committed.
   The FFS methodology has proven to be a suitable and successful farmer driven approach that goes along well with the learning requirements related to the CA farming concept. This is because FFS and CA are both multi-faceted and should be implemented in a multi-sectoral perspective. They both engage farming communities in an all-inclusive way. The FFS methodology builds a platform that is conducive to exploration of new as well as traditional farming approaches with self-learning and group-learning exercises, experimentation and local empowerment and as a key feature.

ii. **Knowledge or experience of benefits:** of practicing CA, e.g. reduced tillage (either basins or animal drawn ripping had proven effective in guaranteeing some yield even in poor rainfall seasons). Many farmers also sighted reduction in labour demand especially at peak times. This could be noted as a contested point as many of those not adopting referred especially to making of basins as a very high labour intensive operation. Labour demand for weeding is another key factor that affected adoption or sustaining of adoption.

iii. **Availability of CA equipment and tools** was in some cases noted as key in enabling farmers adopt particular options, e.g. the Jab planters in Kenya allowed many farmers to try out and adopt direct planting while use of the “chemical hoe” (Zamwipe) for low cost and minimum chemical use weed control could not move on, despite many farmers aware about it, as the equipment was not accessible

iv. **Link to markets:** This was affected by both infrastructures as much as access to market information the farmer had. Tanzania’s Karutu and Arumeru well picked up CA through the “live cover crop” entry. This was because the lablab-bean market mostly in Kenya. The growing demand also brought pressure on seed availability. Many farmers involved had to focus on seed production. This experience also highlights the importance of involving a cash crop in the system. The cash income was instrumental in enabling households mitigate/off-set the risks and delayed returns of investing in soil rehabilitation measures.

3.3 Implications on food security and other rural livelihood parameters

The CA SARD project has shown through the project period a positive and growing trend in effects on food security and farm incomes. In a situation were households are running out of food for increasingly more months – 3 to 4 months with 1 to 2 of them classified as severe, even one more month guarantee of food was regard as a significant and desired development. Of the 144 households whose food availability data was analysed over the two years, number of households suffering severe food shortage declined from 75% in 2004 to

just over 50% in 2006. Overall food deficit period declined from 4 months to 3 months. It would be useful to follow through this assessment to check the trend over a longer period.

Effect from change in income levels was more dramatic in Tanzania in groups/ households involved with commercial lablab production. The incomes were significant and made noted impact on the household livelihoods and their ability to invest in capital items.

Extra lessons noted in Tanzania was that some farmer groups went further to organise for themselves some income generating activities such as vegetable gardening for the farmers in Arumeru on the slopes of Mount Meru. Members in such groups took up use of more purchased inputs such as fertilizers and improved seed. The incomes from vegetable provided a steady almost-year-round source of income.

3.4 Sustainability and scaling up

There is clear indication that the CA-SARD has greatly helped to attract attention into agriculture in general and CA in particular within the context of food security and poverty alleviation. However, translation of this growing awareness and interest into active support and actual widespread adoption is yet to be realised. This is hampered by factors such as lack of appropriate farm equipment and tools and inconsistencies in government agricultural extension messages on various related aspects – government and other NGO programmes are still actively promoting ploughing.

3.5 Overall assessment on the Project contribution to the Project Development objective

As noted under 3.3 above, adoption of conservation agriculture practices had in target communities demonstrated impact on enabling households/communities more able to provide for own food needs. Additional to reducing the food insecure months (due to higher harvest), most households were attracted to CA by its ability to mitigate adverse weather conditions – farmers applying CA managed to get some yield even in poor rainfall seasons. This immediate link to food security will continue to be a key factor as farmers decide on adoption of CA practices.

Through adoption of CA practices, many farmers, both Kenya and Tanzania, as individuals or in groups, were noted to increase their participation in local market based on the “excess” yields. Many farmers were also noted to have diversified their cropping systems, mostly by integrating cash crops such as mucuna and lablab (in Tanzania’s Arumeru districts), vegetables (in Tanzania’s Arusha district) and citrus fruit production and goat husbandry (in Kenya’s Mbeere districts). The increased income from “excess” yields sale lead to investments in housing, increased school attendance of the households children (especially girls) due to the possibility to pay the school fees, and diversification into other activities such as poultry farming. These factors have underscored a growing self-reliance among the participating households with many household not only serving as examples to their fellows, but actively taking up to inform and train others in CA practices. The Project could, in this way, be assessed as having contributed to the evolution of what could be described as “CA impact spots”. These impact spots were already serving as foundation for the expansion of conservation agriculture (CA) adoption in the target communities and areas in the vicinity, hence with potential to build critical mass on CA contribution to Sustainable Agriculture and Rural Development (SARD) in the areas. The emerging learning groups driven by shared values on sustainable productions systems including the groups’ value in facilitating social learning and collective decision making and serving as social capital are all part to the largely Project induced drive to – in a sustainable way - engage in natural resource management and enhanced and sustainable agriculture productivity.

