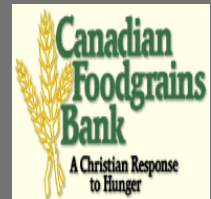
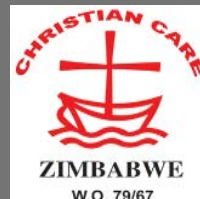


Conservation Farming in Zimbabwe

Evaluation Report



Authors: Chris Woodring, Alden Braul
Contributors: Wondimu Kenea, Erick Ruwona

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Heart-felt appreciation is given to the women and men, children and elders who have adopted CF in Zimbabwe. Accolades are due to these pioneers who have bravely adopted a transformation in farming in spite of the risk of change and the social pressure to maintain conventional production. May this evaluation lead to an increased meaningful adoption of CF by vulnerable small farmers around the world.

Acronyms

AGRITEX	Agriculture Technical Extension
CA	Conservation Agriculture
CF	Conservation Farming
CFGB	Canadian Foodgrains Bank
FAO	Food and Agriculture Organisation
FGD	Focus Group Discussion
HH	House Hold
NGO	Non-Governmental Organisation
OPV	Open Pollinated Variety
SSF	Small Scale Farmer
UCC	The United Church of Canada
WFP	World Food Program

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1. EXECUTIVE SUMMARY

Conservation Farming (CF) is a crop production system adapted for smallholder farmers in Southern Africa based on three principles of conservation agriculture – minimum soil disturbance, permanent soil cover and crop rotations. This system of crop management is superior to conventional management systems which rely on tillage for land preparation and weed control. The main advantages of CF include enhanced soil fertility, accurate placement of crop nutrients, timely planting and increased availability of soil moisture for crop use.

Christian Care Zimbabwe has implemented CF projects with support from The United Church of Canada and Canadian Foodgrains Bank since 2006. The Nkayi and Chirumhanzu CF projects were evaluated by a 7 member team of local and international experts. Qualitative data collection methods relied on participant interviews using focus group discussions of CF and non-CF farmers supplemented with institutional interviews, farm visits, and the review of relevant documents, including Christian Care program planning and reporting documents as well as CF research documents.

The main results of the CF projects were categorized in the areas of technology adoption, yields, and impact. Minimal tillage was universally adopted by CF farmers, permanent soil coverage/mulch was adopted by 83% of those evaluated, and crop rotation was adopted almost universally in Chirumhanzu, and practically not at all in Nkayi. Maize yields increased dramatically under CF, averaging between 2.9 and 3.9 MT/ha during the last cropping season, while conventional yields averaged between 0.5 and 0.7 MT/ha. Improved maize yields increased the amount of food available at the household level. In addition, increased income levels from surplus production allowed project participants to send children to school, buy livestock and purchase supplies such as cooking oil and sugar. The majority of CF farmers, especially women, felt that maize production using CF was less labour intensive per unit of production. In Nkayi, approximately 15% of the households were trained in CF, and now approximately 50% of the households practice CF. Adoption was enhanced by working closely with government agriculture extension agents and coordinating with other institutions. Critical issues facing continued adoption of CF include sufficient procurement of mulch and plant nutrients (both organic and inorganic forms), clarifying actual labour demands and promotion of CF for crops other than maize. The evaluation was not able to determine the impact of linking Biblical teachings with CF adoption.

The evaluation concludes that CF is a very relevant response to the needs of smallholder farmers particularly in achieving food security and appears adaptable to a wide range of agro-ecological environments. It also provides a resilient approach to helping smallholder farmers adapt to changes to climate patterns, especially related to increased drought and higher temperatures. Up scaling the promotion of CF based on farmer trainings and follow-up, needs to be the focus of the CFGB network and other organizations. The greatest risk to non-adoption of CF is focusing CF projects on input transfer in the form of seeds and fertilizers rather than knowledge building.

Based on the findings, numerous recommendations were made for enhancing the role of CF in the livelihoods of smallholder farmers in the region. Introduction and promotion of CF programs should be

coupled with organic methods of maintaining and restoring soil fertility such as green manure and cover crops. Permanent soil cover with mulch is a key component of CF and must continue to be promoted strongly. In regions where commercial seed is scarce and expensive, OPV seed production and the development of community seed banks should be promoted. Participatory farmer research and demonstrations should be carried out in investigating the use of appropriate nitrogen fixing plants, green manures and cover crops, and in the use of alternative staple and cash crops. It is also important to ensure a broader institutional support and stakeholder involvement in the promotion of CF by working closely with the local agriculture department, research centers, extension officers, local leaders and other NGOs working in similar programs. In promoting CF, the focus should always be on capacity building activities, and inputs provided to the farmers should be minimal.

2. PURPOSE OF THE EVALUATION

The success of food security programs which introduce proven technologies is related to the adoption rate and spontaneous uptake of the technology in the community. This approach also applies to the promotion of CF. If there is an initial adoption of CF after being introduced into a community and if the number of smallholder farmers practicing CF spontaneously grows each year in the community, the promotion of CF will be considered self-replicating and therefore sustainable.

The purpose of this evaluation is to develop recommendations for Christian Care and the larger CFGB network that will increase the sustainability of CF adoption in food security programs. More specifically, the evaluation seeks:

- a. to validate the effectiveness and sustainability of CF practices in enhancing productivity of smallholder farmers
- b. to assess the adoption success of CF practices by project participants and other smallholder farmers in the community
- c. to assess how the inclusion of God and biblical principles increases the adoption of CF
- d. to identify key principles that enhance the adoption of CF in order to provide direction to Christian Care as they design projects to continue to promote CF
- e. to provide findings and recommendations to the CFGB network that is actively promoting or planning to promote CF practices as part of their food security programming

3. CONTEXT OF THE INTERVENTION

3.1 Overview of Conservation Farming in Zimbabwe

Despite the crucial role of smallholder agriculture in the livelihood of the majority of Zimbabweans, the sector is characterised by declining soil fertility, shortages of key agricultural inputs, recurrent drought and low productivity that ultimately contributed to an increased food and nutrition insecurity in the households. In an effort to reverse this negative trend of productivity and food security, there has been a series of initiatives in Zimbabwe such as Conservation Farming (CF) for improving household food security.

CF is a crop production system adapted for smallholder farmers based on the three principles of conservation agriculture - minimum soil disturbance, permanent soil cover and crop rotations (FAO 2010). Conventional crop production systems used by smallholder farmers in Zimbabwe rely on tilling the soil for land preparation and weed control, usually with a plough using animal traction. In contrast, the only tool used by CF practitioners is a hoe which is used to prepare carefully spaced planting stations. Manure and/or chemical fertilizer are added to each planting station to enhance soil fertility. Mulch is spread over the field leaving small openings at each planting station which moderates soil temperature, reduces soil erosion, minimizes soil moisture evapo-transpiration, enhances microbial activity and increases soil fertility over the long term. After a significant rainfall during the beginning of the rainy season, farmers plant three maize seeds per planting station. Later in the season, the plants are thinned to an average of two plants per planting station to achieve the ideal plant density for maximum yield.

In Zimbabwe, CF has been increasingly promoted with smallholder farmers since 2004 by the Zimbabwe Ministry of Agriculture and numerous non-government organizations through various donor-funded relief initiatives with the aim of improving crop production among vulnerable farmers. Farmers have shown a growing interest in CF mainly due to gains in yield as a result of practicing the method. The number of farmers who practice CF has increased from 4700 households in the 2004/2005 planting season to more than 50,000 in the 2008/2009 planting season.¹

3.2 Christian Care-CFGB-UCC Supported CF Program

Christian Care, supported by the Canadian Foodgrains Bank (CFGB) and The United Church of Canada (UCC), has carried out CF programming in five rural districts in Zimbabwe: Nkayi, Chirumhanzu, Nyaminyami, Chimanimani, and Gutu with the objective of improving crop yields and household food security in these communities. This evaluation was limited to the CF projects in Nkayi and Chirumhanzu districts which included an open pollinated variety (OPV) seed production component.

The CF program started in five wards in Nkayi district in the 2006/7 farming season with 50 households, upscaling to 500 households by the 2008/2009 season. In Chirumhanzu district, a 3 year CF program

¹ Twomlow S, Urolov JC, Jenrich M and Oldrieve B. 2008. Lessons from the field – Zimbabwe’s Conservation Agriculture Task Force. Journal of SAT Agricultural Research 6.

started in the 2008/9 cropping season, with 120 households in 6 wards, and upscaling to 720 households in 7 wards by the year of this evaluation, 2010/2011. Since the start of the program, more and more farmers have taken up the practice spontaneously and the size of land put under CF has gradually increased.

Both projects were training oriented. Training included workshops on the principles of conservation farming, organic fertilizer production, crop rotation, crop management, harvest technologies, and seed production and storage. Techniques used for training include: a) community based workshops and individual farm visits by staff, Zimbabwe Ministry of Agriculture Technical Extension (AGRITEX) officers, and/or trained farmers, b) field days at ward and district level, and c) farmer exchanges within the district as well as to other districts. In addition, prizes were given to individual farmers in recognition of their achievement. Inputs typically provided to individual farmers were limited to OPV maize seed which was provided to all farmers in their first year of the program. In subsequent years most farmers were required to produce their own seed. Legume seed was provided in Chirumhanzu as an encouragement to crop rotation.

Christian Care in collaboration with local communities and government departments has implemented the program while CFGB and UCC provided financial support and periodic technical consultation during the implementation.

3.3 Institutional Context

- **Public Policy**

The Government of Zimbabwe has prioritized Millennium Development Goal number one, the eradication of hunger and reduction of poverty. Zimbabwe strives to reach this goal through increased food production. Food production has been compromised by removal of agricultural input subsidies after adoption of the economic structural adjustment in 1992, climate change, and fast track land reform which was embarked on in an effort to empower the landless Zimbabweans. The government does not have an agriculture policy directly referring to Conservation Farming. During recent years the Zimbabwe government has promoted a highly mechanized and input intensive model of agriculture and has donated imported farming equipment which include tractors, combine harvesters, and ox drawn implements. For the past decade the nation confronted a multitude of challenges, including droughts, floods, inflation, degradation of health and educational facilities. However, due to the formation of the Government of National Unity (GNU) in 2009, 2010 was economically and politically stable and conducive to the initiation of sustainable livelihood projects.

The GNU has promoted a free market economic model, removing monopolies held by parastatals, which has created an improved political environment conducive to economic growth. Accomplishments include dollarization, control of catastrophic inflation, widespread availability of food throughout most of the country, generally lower cereal prices, and better harvests due to slightly improved capacity utilisation in the agricultural sector.

- ***Institutional Context***

From 2004 to 2008 the number of households supported by numerous NGOs with seed, chemical fertilizer, and technical support went from 4,700 to 50,000, with FAO recommending input packages covering seed and fertilizer needs for 0.25 ha². Models of extension vary, from those that are church based, and following faith based methodology (i.e.: Farming God's Way) to secular approaches. Inputs provided to farmers also vary widely, from organizations that include seed, farm tools, chemical fertilizers, pesticides, and other farm supplies, to those which provide training only.

3.4 Rationale for Conservation Farming Program in Zimbabwe

- ***Original Situation***

The major problem causing food insecurity in many districts in Zimbabwe, including Nkayi and Chirumhanzu, is declining crop yields which are reducing the number of months that families can feed themselves. An average family of 6 consumes between 0.9 MT and 1.5 MT (900-1500 kg) of maize per annum. While average national maize yields for the last two seasons (2009 & 2010) was 0.85 and 0.7 MT/ha respectively, the average yields in Nkayi and Chirumhanzu were considerably lower, estimated at 0.4 to 0.6 MT/ha per year during the last two years.

The problem of declining crop yields is attributed to recurrent droughts or prolonged dry spells, the lack of draft power, and limited access to quality seed, chemical fertilizer, and other agricultural inputs. In conventional farming the use of draft power is one of the key inputs to crop production. Drought periods lead to reduced or weakened livestock as grazing lands become barren. Farmers who rely on livestock for land preparation risk lower yields due to late planting. They also become more vulnerable to late dry spells. In many rural areas of Zimbabwe, access to agricultural inputs is difficult. In some years, agricultural inputs are not available in the local markets on time, in the quantities needed, or at an affordable price. In addition the resources available are often not used efficiently, also reducing yields and increasing costs.

- ***Programming Response***

The CF programming paired with OPV seed production is aimed at increasing household maize availability through increased and sustainable maize yields. It is assumed that by using a hoe, instead of draft power, planting can be timely and make the best use of the available rains. In addition, by using planting basins, applying a thick mulch cover, increasing the amount organic matter in the soil, and improving the water retention capacity of the soil through improved soil structure, dry spells and water logging stress can be mitigated. By achieving ideal plant populations and micro-dosing with organic and/or chemical fertilizers the CF system also uses the land, seed, manure and chemical fertilizers more efficiently, requiring less of each for a significantly increased yields, and making maize production more efficient and more capable of achieving food security with fewer resources. In addition, by capacitating

² Twomlow S, Urolov JC, Jenrich M and Oldrieve B. 2008. Lessons from the field – Zimbabwe's Conservation Agriculture Task Force. Journal of SAT

the farmers to produce their own quality seed, this program expected to enable the farmers to plant on time, reducing their vulnerability to late seed procurement and consequential late or null planting.

4. EVALUATION METHODOLOGY

The evaluation was mainly based on participatory approaches to engage key stakeholders more actively in reflecting and assessing CF principles, practice and impact. The methods used for information gathering during the evaluation were institutional interviews with representatives of local stakeholders working in the districts, FGDs with community members, farm visits of participant farmers and observation of their farms and review of relevant documents such as project reports, proposals and policies and guidelines. For an outline of the information sources related to interviews and focus group discussions (FGDs), please refer to Annex 8.1. Annex 8.2 summarizes responses from the FGDs.

The guiding questions for each of these data collection methods were structured around five criteria – relevance of CF to farmers’ needs and challenges and also to the priorities of the government, effectiveness of the CF program in achieving planned results, efficiency of CF in terms of cost-benefit, impact on the livelihoods of the participants and the environment and sustainability of the program. See Annexes 8.3 to 8.8 for a summary of Evaluation Questions.

The evaluation was conducted by a team comprising of 7 local and international experts each having different expertise in agriculture and rural development. See Annex 8.9 for the evaluation team members.

4.1 Data Collection Methods

- ***Institutional interviews***

Interviews were conducted with the Christian Care Deputy Programs Director and 8 field staff, past project officer, 11 local government officers and AGRITEX using a semi-structured questionnaire (Annex 8.3). The main objective of conducting the institutional interviews was to obtain a general picture of the districts, government policy and practice of CF and Christian Care’s perspective on the practice, achievement and lessons learned as a result of implementing CF programs.

- ***Focus Group Discussion***

Focus group discussions and semi-structured interviews with targeted groups in selected villages were organized to get a deeper insight into the CF program from the participants’ perspectives. FGD is a form of group interview that capitalizes on group interaction in order to generate data. The FGDs were held in 4 sites in the two districts with selected groups of people usually comprised of 4 to 6 randomly selected participants. For a copy of the semi-structured question guides see Annexes 8.4 to 8.7. There were a total of 18 FGDs held. Within the report, the frequency of specific responses is presented as a percentage of the total number of FGDs. For a summary of the FGD responses, see Annex 8.2 where both the actual numbers and percentages are presented.

During the FGDs, specific information was gathered from individual FGD participants in addition to the open ended questions. A summary of these individual farmer responses showing the total number of respondents is also summarized in Annex 8.2.

The FGDs included men and women farmers selected from 4 CF participant wards. For comparison purposes, FGDs were conducted in wards where there was the highest and lowest reported CF uptake, and included non-CF practitioners from the same wards. The times and places for the discussions were arranged in advance by Christian Care in coordination with local leaders. The FGDs were held in community spaces in the villages (schools and churches) and lasted from one to two hours each.

In order to have a cross-section of perspectives on CF, the following sub-groups were selected:

- Trained CF practitioners – gender mixed
 - Trained CF practitioners – women only
 - Spontaneous CF practitioners – gender mixed
 - Spontaneous CF practitioners – women only
 - Non-CF practitioners – gender mixed
- ***Farm Visit and Observation***

When the FGDs were done each day, the team divided into three sub-teams accompanied by a community member and a Christian Care staff person. Each sub-team attempted to do a “trans-sectional walk” which involved visiting every household along a designated section of road. The number of farms visited in Ward 25, Ward 13, Tatonga Ward and Maware Ward were 12, 9, 11 and 16, respectively, for a total of 48 farms. These farm visits were generally random in Nkayi, but not in Chirumhanzu where sub-groups were taken to village clusters where CF was promoted. The data collected in each visit focused on whether CF was adopted and what CF practices were adopted, as well other farm characteristics (see Annex 8.8 for farm visit checklist).

• ***Relevant Document Review***

Relevant documents for the evaluation such as project proposals, progress reports and policies and guidelines of the government and Christian Care were reviewed to gather information and identify relevant issues for the evaluation. Research results on CF were also used to gather and triangulate information. These included the following project proposals and reports:

- Chirumhanzu Agricultural Recovery and Conservation Farming Project End of Year Report, 2010
- Chirumhanzu Conservation Farming Project, 2010
- Nkayi ARP Terminal Report, 2009

The following secondary research documents were reviewed by the evaluation team:

- “Conservation Agriculture Practices and Adoption by Smallholder Farmers in Zimbabwe”, Mazvimavi, Kizito; Ndlovu, Patrick V.; Nyathi, Putso; and Minde, Isaac J., Poster presented at the Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa, September 19-23, 2010

- “Socioeconomic and institutional factors influencing adoption of conservation farming by vulnerable households in Zimbabwe”, K. Mazvimavi, S. Twomlow / *Agricultural Systems* 101 (2009) 20–29
- “Lessons from the field,” Twomlow S, Urolov JC, Jenrich M and Oldrieve B. 2008. Zimbabwe’s Conservation Agriculture Task Force. *Journal of SAT Agricultural Research* 6.
- “Conservation agriculture and smallholder farming in Africa: The heretics’ view”, K.E. Giller et al. / *Field Crops Research* 114 (2009) 23–34

4.2 Limitations of the Evaluation

There were a few challenges in conducting the evaluation but the team tried its best to minimize their effect on the reliability of the evaluation. These limitations included the following:

- The evaluation was held in only two of the 5 regions where Christian Care is collaborating with CFGB and UCC in CF programming
- The evaluation team in many cases was forced to rely on translation or information shared in the speakers second language,
- The active participation of project staff in the ward selection process, translation, and occasionally in the selection of the participants in the FGDs.

5. MAJOR FINDINGS

This section summarizes the findings of the evaluation and provides answers to the questions posed in the evaluation framework such as the relevance of CF to farmers' needs and challenges and also to the priorities of the government, effectiveness of the CF program in achieving planned results, efficiency of CF in terms of cost-benefit, impact on the livelihoods of the participants and the environment and sustainability of the program.

5.1 The Practice of Key Conservation Farming Principles

"CF is just like Noah's ark; you have to do everything to standard and measure exactly right."

Observation from Chirumhanzu FGD

Understanding the key principles of CF such as minimal tillage, permanent soil coverage and crop rotation and their practice is critical in understanding the overall achievement and level of adoption of the system. The following sections highlight the practice of CF in the two districts.

- **Minimal Tillage**

Smallholder farmers currently practice conventional agriculture where soil tillage, usually with animal traction and a plough, is considered as one of the most important operations to create a favourable soil structure, prepare the seedbed and control weeds. A key principle of CF is minimizing soil tillage to reduce soil erosion, mineralization of soil organic matter and moisture loss. Other benefits of a minimal tillage system include enhanced microbial activity and improved water infiltration.

The evaluation observed that farmers trained in the practice of CF had successfully minimized tillage through the preparation of properly spaced planting stations. These stations were dug during the dry season with hoes, and often in groups. Pictures 1 and 2 show examples of how the fields had been prepared.



Picture 1 and 2: Planting stations in sample farmer's fields

- **Permanent Soil Coverage**

Permanent soil coverage has been achieved through the use of stover left over from the previous harvest and through sourcing organic material from the surrounding grazing areas and forest. The most common material used is maize stover, followed by grass, especially thatching grass, and then forest

leaves. While 83% of the farmers interviewed on mulch usage reported using mulch (Annex 8.2), there were many challenges highlighted related to the procurement of mulch. These included:

- ✓ **Timeliness** - Many respondents noted that mulching takes time, and must be done well ahead of time when it is abundant, preferably when there is still plenty of grass available in the surrounding areas. Mulch gathering cannot be delayed until immediately before planting season when it is sparse, scarce, and may have been burned. This is compounded by sourcing mulch when it is time to begin preparing planting basins and planting. In addition, by delaying mulch application, moisture levels in the soil are lower and planting is delayed and germination is poorer.



Picture 3 and 4: Mulch gathering and placement on field

- ✓ **Protection** - Due to the pressure from cattle during the dry season, the CF plot must be fenced, or the mulch must be removed during the dry season and returned at planting time. In addition, mulch is very vulnerable to fire, which is harder to protect from. Fire breaks can be built with some success.
- ✓ **Scarcity** - In some areas there are little grasslands and forest to source mulch from and harvesting reeds from the river banks can be dangerous due to crocodiles. In addition, as more farmers use CF there is greater competition for that mulch sources.
- ✓ **Limited Stover** - Mulch based on stover can only be produced if there is already excellent fertility and acceptable rains. It is difficult to have an excellent yield without mulch, and thus it is difficult to produce that stover in the first place to make that needed mulch (See Annex 8.2 for a summary of FGD and individual participant responses for each of the findings).