4. CHALLENGES

The project exposed critical limitations and challenges both in practical CA options (technologies), socio-economic and cultural and in dissemination/promotion approaches, especially in relation to widespread adoption of CA practices.

The up-take of CA practices among neighbouring farmers was very low despite them noting and acknowledging the benefits from those practicing. Some most prominent challenges noted were:

Technical:

a) **Weeding**: This for many remained a critical challenge, as there seem to be no ready options for different "classes" of farmers. This needs critical attention in adapting weed management options that are agronomically appropriate and socio-economically feasible, especially for farmers using hand-hoe or draft animals. From the project's experience, it is important, that this does not automatically and necessarily mean that farmers have to use herbicides. Challenges noted on use of herbicides were many and some very critical and range from negative attitude on chemical use to very poor and dangerous handling and application practices.

b) **Rotations** was also noted as a challenge especially in devising a cropping sequences that were appropriate for agronomic and soil fertility needs as well as attractive in terms of crop types and associated uses. In some cases, rotations implied introduction of new crops a feature that did not appear attractive to the farmers especially when the crop did not have obvious food and/or cash value. In cases of intercropping definite and practical agronomic information is simply missing e.g. at what stage in the growth of maize should one plant (interplant) the lablab. It is known that planting too early may lead the lablab or mucuna (which are more aggressive) to "strangle" the maize crop – how early is too early? How late is too late in order to enable the intercropped lablab to provide the envisaged soil cover for the intended weed suppression (with zero herbicide input).

   Rotation remained the least adoption of the options that relate to the three core principles of CA

c) **CA tools and equipment:** This is a critical issue as for main appropriate equipment is not available even when they may have the funds. For some farmers it also involves lack of information and knowledge about possible equipment options their can use in the application of CA practices. Therefore, CA equipment related challenges are in various forms with often-different implications from community to community. Generally, this would be in the form of (i) lack of information/not aware of possible options, (ii) appropriate equipment simply not available in accessible markets, or (iii) inaccessible due to what comes as high cost to the local farmers. Poor community networks for machinery use also make availability and accessibility to equipment limited. Even hiring is normally perceived as undependable as often the owner would also be farming and hence only goes to provide the service after having worked their own fields – this may be too late for others.

d) **Soil cover:** Critical challenges remain in attaining and sustaining appropriate levels of soil cover. In most areas, the biomass output is low and then farmers have to put up with all the other uses for crop residue including livestock grazing. Extensive and consistent application of the soil cover option remained a challenge. However, it some households came up very with maintaining soil cover. It is noted farmers' appreciation of the need and role of soil cover was key component for them to innovate and take measures to protect/sustain some cover in the fields.

The live cover crop option remains largely based on exotic crops such as lablab and mucuna. Kenya particularly experienced problematic pest and disease on lablab, which was affecting other crops. At the end of the project there was no satisfactory solution identified for this problem. Other dimension of the challenge was in the need to identify indigenous crops with food/income value but also good in soil cover characteristics. Crops such as pumpkin can be ideal especially within the rain season.

Socio-economical:

a) Livestock-crop conflicts stood out even more pronounced in communities attempting CA. This is not a new CA specific issue, however, application of CA on some fields in the community made it more critical in that normally this is a problem only in the cropping season, but now CA practicing was demanding that livestock grazing is controlled all-year round. Most noted cases involved cattle, but also sheep and especially goats get involved. Some groups in Tanzania's Arumeru districts have good experiences and lessons on community level social agreements in dealing with this problem.