- ***Crop Rotation Practices***

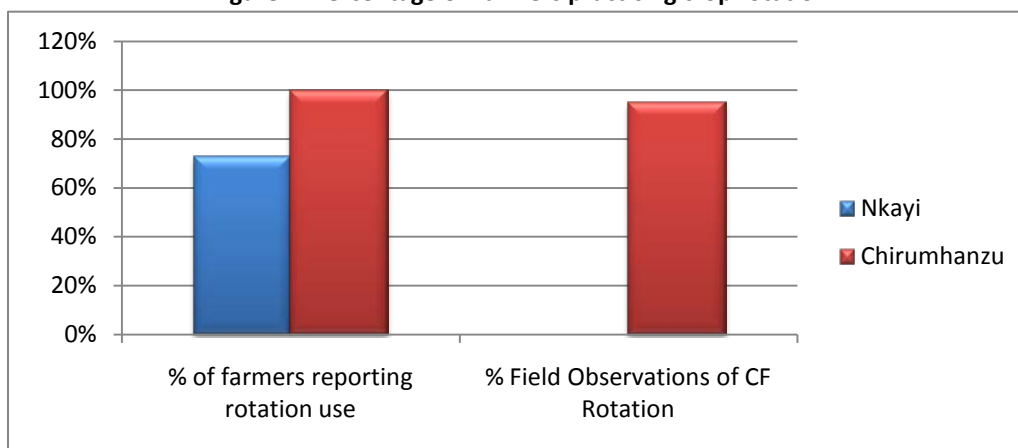
Crop rotation is the third principle of CF and both projects included rotation in its planning and training package by providing legume seeds. Due to local preferences, in Nkayi cowpeas were promoted while in Chirumhanzu, the project promoted groundnuts. Based on FGDs and field visits, farmers were implementing rotations in Chirumhanzu but not in Nkayi (Figure 1). In Chirumhanzu, almost all of the CF plots visited had an adjacent plot with groundnuts or another legume which was marked for planting stations and often mulched. The fact that the plots were marked shows that the area is clearly intended to be part of the CF plot. In Nkayi, the legume was generally not part of the CF plot and was not planted in an area that was previously under CF. No example of a mulched legume was observed. A possible

conclusion is that in Nkayi, the farmers considered the planting of a legume to be a 'rotation' when in fact there was no clear rotation taking place on the CF plot.



Picture 5 and 6: Examples of CF crop rotations with maize and groundnuts

Figure 1: Percentage of Farmers practicing crop rotation



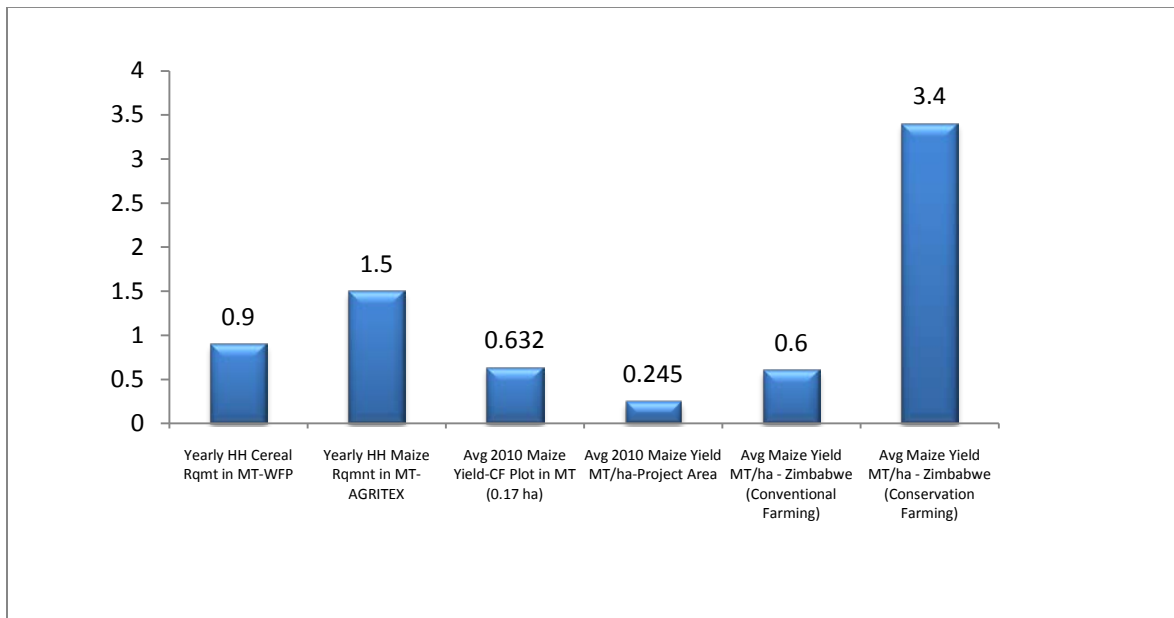
5.2 Maize Yield in Conservation Farming versus Conventional Farming Systems

“You have to follow a plough a long way to get 20 bags of maize . . . with CF on just a small piece of land you can get a lot of maize” – FGD participant, Nkayi district

The evaluation confirmed that CF, when properly used, can result in improved soil fertility and water efficiency of farms and consequently in a significant yield increase. During the evaluation 72% of the FGDs identified yield increase as an advantage of CF. Both FGDs and independent sources report that maize yields using conventional farming systems average between 0.2 and 0.8 MT/ha, depending on the year, with 0.6 MT/ha being the national average over time. However, participants reported that with CF, they were able to harvest the equivalent of 2.9 to 3.9 MT/ha when they extrapolated their yield to one hectare. While in comparison, this may seem like an extravagant amount, it should be noted that

the average amount of land planted under CF was only 0.17 hectares³ for both districts, while conventional plots averaged 2 hectares in Nkayi and 3 hectares in Chirumhanzu. Nevertheless, the contribution to family food security is significant even on this relatively small plot. The average production from this plot was 500 to 700 kg and is comparable to the average harvest for an entire hectare under the conventional system, and represents about half of the family requirements for maize grain (estimated at 0.9 to 1.5 MT per household according to the World Food Program and the AGRITEX office, respectively). Farmers did not abandon conventional agriculture, but rather continued to use both systems. CF was valued as an important means to increase production.

Figure 2: Comparison of household maize requirement and yield under conventional and Conservation farming systems



“CF gave me the ability to be as good as everybody else” – Chirumhanzu participant

The increased production resulting from CF caused other significant changes in the daily lives of the farmers. They included the following:

- Increased food consumption – The majority of the FGDs reported that that there was more food available for consumption due to CF implementation, and many participants noted that now they no longer need to beg and borrow from their neighbours. Some specifically reported that they now have enough food to feed their grandchildren and have a personal food reserve. Non-CF farmers who participated in the FGDs were quick to note that their neighbours no longer come begging for work and food from them. Instead, some of the better off conventional farmers now go to the CF farmers to purchase grain.

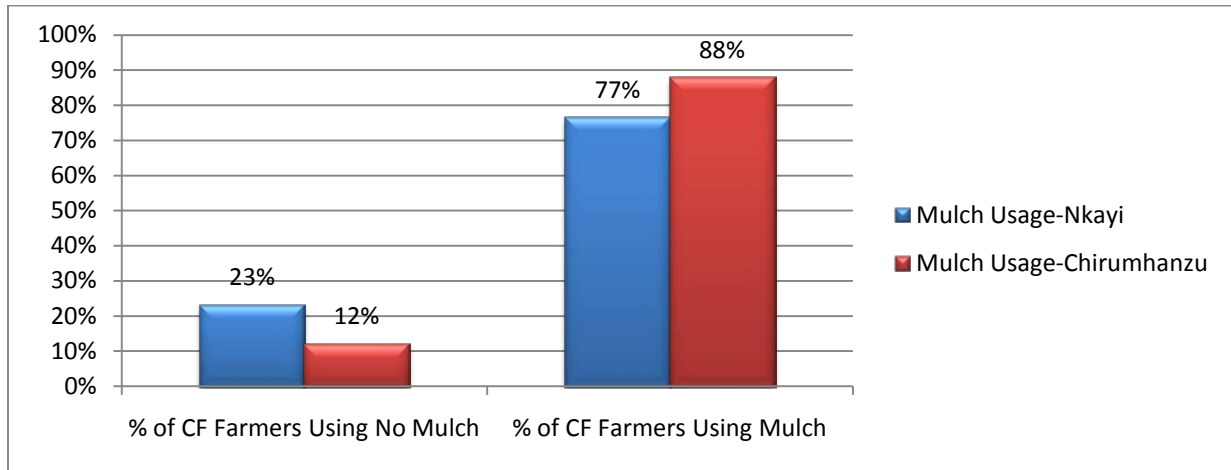
³ 0.17 ha = 41 meters x 41 meters

- Increased income - Higher maize yields also increased amount of cash available to cover other needs. 64% of the FGDs observed that there was increased income. With conventional tillage during good years, farmers were able to harvest just enough to cover their HH needs on their average plantings of 2 hectares. By adopting CF on an additional small plot, instead of struggling to procure a minimal amount of food, many of these families have enough to eat and a margin to sell to purchase other necessities. CF farmers now have cash or barter for things such as cooking oil, grinding mill fees, livestock (chickens, goats, sheep, and cattle), and even a margin for such luxuries as sugar for their tea, new kitchen and table ware, and being able to give food and seed to needy neighbours.
- Improved self-dignity - Non-CF practitioners noted that many of the people who are now CF farmers used to be looked down upon in the community, but are now perceived differently. They no longer beg for work and food, but walk tall, bath 'even with soap', and wash their clothes, and some even have new clothes. A large percentage of FGDs reported that CF provided them with more funds to cover the schooling needs for their children. This included being able to pay school fees and purchase the required uniforms, shoes, books and school supplies. Children reflect their parents and there is a great sense of dignity in being able send children to school with all the proper materials and properly uniformed.
- Enhanced family and community life - The majority of the FGDs observed that the practice of CF enhanced their family and community life. Farmers shared that in many cases the family unit was working more harmoniously as a result of CF. Families were worked together on their CF plot, and for some of the more difficult tasks such as digging planting stations, communities were worked together. CF gave men and women something productive to do all year, and made them more 'professional' and productive in other areas of their lives. Families were also able to gain other assets such as purchased foods (sugar), clothes, livestock, and house wares that make family life richer and more joyful. Due to production not relying on a hoe instead of draft power there was less community conflict related to accessing shared draft power now that everyone had the capacity to plant on time using their own resources.

5.3 Moisture Use Efficiency

The CF system promoted in both districts emphasized that mulch covers be at least 5 cm thick. This focus on mulching significantly contributed to improving the moisture use efficiency of the cropping system. The net effect was a more sustainable and reliable cropping system with an assurance that in years when reduced rainfall could not sustain a conventionally managed field, the CF plot would likely have only a slight yield decline. Interestingly, while 39% of the FGDs identified mulch procurement as the disadvantage, this did not deter them from actually procuring the mulch.

Figure 3: Percentage of CF farmers using mulch



The level of mulching was lower in Nkayi where the project has been inactive for two years compared to the current project in Chirumhanzu. The main reason for this difference is related to training. All but two of the respondents who had not applied mulch in Nkayi were spontaneous adopters. They had never been formally trained and were picking up the system from their neighbours.



Picture 7 and 8: Mulch application

It was sometimes observed during field visits that non-trained adopters tend to apply CF principles except mulch to a smaller plot at first (using basins with optimum plant populations and micro-fertilizing), and then later, or incrementally adding mulch as they increased their plot size. Trained practitioners, on the other hand, often apply all of the CF principles, including mulch, to a model plot, *and then have one or more fields applying all the principles but the mulch*. Field visits in Chirumhanzu showed that numerous farmers who claimed to be ‘non-adopters’ were actually applying CF principles

to at least one field with the exception of the mulch. In the same way, the actual number of hectares under CF was under reported due to the same issue. CF program farmers who had fields using all the principles but mulch would only count the plot with mulch as a 'CF Plot'.

Reasons for the partial and incremental adoption of mulching are unclear, but are probably in relationship to experience and training. Because the sourcing of mulch is labour intensive and 'optional' to planting (you can't plant without the basins, but you *can* plant without mulch), mulching can be postponed until a later date. As farm activities intensify on conventional plots, mulching on the CF plot can and is neglected. Farmers with more experience and training are less likely to neglect mulching as they have seen the impact in previous years, or heard testimonies during training, while untrained farmers are less aware of the impact of mulch on yields.

The regional chief for Maware Ward, Chirumhanzu, noted that the key contribution from this CF project by Christian Care was the mulch. He said "We have been digging from way back to our ancestors, but the mulching came from Christian Care". Planting grains with a hoe is one of the traditional methods of farming in Zimbabwe and Southern Africa, even though ploughing with animal and motorized traction has largely replaced hoe-based tillage in Zimbabwe. At the same time, the Christian Care CF project is not the first to promote CF in Chirumhanzu. Other international NGOs have introduced and promoted CF over the past five years. Many of these projects share one thing in common in contrast with Christian Care's approach; mulch is not emphasized, and is based on stover alone. A significant finding by the community in Maware was that the farmers who had adopted minimal-mulch CF had increased harvest for the first years of the project, but then began to have reduced yields due to soil compaction and weed pressure, until most of them abandoned the technology. However, they have found that with a heavy mulch layer they do not have issues with compaction and weed pressure and yields have increased from year to year.

In conclusion, while procuring mulch is clearly a key challenge for the farmers, it has also been affirmed to be one of the key contributors to enhancing the sustainability of high crop yields even on drier years. Mulching may be the most important key to making CF sustainable.

5.4 Labour Demands

The issue of labour is a major concern with the CF system and is often cited as the number one reason for non-adoption. It is usually assumed that vast amounts of additional labour are needed for the CF system because of the need to procure mulch (something not needed or wanted under the conventional system) and dig planting basins, a human powered task that replaces work done by animals or tractors. However, 83% of the FGDs with CF practitioners identified CF as less labour intensive. Analyzing the labour input difference between CF and conventional farming was a difficult task in the FGDs because the scale and intensity of the two practices varied so much. However, after considerable debate in the FGD, farmers largely agreed that less labour was required under CF compared to conventional farming to produce 20 bags of maize.

A farmer based exercise was also carried out to estimate the actual labour investment in CF as compared to conventional tillage. The results showed that in the first year of adoption, applying 100%

mulch coverage at 3 cm of thickness (mulching being the by far the most labour intensive activity), the CF system used 3 to 5 times the labour required for the same amount of land as the conventional system. By the second year this dropped to 1.5 to 2 times the labour of the conventional system. When considering the yield increase by following CF practices, the FGD conclusion that CF is less labour intensive is credible. These results are similar to those from research carried out by INCRISAT in 2009, which showed similar ratios of labour to yield in comparing the two systems. Please review Annex 8.10 for summaries of both studies.

There were several reasons shared which explain why CF requires less labour per unit of output compared to the conventional system. First, while a significant amount of labour is required for mulching, this input is greatly reduced in subsequent years because of the increased production that produces more stover for mulch. Second, even in the first year a well mulched field will have very little weed pressure, such that the burden of weeding, which must be done in a very short time period, can be spread out over a period of 12 months through mulching. Likewise, the use of permanent planting stations can also be spread out over a longer period of time as compared to ploughing, and after the first year becomes a much easier task as the spot for planting becomes conditioned with organic matter. The biggest difference is not so much the quantity of labour required, but the timing of the labour. The CF farmer has moderate farm activities to attend to all year, while the conventional farmer has little to do for six months of the year, but then requires intense labour during the cropping season.

5.5 Maize Seed Production

An interesting observation of the evaluation was the impact of the formation of community OPV seed banks on sustainability in the Nkayi project. The use of OPV seeds is technically not a practice of CF, but was observed by some farmers to be an integral part of CF system. How the use of OPV seeds contributed to sustainability was simply a matter of economics. Instead of purchasing expensive hybrid seeds, farmers grew their own OPV seed with the assistance of Christian Care, and developed seed banks for their community and other communities. As a result, a high degree of seed sovereignty was achieved in the communities. In Nkayi, the majority of the farmers were using OPV seeds.

In contrast, in Chirumhanzu the vast majority of the respondents reported planting with hybrid seed on their conventional plots. Most planted OPV maize seed on their CF plot, but this reflects the push of the program, rather than actual farmer preference and usual practice. In Chirumhanzu the source of the hybrid seed varied. In many cases the farmers purchased it at a subsidized rate at a nearby government depot, received the seed as a donation from government or NGO sources, or purchased the seed at market rates.

During the course of the two projects, there were several planting seasons where commercial seed simply was not available on the market, was not available on time for the planting season, and/or was priced beyond the reach of most farmers. In response, both projects planned on supporting local seed production and seed sovereignty through the promotion of OPV maize seed varieties, the organization of community seed banks, and training in seed production techniques. In Nkayi this initiative was greatly valued by farmers as improving food security. However, in Chirumhanzu most farmers prefer to source hybrid seed every year, and show little interest in OPV seed production. According to Christian

Care staff, currently only about 20% of the project farmers are actively involved in seed production in Chirumhanzu.

5.6 Conservation Farming Adoption Trends

"We are never turning back; we'll do it 'till we die."
Refrain from participants in both Nkayi and Chirumhanzu.

- ***Change in Conservation Farming Plot Sizes***

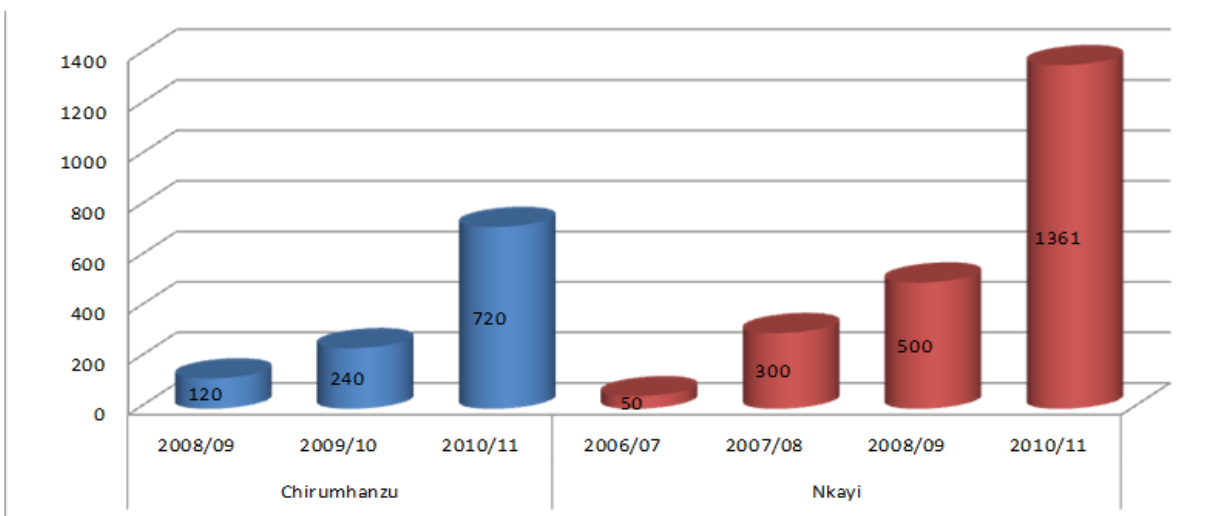
Average household CF plot sizes did not increase dramatically over time in the two project areas. In the Nkayi project, new CF farmers established a 0.15 ha plot when they entered into the program. Based on the evaluation data, the current average plot size is 0.17 ha, a relatively modest increase. For the Chirumhanzu project, initial plot size promoted in 2009 was 0.06 ha and was increased to 0.25 ha in 2011. The majority of the households practicing CF in Chirumhanzu had reached this size based on the field visits. Based on the evaluation data from the FGD, the average plot size in Chirumhanzu was 0.18 ha. Project reports show that CF farmers generally upscale in their second and third years.

In both districts, participants consistently reported plans to increase plot size. In this evaluation, 73% of the respondents confirmed that they planned on continuing to increase their plot size in the coming years, and this is echoed by both projects' reporting documents. While the trend to increase CF plot size is encouraging, the actual increment is lower than expected. There are several reasons which could explain this lack of change in plot size. Farmers may have met the majority of their household production needs, and there was little incentive to increase production for the commercial market where demand was low. Other crops that are highly desired for consumption are not currently emphasized by Christian Care for production under CF, especially small grains, vegetables and tubers, and therefore farmers continued to plant those crops using conventional tillage systems. Since land tenancy is based on occupancy, farmers were loath to abandon tillage of larger tracts of land due to fear of losing the right to access it. Lastly, other factors such as the need to invest labour throughout the year, the challenge of procuring mulch, and the heavy labour of preparing planting stations may also be important in limiting broader application of CF.

- ***Number of Farmers Practicing CF***

There has been a rapid up scaling of the number of farmers practicing CF in both of the districts evaluated, and this is a clear indicator of sustainability of the program. In the Chirumhanzu project the number of participating farmers is increasing steadily as a direct result of project activities and promotion. In its first year there were 120 CF farmers, in the second year 240, and in the current season they report 720 farmers actively practicing CF through the project as shown in Figure 3 below. This increase is strictly farmers trained in CF. During FGDs, farmers reported that in Chirumhanzu an average of 22% of the population in their villages is now practicing CF, with the ward with highest uptake reporting a 34% adoption rate.

Figure 4: Number of households practicing conservation farming by district and year



The Nkayi project serves as a better case study to determine the change in percentage of farmers practicing CF because no additional farmers were trained by Christian Care during the last two years. Therefore, any changes during that period should be the result of spontaneous uptake rather than continued promotion of CF by Christian Care staff. The project worked with 50 households in the 2006/07 season, 300 households in the 2007/08 season, and had increased to 500 households, representing 15% of population, by 2008/09, when the project concluded. Based on FGD and field visits, approximately 50% of households are now practicing CF which represents 1,361 households. There is a clear perception by the farmers that CF is increasingly relevant in their communities and adoption is increasing steadily.

- **Challenges to Conservation Farming Adoption**

“Dig and die!”- Common epithet for CF

Mulch Procurement

It is no surprise that 39% of the FGDs observed that mulching was the single biggest disadvantage to the CF system. While all of the other inputs needed for CF implementation imply a direct savings in inputs as compared to the conventional system, mulch is an additional input which requires time to procure and spread on the land. There are also competing uses for mulch, especially as cattle fodder. In addition, there is the risk that the mulch be burned off when neighbouring fields are burned.