Dissemination/promotion approaches:

a) **Contradictory messages** farmers are subjected to especially on the aspect of "tillage". Ploughing is actively promoted in these communities by extension staff and NGOs. Even government programmes are known to be supplying ploughs in the same communities.

b) **Supportive and active government policies and institutional alignment** even at the levels of local civic authorities is weak and inconsistent. This could partly be due to limited information and knowledge available on CA. This factor is true for the general agricultural development agenda

c) **Strategies to develop local equipment/input supply chain:** Support interventions such as training appear to have had very limited impact on stimulating the development of a local marketing systems especially with regard to CA equipment and provision of equipment use related hire and repair services. Both Kenya and Tanzania's extensively developed small-scale (Juakali) industry is still a long way from taking up especially CA equipment related supply, repair and hiring services. The primary challenge for a project such as the CA SARD is to identify those factors – economic or otherwise, that would provide the desired incentives for the Juakali entrepreneurs to embrace the CA equipment related business services

5. RECOMMENDATIONS

It is clear that the CA SARD I project has developed concreted spots of CA Adoption with increasing knowledge and skills in the application of CA practices. There will be need at two levels in supporting and enhance further development and application of CA practices in the target communities and beyond. This part presents some of the key primary recommendations based on experiences of the CA SARD I project. Classified under three main heading, namely: (1) Technical, (2) Methodologies and Approaches and (3) Management and Project Arrangement. The recommendations are directed at enabling possible further project interventions to specifically:

a) consolidate the gains made in the project villages, in terms of knowledge and skills and evolving practices, so that participating farmers enhance adoption with regard to adapted practices and extent of land getting onto CA

b) scaling up of the CA practices in among other farm households in the village/ community and beyond

5.1 Technical

In terms of technical issues and lessons, the following is recommended:

5.1.1 Further support and consolidation of on-farm experimentation and innovation chains directly specifically at adaptation and definition of locally appropriate CA practices. CA FFS groups have made significant progress and further support can build on past CA SARD I achievements. The processes should have build in mechanisms to capture related knowledge.

In identifying /innovating CA practices adapted to local circumstances, it will be useful for the subsequent project support to pay particular attention to identification of most feasible "entry point practices". It should in this regard be realised that **an elaborate transition** may be inevitable in setting the "stage" for effective application of "CA". This is even more so necessary the more the field was degraded. The transition phase may include application of seemingly conventional practices, such as infiltration pits, contours, no burning of residue. This should include measures to eliminate hardpan or compaction in cases where they may exist.

5.1.2 Farmers' physical and financial accessibility to appropriate CA equipment is one of the factors that will decisively affect adoption and especially expansion to economically viable levels. Project interventions need to explore for means that will enable farmers' access CA equipment and tools. Whiles importation from Brazil or elsewhere would be useful, this is likely to be short term. Therefore, efforts on equipment availability should be aiming to ultimately contribute to enhanced local commercial systems for equipment manufacturing, retailing and provision of after-sales services. Interventions on equipment availability should address issues of both supply and demand within the context of a local marketing chain. Care should be taken that factors to "drive" the equipment component may be non-technical – and therefore coming more in the field of loans for procurement of equipment, commercialisation or introduction of cash crops into the systems, so that farmers gain some disposable income which could be invested in the procurement of equipment.

5.1.3 Options for soil cover: Issue and options for soil cover shall need to be looked into closely. This is from agronomic issues such as timely/early planting, planting dates of inter cropped cover crops, and spacing in an intercropping system to expansion of possible cover crop types especially from the indigenous lot. To enhance the overall biomass output, consideration should be given to integration of agro-forestry systems.

5.2 Methodologies and approaches

5.2.1 Adapting the FFS Approach: It is clear that a lot of success in the project can be attributed to the elements of the FFS approach adapted. Work should continue paying particular attention to elements and components of the FFS approach that can be adapted/refined for promotion of CA. The main thrust is that the FFS approach techniques adapted have allowed Farmers to innovate and adapt practices appropriate for their circumstances in a manner that also allows learning and generation of knowledge. Some of the elements that would need attention are:

i. integration and harmonisation of the Agro-Eco-System Analysis (AESA) and the M&E-Learning systems. This also relates to ensuring that the AESA allows an holistic approach as opposed to the focus on the agronomic cropping cycle

ii. CA FFS groups should encouraged to use the grant support provided on investment related expenses, especially on items that they would normally not get, e.g. seed for new crops, equipment, etc…

iii. To enhance and allow internalisation of the on-farm experimentation approach, it is recommended that the current format and techniques in the "GROUND BREAKING exercises (as adapted from the standard FFS approach) be revised to introduce and place reasonable emphasis on participatory diagnostic exercises. This should allow farmers to critically and objectively review and understand within their own context problems/opportunities related to farm productivity