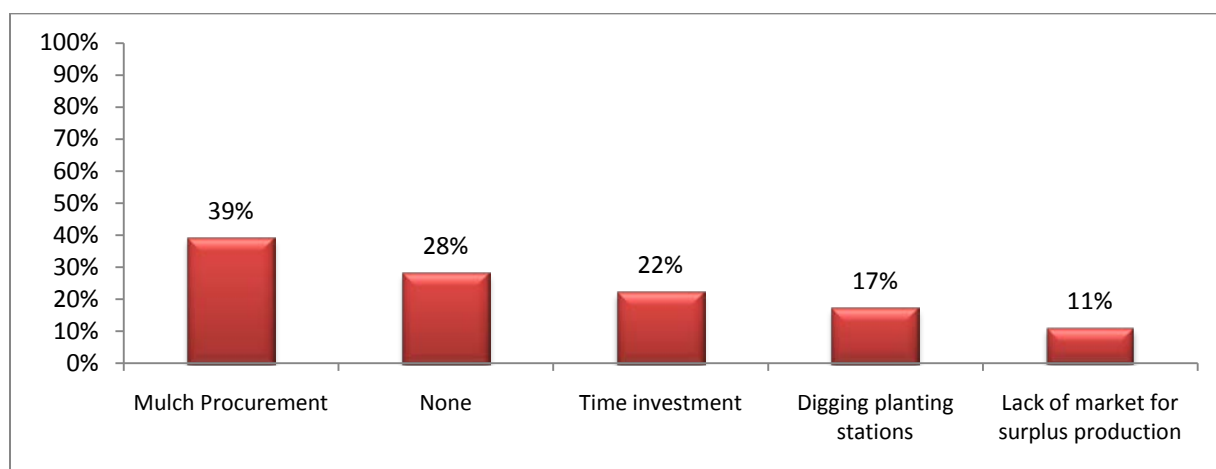
Other challenges with sourcing mulch are cultural. The first CF farmers in a community face considerable social pressure when they embark on a form of farming that is very different from their traditional system. Farmers noted that their neighbours would ‘scoff’ and ‘mock’ them as they worked day after day cutting and carrying mulch to their fields.

Mulch is easiest to gather early in the dry season. If it is not gathered on time, it becomes increasingly hard to source, and the risk of losing it all to fire is a constant threat. Some communities have a very limited amount of grass or other natural sources of mulch available making procurement a special challenge in their areas.

Time investment

22% of the FGDs noted that time management is critical in CF as labour must be invested in CF throughout the year. Funerals, weddings, and other social engagements can be costly to CF implementers, whereas community members practicing conventional farming could commit freely to these events during the dry season. There is no month when there is nothing to do in the CF plot.

Figure 5: Frequency of CF adoption challenges noted in FGDs



Digging planting stations

17% of the FGDs identified the digging of planting stations to be a disadvantage of CF as compared to the conventional system. While the response rate was low, it is notable that the heaviest labour involved in establishing CF is in digging planting stations, especially in clay and rocky soils. For the elderly, disabled, pregnant, and chronically ill, this activity can be very tasking, especially in the first year. In later years the difficulty of this activity is reduced. Many communities dig planting stations in groups to share each other’s burden.

Lack of market for surplus production

11% of the FGDs identified the low market price of maize as a challenge with CF. Ironically, with increased production, some farmers now have the challenge of marketing their excess grain. The sale price for producers is generally very low, especially at harvest time, and as more farmers have an increased amount of excess grain, the price dips even lower. In Nkayi some farmers were reported to have moved away from CF production in favour of a cash crop with greater returns (cotton).

No disadvantages

It is worth noting that 28% of the FGD observed that there were no disadvantages to CF. While there are obvious challenges in CF implementation, the immediate response in many groups was an emphatic 'none'.

Others

Other disadvantages of CF were mentioned, but were not measured statistically in the evaluation. They are important in highlighting other significant community dynamics common where CF is promoted. First, some farmers felt a disadvantage of CF was that it could not be used to grow traditional crops such as pumpkin, beans, small grains (especially for beer production), sweet potatoes and other vegetables. In most communities, CF was promoted as a mono-cropping system for a limited number of crops (primarily maize), and therefore conventional systems inter-cropping traditional crops were used to grow most other crops.

CF potentially could reduce families' long-term access to land. In the evaluation target areas, traditional land tenancy is based on occupation. If a family abandons land in order to concentrate on a smaller plot under CF, they can lose the excess land permanently. By ploughing and planting large tracts, they ensure an inheritance for their children regardless of profitability or yields.

Conventional farming using animals is a long-standing cultural tradition, and CF challenges these. There are cultural rituals and traditions related to ploughing with cattle, and many people, men in particular, enjoy ploughing as part of their male identity.

5.7 Uses of Organic Nutrients

The CF system becomes more sustainable as the investment into soil fertility inputs decreases relative to production output. Although the evaluation did not undertake an economic analysis to study this issue, the decisions farmers made in their management system reflects their preferences. The evaluation revealed that there were principally two ways CF farmers managed the need to provide plants with nutrients.

The first method was relying strictly on manure to provide nutrients to the plant. In Nkayi district, 30 farmers from the FGDs were specifically asked about their fertility management system. All indicated they only used manure. This overwhelming preference of manure is consistent with project report documents as well as with field visits. This management choice was not carefully investigated, but suggests that farmers felt it was a better decision to apply manure than to purchase chemical fertilizer. Manure is readily available and by using manure, the investment into expensive fertilizers was avoided. In contrast chemical fertilizers are not available in the community and must be sourced from urban areas. By relying less on outside soil fertility amendments and more on local nutrient sources, the sustainability of the CF system was improved because it was more economical.

A second method to enhance soil fertility was being practiced by the majority of the CF farmers in Chirumhanzu, and consisted of a combination of organic fertility inputs (manure and compost)

combined with chemical fertilizers. This specific fertility management approach was undoubtedly influenced by the availability of subsidized and donated chemical fertilizer in the community, as well as the promotion of organic soil fertility inputs by Christian Care. It is doubtful that free and subsidized chemical fertilizers will be the norm in the future, and therefore farmers eventually will need to pay market prices, leaving the question as to whether farmers will be able to afford this input in the future. Unfortunately, the soils in Chirumhanzu are extremely nutrient deficient, and given the high rate of leaching this year with the high rainfall, the few nutrients in the soil were likely washed away below the rooting zone.

Comparing the two systems, the reliance on local nutrient sources in Nkayi was clearly more sustainable than dependence on chemical fertilizers in Chirumhanzu. However, the context between the two areas is very different and needs to be considered closely. Unless long-term soil fertility solutions are provided to farmers managing severely depleted land in Chirumhanzu, the future sustainability of farming there, CF or otherwise, is questionable.

5.8 Agriculture Policy

Despite generally strong support for CF programming from local leaders, district government officials and most of the AGRITEX officers, there was no evidence of a government agriculture policy that highlighted the value of CF to enhance food security for smallholder farmers. Although the evaluation team did not study the Zimbabwean Government Agriculture Policy, responses made during institutional interviews suggested that the policy was directed at mechanizing smallholder agriculture farming systems by promoting conservation agriculture principles, zero-tillage equipment (both animal traction and fully mechanized with tractors for seeding and spraying herbicides) and the use of external inputs, mainly chemical fertilizers and herbicides. The ultimate goal seemed to be focused on transforming the smallholder farmer from subsistence farming into commercial farming, rather than increasing smallholder farmer food security. There was also resistance by to the idea of the smallholder farmer reverting back to a hoe.

Many Christian Care staff and farmers in the FGDs identified the local AGRITEX officers as being instrumental in introducing and promoting CF. This was made possible as a result of Christian Care funding the CF training of AGRITEX officers at the River of Life Training Center in Harare, as well as receiving cash compensation for supporting a limited number of project activities. AGRITEX officers play a key role in the promotion of CF because they are permanently based in communities and therefore have the opportunity to engage much more with local farmers than Christian Care staff, and can continue training when Christian Care moves to a different area. Despite no formal policy to promote CF, the Ministry of Agriculture appears open to their field-based staff supporting the training of farmers in CF.

5.9 Impact on Gender

The implementation of CF has a significant impact on women. In all of the women-only FGDs, women stated that their labour input was less using the CF system compared to the conventional system to produce an equal amount of food. Some of the reasons reported for this labour reduction included

reduced time spent weeding and less travel time for agriculture production due to the close proximity of the CF plot to house. This is particularly important to the women who can now easily make multiple trips to the field in a single day, making more efficient use of time in the field, without neglecting other duties. In addition there is a special advantage for women in adopting CF because agricultural labour can be spread out over the year and harmonized with other household responsibilities.

Women also noted that CF increased their access to food. The person who prepares the field generally takes ownership of the harvest. Under conventional agriculture the man ploughs, and thus gains considerable claim to the harvest, even though the women often plant, fertilize, weed and gather the harvest. Under CF the women can do all land preparation, and thus often gain increased access to the harvest. During this evaluation women mentioned numerous times that when their children cried for food, they no longer had to beg for cash from their husbands but could use their own grain for food, or barter for supplies. They also reported being able to improve their cooking utensils and purchase other household items such as shoes and clothes. As they contributed to household food security, women experienced improved self-esteem, especially in situations where the men and women farmed separate pieces of land and women could become sole proprietors of the harvest.

The impact of CF on widowed and abandoned women was also important to note. Women reported that as they began to produce greater amounts of grain on their own, without relying on men to prepare their fields, they became less reliant upon men for land preparation and less vulnerable to hunger. Married women noted that they had gained increasing respect from their husbands as they began to contribute significant amounts of grain to the family granary.

Some challenges emphasized in women-only FGDs in adopting CF were those of mulch and time management. It was unclear why these particular challenges were reported at a higher rate in women-only groups than in mixed groups. The challenge of mulching was reported in 3 of 4 women-only FGDs as compared to 4 of 15 of the mixed FGDs. The challenge of time was mentioned in 3 of 4 women-only FGDs as compared to only 1 of 15 of the mixed FGDs. Since the majority of the participants in all of the FGDs were women, it is unclear if these differences are anomalies, or reflective of challenges specific to women.

5.10 Application of Biblical Principles

“Whatever you do, do all to the glory of God” -1 Corinthians 10:31

One of the expectations of this evaluation was to identify the impact of the use of Biblical principles and faith into the extension and teaching methodology. It was hoped that the evaluation would be able to assess how the inclusion of God and biblical principles increases the adoption of CF. It was discovered, however, that Christian Care has no systemic inclusion of Biblical principles in their teaching and extension methodology. While faith expression is a common part of their field work, with the use of prayer for opening and closing public events and Biblical references being a common tool for teaching, there is no systematization of their usage or inclusion in CF extension. The usage of biblical principles is left almost entirely to the capacity, interest, faith development and training of the individual extension worker. It should therefore be assumed that this evaluation will not be able to assess the impact of the

inclusion of God and biblical principles on adoption rates since there was no systematized, sustained effort to make them a part of the project.

Having made a note of this, there were interesting findings in the field that linked faith with CF, whether it was taught to the farmers by extension workers or not. During the FGDs one biblical connection made numerous times that inspired adoption was the story of Joseph, (from Genesis). Farmers made particular reference to his inspirational dreams; the concept of good stewardship and saving in abundant years for the lean years; and being a blessing to the nations through faithfulness with the resources to hand. Another story mentioned was that of Moses being called to lead Israel out of Egypt. Farmers connected this story with God's all sufficiency; there is no need for outside resource as God provides for every need. A third story mentioned was that of Garden of Eden. They concluded that it is a call to us to care for the earth that we have been given. Participants also mentioned many proverbs, such as 'God is a god of timeliness, and we also should become timely in all that we do', and 'God loves a cheerful giver'.

While many faith connects were made, many people were at a loss to make a faith connection with CF since this was not part of their training. They noted that even if CF teaching methodology isn't faith based, people would have adopted CF because it works. They also noted that faith incorporation into CF teaching methodology isn't necessary, but it is a good thing and encourages people. Generally it was clear that this was not an important issue with the participants that were interviewed, perhaps because it wasn't a significant part of the methodology used.

6. CONCLUSIONS

6.1 Impact of Conservation Farming on Women

CF has a significant impact on women. Because CF is much more productive per unit of land, inputs, and labour, improved food security is more accessible to women than under conventional agriculture, due to the fact that men often have ownership of the majority of these resources. In addition the increased yields have given women increased economic independence, decreased their vulnerability and reduced their dependence on men in food production.

6.2 Adaptability of Conservation Farming to other Agricultural Areas

Although the evaluation observed CF in only two similar agro-ecological contexts in Zimbabwe, there is ample evidence from literature that shows that the principles of conservation agriculture (minimum tillage, soil cover and rotations) are being applied broadly throughout almost all agriculture regions in the world. The CF package based on conservation agriculture principles is one of the best alternatives available for smallholder farmers, and not surprisingly, is being promoted widely by many organizations. This simple observation highlights the value of adapting CF practices to a range of agro-ecological contexts not only in southern Africa, but in many parts of the world where CFGB supports projects. Although CF has potential for improving productivity and is also adapted to a range of agro-ecologic context in many countries, agencies must make their own assessment and identify the ecological and socio-economic conditions that are best for CF implementation.

6.3 Application of Evaluation Recommendations to the Broader CFGB Network

The evaluation findings point to specific recommendations not only for Christian Care, but for the broader CFGB network. As the challenges facing smallholder farmers are similar in many different contexts, so also are the challenges with promoting CF. Therefore, members and partners of CFGB who are promoting CF can equally benefit from the recommendations developed in this evaluation.

6.4 Relevance of Conservation Farming for Climate Change Adaptation

Based on the evaluation findings, CF provides a resilient approach to helping smallholder farmers adapt to the current climate variability and future shifts in climate, especially related to increased drought and higher temperatures. The evaluation learned the effectiveness of CF practices over a range of crop production seasons with variable climatic conditions ranging from drought to excess rainfall. This weather-proofing characteristic of CF is founded on a set of agro-ecological concepts and production practices that addresses the risks of climate variability and reduces vulnerability to drought, flood and heat, and stabilizes smallholder farmer production levels over a range of climatic conditions.

6.5 Importance of Up Scaling Conservation Farming

Given the impact CF is already having for some smallholder farmers, methods to promote upscaling of this farming system needs more focus. This theme is echoed by many other organizations, especially FAO which has for many years been strongly promoting the adoption of conservation agriculture

principles in smallholder farming systems to improve food security. The recent symposium on Conservation Agriculture in Johannesburg, South Africa in February 2011 highlighted the critical need for upscaling CF. A key point was encouraging governments to develop and implement policies that support the upscaling of conservation agriculture. This evaluation also recognized the importance of working closely with government organizations to promote CF.

6.6 Understanding Factors Causing Non-Adoption of Conservation Farming

The evaluation team concluded that there are several components of the CF system which result in farmers making a decision to not adopt CF. Some of the most frequently mentioned included mulch procurement, time investment, cultural stigma and the continued need to cultivate traditional crops using the conventional system. Focusing efforts to clarify misconceptions or improve/adapt the existing CF system will improve CF adoption.

7. RECOMMENDATIONS

The evaluation revealed that there are some positive results of promotion of CF in Zimbabwe that have impacted the livelihoods of the practitioners in a positive way. However, the promotion of CF was also faced with challenges that need to be addressed by Christian Care and other stakeholders in this program. The evaluation team recommends the following actions for enhancing the role of CF in improving household food security and management of natural resources.

7.1 Promotion of Mulching

Maintain the promotion of mulch cover as a key component of the CF system - A key technical finding of this evaluation, consistently confirmed by other research and evaluations of CF, was the challenge of procuring mulch. This evaluation confirmed that this is a key challenge for the CF farmers as well as a key benefit and necessary component for sustainability. Throughout the different activities in the project (training, monitoring, field days, exchanges, etc.), mulching must be stressed. The positive impact of the mulch under normal rains, high rainfall, and drought conditions should be stressed so that farmers prepare their field each year ahead of time, rather than attempting to respond to dry spells by mulching, with tragic but predictable consequences. The challenge of mulching should also be approached from a broader perspective when appropriate. Regional government entities as well as traditional and elected community leaders should be involved in awareness raising and dialogue, as appropriate, to discuss community management issues related to mulch availability, such as controlling the burning of the grass and forest lands, cattle control, and competition for this resource between cattle owners and farmers.

7.2 Soil Fertility Restoration Using Organic Methods

Incorporate the use of nitrogen fixing plants, green manures and cover crops through capacity building and field trials - The lack of soil fertility, especially nitrogen, was observed as a limiting factor on many CF plots. Many participants observed that chemical fertilizers were too expensive to purchase, or were procuring them through non-sustainable means (donations & subsidies). From the very beginning of CF training, leguminous plants should be promoted as an integral part of the CF system. These plants may be used as intercrops, relay crops or in annual rotations. Participatory farmer research groups should be established to investigate which plants are most suitable for their region.

7.3 Crop Diversification

Promote the use of alternative crops, both staple foods and cash crops, to increase diversity - CF farmers shared that they continue to crop using conventional ploughing in order to grow traditional crops that they value, such as millet, squash, rape, and sweet potatoes, among many others. In addition, some farmers shared that they are able to produce more maize than they can consume, but that there is not a good market for maize, and as a result they were maintaining only small plots of CF maize. For this reason, the CF system should not focus exclusively on maize. Not only does this make rotations more attractive, but it responds to many essential dietary and cultural needs. Promoting

the planting of traditional crops in the CF system would go far in responding to these needs, and the promotion of cash crops would help the families develop a more diverse base of production that could help them cover needs in education, health, and housing.

7.4 Improve Access to Markets

Investigate approaches to help smallholder farmers access to markets to receive a fair price for surplus crop commodities - Some farmers shared that with CF they are able to produce more maize than they can consume, but that the market for maize is very poor, giving them little incentive to improve production beyond consumption. Staff noted that some farmers were opting for conventional cash crops due to the poor market for maize. For this reason, market access should be considered during the promotion of crops for CF adoption. When going beyond the production of the commodities needed for HH consumption, programming must take into consideration the market access and value of crops to be produced, and work with farmers to identify the most relevant options for their particular circumstances.

7.5 Seed Production

Promote OPV seed production - This evaluation discovered that in regions where commercial seed is scarce and expensive and where supply is erratic due to supply challenges, seed sovereignty is an important issue, and an OPV seed production component is a highly valuable response. At a minimum, farmer trials of recommended OPV seed varieties should be done to evaluate the difference in performance between OPV and hybrid seed so that farmers can make informed decisions on which variety to plant. In areas where the cost of hybrid seed is prohibitive and/or the supply is erratic, CF projects should be coupled with OPV seed production program to include training on seed production, selection, treatment and storage, and where appropriate the establishment of community seed banks and/or seed exchanges should be promoted.

7.6 Farmer-to-Farmer Extension for Promoting Conservation Farming

Continue to emphasize the use of farmer exchanges and field days to enhance CF adoption - Farmer to farmer exchanges between established CF farmers and new adopters were reported to be one of the most effective teaching methods and agents of increasing CF adoption. These interactions created understanding and enthusiasm that leads to CF adoption. Besides giving new CF farmers a vision of what can be done on their own farms, this activity can also encourage established CF farmers as they become role-models and teachers.

Project staff identified field days as a very effective way of increasing CF adoption. Field days carried out at ward and district levels are recommended for highlighting the achievements of outstanding farmers and creating positive local and regional support for CF by government authorities, traditional leaders, as well as the broader public. Field days can help change the public perception of CF such that it is appreciated by a broader spectrum of the community and can make possible changes in community management of grasslands, cattle management practices, isolation for locally produced seed, etc.

7.7 Participatory Research, Learning and Action

Promote farmer in-field demonstrations and research groups - The most effective adoption of crop rotations (ground nuts in Chirumhanzu) and local seed production (OPV seed in Nkayi) was done where farmers were a key part of the experimentation, planning and implementation process. These innovations to the CF system must be done in the fields of farmers by the farmers themselves, and should respond to problems that farmers have identified. Initial CF application, trials with legumes, seed production and storage, rotations, cash crops, green manures, etc. should be done with and by farmers and farmer research groups on their land. Doing so gives tremendous credibility to the results achieved and challenges with the technologies can be more quickly identified and resolved.

7.8 Context Specific Planning

Investigate CF labour requirements and monitor CF yields with farmers to understand the relative efficiency of the CF cropping system compared to the conventional cropping system - In almost every critical discussion on the relevance of CF with beneficiaries, staff, and stakeholders, the issue of the labour requirements for CF, as compared to the conventional system was a primary interest. The relationship between the amount of labour required for the CF system and the yield achieved, as compared to the conventional systems should be integrated into the training and monitoring of the CF program. The results should be made available to the farmers and used in reporting and project planning, as well as made available to relevant stakeholders. CF projects need to focus on the relationship of labour to yield in order to provide a clearer understanding of the relevance of the CF system.

7.9 Training and Capacity Building

Continue to focus on the knowledge component of CF through trainings and other capacity building activities that empower individuals and communities to utilize and manage local resources and reduce dependence on external inputs - Research has shown that training based programs have much greater long-term impact as compared to input based programs. The Nkayi program provided very few inputs during most of the project cycle and had excellent adoption rates. CF requires a simultaneous and dramatic change in multiple farm practices. Low rates of CF adoption are often due to poor application of the techniques and lack of participation by farmers in the process of problem identification and problem solving throughout the project. Only a high level of participatory capacity building can be expected to create the expected long-term changes required for successful CF adoption.

7.10 Technical Resource Development

Develop training materials to inform farmers about the technical components of CF - Project staff noted that there were no written materials available for use by farmers that summarized the key CF related technical information. Appropriate training materials should be developed covering the technical components of CF, taking into account local language, culture, climate, traditional crops, etc., of the area targeted.

7.11 Stakeholder Involvement

Improve coordination and consultation with relevant stakeholders to enhance the adoption of CF practices - In both regions evaluated, local government and traditional leaders were important participants in the success of the projects, and maintaining healthy working relationships with local leadership was emphasized. CF projects must coordinate and consult with all relevant stakeholders in order to minimize challenges and conflict during the project. This should include working closely with local and regional government authorities, government agriculture extension services, local elected and traditional leaders, other NGOs working in agriculture and community development, etc. In as is possible, all relevant stakeholders should be consulted, with the goal of achieving good communication, harmony, and as is possible, active support.

7.12 Long Term Plan

Develop a long-term project plan of 3 to 5 years to achieve a sustainable level of CF adoption - Staff and stakeholders alike noted that CF programming requires a long term commitment by implementing and funding partnerships in order to effectively bring about adoption on a wide scale. It is recommended that CF programming should be carried out in the target area for at least 3 to 5 years in order to achieve long-term adoption. The technology package is complex and cannot be expected to be adopted quickly. Six month or single year CF projects should be avoided.