5.2.2 Training and materials support to facilitators: Whiles initial basic training (re-training) of facilitators-to-be is essential and proved worthwhile in CA SARD I, it is recommended that facilitators should be given more opportunity to learn through on-the-job-training, and specially organised exposure visits to help them build both the knowledge base and confidence to support farmers in CA. This should also recognise that Facilitators involved with the CA FFS groups are required to exercise their roles and responsibilities in form radically different from what they are used to in conventional extension. This also relates to access to CA materials (reference book, magazines, posters and flyers, etc., both for their own reading and for use in their facilitation work). It is suggested that every facilitator should have at least a copy of the ACT/IIRR CA Manual. Consideration should also be given to subscribing all facilitators to some regular magazines that are informative on CA/SLM.

5.2.3 The CA – FFS curriculum that evolved over the project time and that is now available in draft form should be further consolidated and improved and adjusted according the feed back from the FFS groups

5.2.4 Knowledge generation and capturing of impact data are important components of the project. There is need for more deliberate attention to this aspect of the project in terms of the M&E-L tools deployed and their management. Further project support should also consider regular documentation and dissemination of evolving knowledge and experiences.

5.3 Management and project arrangement

5.3.3 FAO should remain to hold the overall project management. However, emphasize should be given that the regional coordination, monitoring and evaluation could increasingly be implemented by the ACT who has a mandate for knowledge management and networking in matters related to CA, SLM and appropriate mechanization. In the same way should FAO and ACT make sure that both national teams take one more responsibility and ownership of the project philosophy.

5.3.2 The regional component of the project was noted as important especially in consolidating regional integration including building supportive institutional memory. This and the suggested emphasis on knowledge management in subsequent project support make it necessary that the role of ACT is defined precisely and integrated in the project.

5.3.3 The regional component of the project was noted as important especially in consolidating regional integration including building supportive institutional memory. This and the suggested emphasis on knowledge management in subsequent project support make it necessary that the role of ACT is defined precisely and integrated in the project. It is expected that such responsibilities will also help strengthen capacities and competencies of ACT as a regional knowledge management institution on CA.

5.3.4 The regional coordination and project national offices need clear terms of reference. Especially for work plan set-up, planning of training and input supply as well as impact monitoring and data collection the roles and tasks need to be clear.

5.3.5 At the national project team level it is recommended that in both countries the Agriculture Research Institutes (KARI, SARI) take on full ownership in terms of the project approach both from the methodology approach and from the technical aspects of introduction of conservation agriculture. Especially the agronomic challenges of CA adoption require continues interaction between practitioners/farmers and researchers.

5.3.6 The data flow and collaboration from project field sites, national offices and regional coordination unit to the global SARD Initiative need to be better institutionalized, planned and inbuilt in the next project phase

5.3.7 To enable the project to contribute to institutional capacity development and consolidating the base for sustainability of CA promotion in the Region, consideration should be given to build the project base on Government institutions. This point applies especially for Kenya. Tanzania actually offers some important lessons in this regard. This means that NGO/CSO can and should be involved, but with very clearly assigned tasks

5.3.8 Terms of reference for the Project Facilitators: Facilitators, most of whom are expected to be seconded from formal Government Extension Departments should have clear terms of reference of which also their supervisors in the extension departments should be made aware.

APPENDIX 1: Project staff

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Name/Institution	Function
Martin Bwalya/ACT	Regional Coordination
Pascal Kaumbutho/FAO	NPC, Kenya
Charles Mwanda/MOA	Assistant NPC, Kenya
Philip Mwangi	Driver/field assistant, Kenya
Thomas Apina	M&E Officer, Regional
Richard Shetto/M	NPC, Tanzania, Gov.
Wilfred Mariki/FAO/SARI	National Facilitator
Marietha Owenya/FAO/SARI	Assistant National Facilitator
Julianous Thomas/FAO	FFS trainer
Gabriel Alphonse Mina/FAO	Driver/field assistant

APPENDIX 2: MAJOR ITEMS OF EQUIPMENT PROVIDED

Quantity	Item	
2	Project vehicles, Toyota Hilux, Double Cabin	
2	Desktop PC	
2	Laptop plus printer	
2	Digital cameras	
5	Tractor direct planter, No. 16,	
104	Long beam Animal draft Direct planters	
4	Hand pulled boom sprayer, 20 litres	
226	Hand jab planters	
57	Animal drawn rippers	
30	Animal drawn sub-soilers	
22	Zamwipes	