7.13 Exit Strategy

Develop an exit strategy with specific indicators at project development to guide program planning - The two projects evaluated did not have clearly articulated exit strategies to guide their eventual departure from the region or wards where they promoted CF. Incorporating an exit strategy into their planning document will assist in making program decisions and strategic planning.

8. ANNEXES

8.1 Information Sources for Evaluation

- Institutional Interviews***

Institution	Participant Name	Position
Christian Care Zimbabwe Administration	Addmore Makunura	Director of Programs
Christian Care Zimbabwe Nkayi	Edmore Moyo	Project Assistant
	Leonard Jazi	Project Officer
	Shebeniah Ndlovu	Project Assistant
	Mathutu	Project Assistant
	Vurayayi Pugeni	Past Project Officer
Nkayi District Administration District Council	Zimbabwe Ndlovu	Chief Executive Officer
	C.Nove	Presidents office admin officer
	Knowledge Chikanya	Assistant District Administrator
	Kufakwezwe Ncube	Rural District Council Chair
	Zimbabwe Ndlovu	Chief Executive Officer-Nkayi
Ishmael Makambwa	Social Welfare Services	
Nkayi AGRITEX	Thabo Ndimandi	Chief Agritex Officer
Chirumhanzu District Administration	Mr. Chisirinunhu	Assistant District Administrator
District Council Chirumhanzu	Mrs. Maracha	CEO Chirumhanzu Rural District Council
Chirumhanzu AGRITEX	Calisto Masiwa	Chief Agritex Officer
	Hare Owen	Agritex Field Officer
Christian Care Zimbabwe Chirumhanzu	Leonard Chandomba	Project Officer
	Sheila Rice	Project Assistant
	Audios Mushiringi	Project Assistant
	Tamirirasheh Chinhamo	Project Assistant

- Focus Group Discussions***

District	Ward	Date	Sub-group	Number of FGD
Nkayi	25	Jan. 18	Trained CF practitioners – gender mixed	2
			Spontaneous CF practitioners – gender mixed	1
			Spontaneous CF practitioners – women only	1
			Non-CF practitioners – gender mixed	1
	13	Jan. 19	Trained CF practitioners – gender mixed	1
			Trained CF practitioners – women only	1
			Spontaneous CF practitioners – gender mixed	1
Chirumhanzu	Chizhou	Jan. 21	Trained CF practitioners – gender mixed	1
			Trained CF practitioners – women only	1
			Spontaneous CF practitioners – gender mixed	1
			Non-CF practitioners – gender mixed	1
	Maware	Jan. 22	Trained CF practitioners – gender mixed	2
			Trained CF practitioners – women only	1
			Spontaneous CF practitioners – gender mixed	1
			Non-CF practitioners – gender mixed	1

8.2 Focus Group Discussion Response Summary

- *Focus Group Discussions*

Question	Response	Response Frequency	
		Out of 18 FGD	%
What are the advantages of CF?	Decreased labour	15	83
	Increased yield	13	72
	Efficiency	12	67
	Ability to prepare land with just a hoe	11	61
	Moisture retention	10	56
	Weed control	6	33
	Improved health	5	28
	Plant early	4	22
	OPV seed availability	4	22
	Improved fertility	3	17
What are the disadvantages of CF?	Increased grazing areas	1	6
	Mulching	7	39
	None	5	28
	Time management	4	22
	Digging planting basins	3	17
	Manure procurement	3	17
	Marketing of harvest	2	11
	Fencing of CF plot	1	6
What is the impact of CF on your life?	Fertility management	1	6
	Improved access to school	9	50
	Improved access to food	9	50
	Improved income	9	50
	Improved family and community joy/harmony	8	44
	Advantages for women	7	39
	Improved community	3	17
	Helps widows	3	17
	Ability to donate to others in need	1	6
Decreased labour	1	6	

- **Individual Farmer Response**

Practice	Result	# of respondents:
Conventional Yields/Ha	0.28 Mt/Ha	24
Conventional Yields-Chirumhanzu	0.3	11
Conventional Yields-Nkayi	0.26	13
CF Yields/Ha	3.8 Mt/Ha	39
CF Yields/Ha-Chirumhanzu	2.87	7 ⁴
CF Yields/Ha-Nkayi	3.9	32
Average land area under CF-Nkayi	0.17	32
Average land area under CF-Chirumhanzu	0.18	7
Total Reported Village Uptake as percentage of the population:	33%	59
Total Nkayi Uptake as percentage of the population:	42%	28
Total Chirumhanzu Uptake as percentage of the population:	22%	31
Farmers planning on increasing CF plot size:	29	40
Farmers planning on maintaining CF plot size:	11	40
Farmers planning on reducing CF plot size:	0	40
Farmers planning on increasing Conventional plot size:	0	20
Farmers planning on maintaining Conventional plot size:	4	20
Farmers planning on reducing Conventional plot size:	16	20
Fertilizer use-Manure only-Chirumhanzu	9	38
Fertilizer use-Manure & Chemical-Chirumhanzu	25	38
Fertilizer use-Chemical only-Chirumhanzu	4	38
OPV Seed use-Nkayi	5	9
Hybrid seed use-Nkayi ⁵	4	9
OPV Seed use-Chirumhanzu	9	34
Hybrid Seed use-Chirumhanzu	25	34
Mulch usage-	52	63
Rotation Implementation Reported by Farmers-Nkayi	11	15
Rotation Implementation Reported by Farmers-Chirumhanzu	34	34

⁴ This was the first year for many of the farmers; all were first year farmers in Maware Ward.

⁵ All 4 Nkayi respondents received free hybrid seed from government.

- **Document Review**

Project planning and reporting documents as well as related research documents were used to gather and triangulate information. These included the following project planning and reporting documents:

- Chirumhanzu Agricultural Recovery and Conservation Farming Project End of Year Report, 2010
- Chirumhanzu Conservation Farming Project, 2010
- Nkayi ARP Terminal Report, 2009

The following secondary research documents were reviewed by the evaluation team:

- “Conservation Agriculture Practices and Adoption by Smallholder Farmers in Zimbabwe”, Mazvimavi, Kizito; Ndlovu, Patrick V.; Nyathi, Putso; and Minde, Isaac J., Poster presented at the Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa, September 19-23, 2010
- “Socioeconomic and institutional factors influencing adoption of conservation farming by vulnerable households in Zimbabwe”, K. Mazvimavi, S. Twomlow / *Agricultural Systems* 101 (2009) 20–29
- “Lessons from the field,” Twomlow S, Urolov JC, Jenrich M and Oldrieve B. 2008. Zimbabwe’s Conservation Agriculture Task Force. *Journal of SAT Agricultural Research* 6.
- “Conservation agriculture and smallholder farming in Africa: The heretics’ view”, K.E. Giller et al. / *Field Crops Research* 114 (2009) 23–34

8.3 Semi-Structured/Institutional Interview Guide Questions

General questions:

What are the functions of your organization? What are the limitations/challenges of the department in carrying out the functions?

What are the major social, economic, environmental changes that have been observed in the district in the last 3-5 years? What are the forces behind these changes? How are farmers adapting to these changes?

What role does your organization play in managing these changes?

1. How do you see the role of CF in addressing the issue of food security in the district?

(RELEVANCE)

- How does CF fit to the government's food security policies and strategies?
- To what extent is CF viewed as of great use by the communities?

2. How is AGRITEX/CHRISTIAN CARE/OTHER promoting CF? (Was promotion of CF implemented in the most efficient way? How?) (EFFECTIVENESS)

- What are the main achievements so far?
- What methods/approaches were used to promote CF?
- What were the major challenges in promoting CF?

3. How is the efficiency of CF as compared to conventional farming system? (EFFICIENCY)

- What are the advantages and disadvantages associated with implementing CF in the area?
- What differences in yield have you observed between conventional and CF production systems?
- Under what conditions (agronomic, climatic, altitude, soil conditions etc...) CF provides substantial benefits? Why?
- Are the practices of CF in the area consistent with the principles of CF?

4. How does CF impact the livelihoods of the farmers in the area? (IMPACT)

- What changes (positive, negative, intended, unintended etc...) do you observe in the households as a result of practicing CF?
- How do you see the impact in terms of food and income security of the households?
- How does CF impact gender relations? (work load on women, access to resources etc...)

5. What do you think needs to be done to improve the role of CF in the farming system in the area? (SUSTAINABILITY)

- How is the level of adoption? (increase/decrease of participants and land under CF)
- What are the pre-conditions for adoption of CF in the area? Do these pre-conditions exist?
- What are the reasons for non-adoption of CF?
- Were some approaches/principles more sustainable than others? Which ones? Why?
- Where did non-project participant farmers learn about CF?

- Is there a common adoption pattern of some principles that farmers choose? If so, why are these being selected?
- Do you observe different phases in adoption of CF? (Increased cost & low yield, increased cost & increased yield, low cost high yield)?
- To what extent will CF activities continue after external support is stopped?
- What have you learned through promoting/implementing CF programs that should be applied to future programs?
- How can CF be most effectively promoted in a community?
- How is the partnership and collaboration in introducing, disseminating and promoting CF among stakeholders (Agritex and others)?
- What are the criteria to make decisions to exit a region?

8.4 FGD Guide Questions: Non-Trained/ Non-CF Practitioners/Gender Mixed

1. Relevance of CF to the needs and challenges of the households/communities

- What are the main trends affecting your livelihoods in the last 3-5 years? (Social, economic, environmental etc...)
- How are such trends affecting farm productivity?
- How do you maintain your livelihood under such trends?
- How do you see the role of local organizations in supporting your effort?
- How do you understand CF?
- Did you have a chance to hear about CF or a chance to attend training?
- Do you think CF can address your household challenges and your needs? Why? Why not?
- What is the main source of nutrient for your crops? How do you get it? What alternative nutrients are available to sustain the current yields?

2. Effectiveness of CF in achieving planned objectives (plan achievement)

3. Efficiency of CF in achieving desired results (outputs in relation to inputs)

- What change in yield for Maize, Sorghum, Millet etc... have you observed between conventional and CF production systems?
- How many bags of Maize, Sorghum, and Millet etc...did you get in the year 2010 cropping seasons from your field?
- How many bags did you harvest the previous years?

4. The impact CF has brought in the livelihood of participant households and the environment

- What changes do you see in soil fertility and productivity in your farm?
- How is the non-use of CF affecting your household income and food security?

5. Sustainability of CF programs in the target areas

- What were the major factors which influenced the non-adoption of CF in the area?
- What do you think needs to be done to improve the role of CF in the farming system in the area?

8.5 FGD Guide Questions: Trained/ Non-CF Practitioners/Gender Mixed

1. Relevance of CF to the needs and challenges of the households/communities

- How do you feed your family?
- What is your understanding of CF?
- What the training effective in teaching you about CF?
- Why do you prefer ploughing?
- Are you still interested in CF?
- What are the reasons that hinder you from practicing CF?
- What are the main advantages of using CF?
- What are the main disadvantages of using CF?

2. Effectiveness of CF in achieving planned objectives (plan achievement)

3. Efficiency of CF in achieving desired results (outputs in relation to inputs)

- How many kg of seed did you plant in the previous season?
- How many bags of maize did you harvest in the previous season?
- Have you observed any difference between CF and conventional maize yields?