APPENDIX 3: FORMAL AND INFORMAL TRAINING, FIELD DAYS AND WORKSHOPS CONDUCTED DURING THE PROJECT

June 9 – 11th, 2004, Arusha, regional project launch meeting; project set-up and work planning (26 participants)

August 16 – 27th August, 2004: Njoro, Kenya; Training in Farmer Field School organization and management for both Kenya and Tanzania (33 participants)

Sept 27-October 8th: Arusha, Tanzania; Training in CA practices (principles, operationalisation, cover crops and weed management, equipment, planning, etc. by ACT (39 participants)

February 10th and 11th,, 2005: Eastern Rift Small scale farming and Large Scale farming Conservation Agriculture Field Days cum Farmer to Farmer Exchange and tours hosted by Laikipia FFSs, farmers Muriuki and Mr. Laurie Sessions - Timau and Lengetia Farm, Naro Moru. Laikipia (320 participants)

February, 9th -11th , 2005: Tractor Hirers training was conducted at Lengetia farm Naro Moru (Laikipia) for operators from Bungoma, Nakuru and Laikipia. (12 participants)

February, 14th-18th 2005. Animal equipment hirers (including sprayer use and calibration) and artisan service/repairers training took place in Siaya Farmers Training Centre. (16 participants)

February 17th and 18th, 2005: Western Rift small scale farming Conservation Agriculture Field Days cum Farmer-to-Farmer Exchange and tours hosted by Siaya FFSs Farmer Julius Ahenda, ICRAF/ICIPE Maseno Stations and Sauri Millennium Village farmers. Siaya District Kenya (240 participants)

March 14th, 2005. A day meeting in Nairobi with all District Coordinators to discuss and agree on farmer experimental treatments. NPC office. NARL, Kabete (14 participants)

March 7th and 18th,, 2005: FFS training course Naivasha Kenya. Paid for by our collaborators, the MDG Village FFS training programme. (3 CA-SARD Participants).

May 3rd, 2005 Conservation Agriculture Case Studies mid-term review workshop. Siaya Farmers Training Centre. Siaya. (26 participants) This workshop was followed by a week of visits to farming communities in Siaya and Laikipia where Focus Group Discussions and key-informant interviews were conducted.

October, 3 – 7th, 2005; ACT/FAO/CIRAD/ICRAF/CA-SARD; CA World Congress, Nairobi, 'Linking, Production, Livelihoods and Conservation', 660 participants from 62 countries

February 6-7th, 2006; Nairobi, CA-SARD project review meeting

May 8 – 12th, 2006, Nakuru, Kenya; Promotion of CA using the FFS approach: Impacts and lessons learnt (final project meeting)

August, 14 – 19, 2006, Moshi, Tanzania; Joint CIRAD-FAO-CA-SARD CA case studies write-up workshop in Moshi/Tanzania (20 participants)

APPENDIX 4: DOCUMENTS PREPARED DURING THE PROJECT

Kenya

1. Report on Ground working of Farmer Field Schools: Challenges and Prospects
2. Animal drawn equipment hirers and artisans training, Siaya February 2005
3. Tractor Equipment Hirers Training, Laikipia. February 2005
4. Gender and participatory Methods training, January/February, 2005. By Milcah Ongayo (A TCP/CA-SARD report)
5. Report on Status and Findings: Field Visits October-November, 2004
6. Field report on ground cover establishment using cover crops. January/February, 2005 By Hottensiah Mwangi (A TCP/CA-SARD report)
7. Field report for the planting season: April 2005
8. Reports of the "Targeted Investments in Farm Inputs" stakeholders workshop held on May 25, 2005, MDG Centre, ICRAF, Nairobi
9. Report of stakeholders meeting during the visit by Eve Crowley
10. Report of the visit by Somaliland Extension officers to Kitui, Machakos and Kerio Valley
11. Report of status and findings. Field visits July 2005: Equipment distribution and technical backstopping. By Charles Mwanda, Philip Mwangi and Tom Apina
12. Duty travel to Kenya. GCP/RAF/390/GER, 22 April to 14 May 2005 by Telmo Jorge Carneiro Amado, Agronomist, Federal University of Santa Maria Santa Maria – Brazil
13. Mbeere Farmer to Farmer Exchange and Field Day Report 12th August, 2005
14. Bungoma Farmer to Farmer Exchange and Field Day Report 26th August, 2005
15. The CA trial plot at NARL/KARI Kabete
16. Mid-tern Review briefing and recap meeting internal report
17. Artisan Training Internal report 26th – 30th September, 2005
18. Consultancy back-up by Hottensiah Mwangi: CA-SARD cover crops and weed management, accompanying Telmo and as part of CA-SARD field technical back-stopping
19. Draft report of FFS Review for Bugoma and Nakuru, December 2005 by Masai. FFS Consultant
20. Draft report of FFS Review for Siaya, January 2006 by Masai. FFS Consultant
21. Draft report of FFS Review for Mbeere and Laikipia January 2006 by Mwanga. FFS Consultant
22. Draft report of Gender and Group Dynamics, January 2006 by Milcah Ongayo. Gender Consultant
23. Draft report of Artisan and Equipment Hirer support, February 2006 by Joseph Mutua. Equipment Consultant
24. Report of Kisima Kenya Grain Growers Association Field day January 2006 (without pictures)
25. Case Study reports for Laikipia and Siaya (without photo-stories)
26. M&E report of the extent to which farmers trained by Baraka College in small business management have utilized their learning by Pamela
27. Minutes of special CA-SARD Regional Coordinators meeting by Marietha Owenya
28. Training on Conservation Agriculture & CA equipment at Bar Sauri, 27th – 1st March 2006
29. Report of the visit to Kenya by Tanzania CA-SARD farmers 2nd-8th April, 2006
30. Brief report of the visit by Joseph Mureithi to CA-SARD FFS at Mbeere and Laikipia Districts: 11-13th April 2006
31. Brief report of the visit by Kenya CA-SARD farmers to Tanzania 18th – 22nd April, 2006
32. Meeting with china national construction & agricultural machinery import & Export Corporation. June 19, 2006
33. Under preparation: Report of the End-of Project Workshop and Kerma Field-Day, Nakuru 7th to 12th May, 2006 by ACT/NPC
34. Under preparation: Report of the industrial support to CA equipment supply: Survey between marc and May, 2006 by Joseph Mutua and Brian Sims
35. Under preparation: Report of the end-of-project training in Siaya, June 5th – 9th, 2006 by ACT/NPC office
36. Under preparation: End-of-Project May-June 2006 Reconnaissance Report by NPC office
37. Under preparation: KENDAT LOA final report on CA equipment access, utilization and support services by Josef Mutua of KENDAT
38. Under preparation: Various end-user fliers, Farmer Stories and Technical Notes on various aspects of CA practice in Kenya by NPC office
39. Under preparation: Bar Sauri MDG CA Field day July 11, 2006 by Kennedy Otieno
40. Under preparation: Terminal Report of the CA-SARD Trust Fund Project by NPC
41. Case study of Laikipia District. Lead author Tom Apina
42. Case Study of Siaya District. Lead author Philip Mwangi and Kennedy Otieno

Tanzania

1. Back to office report by FAO Representative (Ms Loise L. Setchwaelo) after her familiarization visit to Arumeru and Karatu CA SARD FFS sites
2. Report after CA SARD Coordinators meeting 6th to 7th February 2006 at KARI NARL station Nairobi, Kenya
3. 2nd National mechanization strategy formulation workshop report 10th to 11th Feb 2006; Kurasini Dar es Salaam
4. Monitoring report by Charlotte and Thomas Apina who visited Eotulelo FFS group for the purpose of quantifying data which was collected earlier. There visit was from 21st to 23 rd February 2006
5. Sustainet write-shop report titled " The Eotulelo Farmer Field School: Learning and promoting Conservation Agriculture" prepared by Martin and Marietha (February 2006)
6. Back to office report after sustained write shop held at Limuru conference centre, Nairobi from 2nd to 11th March 2006
7. Back to office report; by the National CA SARD Coordinator who made a Supervision visit from 14th to 19th March 2006
8. Report by Marietha after sensitization meeting on promotion of CA to top government officials held in Babati district from 18th to 19th April 2006
9. Farmer exchange visit reports (18th -23rd April 2006; and 2nd to 8th April 2006)

Regional:

1. Baseline survey report
2. CA FFS Curriculum
3. CA FFS ground breaking guidelines
4. Farmer to farmer visits guide
5. M&E Documents
6. M&E synthesis Report
7. M&E checklist/record booklet
8. M&E – as a learning and impact assessment tool
9. The CA SARD end of project workshop report. The workshop was held at Bontana Hotel, Nakuru, Nairobi from 8th to 12th May 2006.
10. Tanzania Farmer stories