4. The impact CF has brought in the livelihood of participant households and the environment

- What impacts have you observed in the lives of those practicing CF?

5. Sustainability of CF programs in the target areas

- What were the major factors which influenced the non-adoption of CF in the area?
- What do you think needs to be done to improve the role of CF in the farming system in the area?
- What local community structures exist to enhance the adoption of CF?
- How effective are the CF committees in promoting CF?
- In your village, how many households are practicing CF? What is the total number of households in your village?
- Do you think that farmers will continue to practice CF after Christian Care leaves?

8.6 FGD Guide Questions: Spontaneous Uptake CF Practitioners/Gender Mixed & Women Only

1. Relevance of CF to the needs and challenges of the households/communities

- How did you learn about CF?
- For how long have you been practicing CF?
- What aspect of CF do you use in your farm? (mulching/soil cover, crop rotation, no tillage)
- How did you learn about CF?
- What motivates you to practice CF?
- What are the main advantages of using CF?
- What are the main disadvantages of using CF?
- How did you handle the disadvantages?
- What is the main source of nutrient for your crops? How do you get it? What alternative nutrients are available to sustain the current yields?
- How does CF affect women?
- Are there faith and biblical principles that inspire you to do CF? What are those?

2. Effectiveness of CF in achieving planned objectives (plan achievement)

3. Efficiency of CF in achieving desired results (outputs in relation to inputs)

- Compare the work you do to produce 20 bags of maize under CF and under conventional. Which is more work and which do you prefer?
- CF production: How many bags of maize did you harvest from last year's CF plot? What was the size of the plot?
- Conventional production: How many bags of maize did you harvest from last year's conventional fields? How many kgs of seed did you plant?

4. The impact CF has brought in the livelihood of participant households and the environment

- What changes do you see in soil fertility and productivity as a result of practicing CF?
- How is CF affecting your household income and food security?
- What changes in total land use by both CF and conventional farming have occurred?
- How does CF impact men and women?
- How much land under CF do you have in maize production? How much land do you expect to have under CF in the future?

5. Sustainability of CF programs in the target areas

- What were the major factors which influenced the adoption of CF in the area? Were there incentives for farmers to adopt CF?

- In your village, how many households are practicing CF? How many households are in your village?
- Soon Christian Care will not be working in this ward. Will you continue to practice CF?

8.7 FGD Guide Questions: Trained CF Practitioners/Gender Mixed and Women Only

1. Relevance of CF to the needs and challenges of the households/communities

- For how long have you been practicing CF?
- What aspect of CF do you use in your farm? (mulching/soil cover, crop rotation, no tillage)
- How did you learn about CF?
- What motivates you to practice CF?
- What are the main advantages of using CF?
- What are the main disadvantages of using CF?
- How did you handle the disadvantages?
- What is the main source of nutrient for your crops? How do you get it? What alternative nutrients are available to sustain the current yields?
- How does CF affect women?
- Are there faith and biblical principles that inspire you to do CF? What are those?

2. Effectiveness of CF in achieving planned objectives (plan achievement)

3. Efficiency of CF in achieving desired results (outputs in relation to inputs)

- Compare the work you do to produce 20 bags of maize under CF and under conventional. Which is more work and which do you prefer?
- CF production: How many bags of maize did you harvest from last year's CF plot? What was the size of the plot?
- Conventional production: How many bags of maize did you harvest from last year's conventional fields? How many kgs of seed did you plant?

4. The impact CF has brought in the livelihood of participant households and the environment

- What changes do you see in soil fertility and productivity as a result of practicing CF?
- How is CF affecting your household income and food security?
- What changes in total land use by both CF and conventional farming have occurred?
- How does CF impact men and women?
- How much land under CF do you have in maize production? How much land do you expect to have under CF in the future?

5. Sustainability of CF programs in the target areas

- What were the major factors which influenced the adoption of CF in the area? Were there incentives for farmers to adopt CF?
- In your village, how many households are practicing CF? How many households are in your village?
- Soon Christian Care will not be working in this ward. Will you continue to practice CF?

8.8 Checklist for Field Observations

1. Land use, land sizes and soils

- How is the present land use and land cover?
- How is the household land size?
- How is the cropping system?
- How is the soil condition?
- Cattle ownership and grazing?

2. CF Practices

- How are planting stations? Are they properly designed (distance between rows and in-row spacing)?
- How is the practice of crop rotation? Are rotations being practiced?
- How is legume intercropping, mulching, weed management etc...?
- How is soil cover and soil disturbance? Is minimum tillage being practiced?
- How is CF affecting the features and characteristics of farms?
- How are individual CF fields managed?

3. Discussion points with individual farmers during field visits?

- When did you start implementing CF?
- What are the advantages and disadvantages of CF?
- What challenges do you face in practicing CF?
- What do you think are the solutions?
- Which principles of CF are relevant to you (minimum soil disturbance, soil cover and crop rotation)? Why?
- What is the main source of nutrient for your crops? What alternative nutrients are available to sustain the current yields?
- What change in yield have you observed between conventional and CF production systems?
- How many bags of Maize, Sorghum, and Millet etc...did you get from your field as a result of CF? How many bags did you harvest the previous years? (Estimated benefit of CF in terms of yield for major crops)?
- How do you see the impact of CF in terms of food and income security of your household?
- Do you recommend CF for other farmers? Why? Why not?

8.9 CF Evaluation Team

The evaluation team brought expertise in several disciplines relevant to CF programming to strengthen the quality of the evaluation. The critical disciplines for the evaluation included backgrounds in the social sciences (community development, gender roles, social and political structures, extension strategies, etc.), agronomy (conservation agriculture and local production practices), theology (application of Biblical keys of FGW) and local understanding of social, political and economic issues.

Dr. Wondimu Kenea

- Christian Reformed World Relief Committee Grants Program Manager

Dorcas Gandidzanwa

- Project Monitoring and Evaluation Officer for Lutheran World Federation

Rev. Erick Ruwona

- Christian Care Zimbabwe Food Security National Coordinator

Chris Woodring

- Agriculture Development Consultant

Dr. Shirley Ross

- Plant Science Researcher

Alden Braul

- CFGB Capacity Development Manager

Musa Gozho

- Agriculture Extension Specialist Officer for the Zimbabwe Ministry of Agriculture located in Chirumhanzu, Zimbabwe

Raymond Huitire

- Conservation farmer and community representative from Chirumhanzu district, Zimbabwe

8.10 Labour Comparisons for CF versus Conventional Maize production

- *Farmer comparison of labour requirements between CF and conventional*

CHRISTIAN CARE GWERU - CHIRUMANZU

LABOUR REQUIREMENT ON CF Vs CONVENTIONAL PLOT

COMPONENTS	1ST YEAR(hrs)	2ND YEAR(hrs)	CONV TILL(hrs)
Land Clearing	12	0	0
Land Marking	24	0	0
Holing out	24	24	0
Mulch Gathering	200-400	50-100	0
Manure Application	4hrs	12-16hrs	4
Basal Fert Application	4	4	6
Planting	8	8	6
Mulching	30	15	0
Thinning	2	2	0
Weeding 1st	8 - 10 hrs	2-4hrs	16-20
Weeding 2nd	0	0	16
Weeding 3rd	0	0	10
Topdressing	2	2	2
Harvesting	12-15hrs	15-20hrs	10
Winter Weeding	0	0-2hrs	0
Winter Ploughing	0	0	9
Monitoring	16-20hrs	16-20hrs	10
Ploughing	0	0	9
Total	346 - 555	150-217	98 - 102

Notes:

The information above is based on the following factors

1. Plot size of 0.25 Ha (50*50)m
2. Mulch coverage of 100% and thickness of at least 3 cm
3. Manure application is referring to the actual field application rather than the process of digging out, curing and transportation to the fields/ plots.
4. Fencing not included in labour estimates.

Other information to note

Research done by K Mazvimavi and S Twomlow (2009) revealed the following results

1. First year farmers spent 109 days per Ha producing maize under CF compared to 122 days per Ha ~~in Yr 2 CF spent by an experienced farmer~~ with mulch coverage of at least 30%.
 2. Conventional farmers required at most 77 days per Ha to produce maize.
- ## The research was done in 13 districts of the south in 2007 through a national survey by ICRISAT across different agro ecological regions of Zimbabwe.
3. Labour productivity (kg/day) : Yr 1 = 13.92, Yr 2 = 14.53 in Conservation farming and 5.2 - 5.3 in conventional practice.

Reference

Socioeconomic and institutional factors influencing adoption of conservation farming by vulnerable households in Zimbabwe By Kizito Mazvimavi and Steve Twomlow.
Agric. Systems 101 (2009) 20-29

- *Farm enterprise budget analysis for CF and conventional farm practices (Mazvimavi, K. and Twomlow, S. 2009. Socioeconomic and institutional factors influencing adoption of conservation farming by vulnerable households in Zimbabwe. Agri. Systems 101 – 20-29)*

Table 6

Farm enterprise budget analysis for CF and conventional farm practices for the 2006/07 cropping season in Zimbabwe.

Item	Unit	Price/unit	Conservation farming				Farmer practice			
			First year		Second + year		No fertilizer		With fertilizer	
			Quantity	Cost (\$USD)	Quantity	Cost (\$USD)	Quantity	Cost (\$USD)	Quantity	Cost (\$USD)
A. Revenue										
Maize grain	kg	0.4	1520.00	608.00	1780.00	712.00	368.80	147.52	400.00	160.00
Stover	kg	0.12	0.00	0.00	0.00	0.00	129.08	15.49	140.00	16.80
Total Revenue				608.00		712.00		163.01		176.80
B. Variable costs										
B1. Inputs										
Maize seed	kg	0.47	20.00	9.40	20.00	9.40	20.00	9.40	20.00	9.40
Basal fertilizer	kg	0.33	0.00	0.00	92.50	30.53	0.00	0.00	0.00	0.00
Topdressing	kg	0.35	83.30	29.16	83.30	29.16	0.00	0.00	83.30	29.16
Plowing services	ha	22		0.00			1.00	22.00	1.00	22.00
Total inputs				38.56		69.08		31.40		60.56
B2. Labor										
Winter weeding	day	0.88	0.00	0.00	13.00	11.44	0.00	0.00	0.00	0.00
Winter plowing	day	0.88	0.00	0.00	0.00	0.00	7.59	6.68	7.59	6.68
Summer plowing	day	0.88	0.00	0.00	0.00	0.00	7.50	6.60	7.50	6.60
Establishing basins	day	0.88	27.63	24.31	21.08	18.55	0.00	0.00	0.00	0.00
Residue placement	day	0.88	0.00	0.00	12.90	11.35	0.00	0.00	0.00	0.00
Manure placement	day	0.88	8.57	7.54	0.00	0.00	9.90	8.71	9.90	8.71
Planting	day	0.88	6.00	5.28	7.07	6.22	4.38	3.85	4.38	3.85
Basal application	day	0.88	0.00	0.00	7.98	7.02	0.00	0.00	0.00	0.00
Top dressing	day	0.88	9.09	8.00	7.87	6.92	0.00	0.00	8.00	7.04
1st Post-planting weeding	day	0.88	23.38	20.57	19.25	16.94	13.75	12.10	13.75	12.10
2nd Post-planting weeding	day	0.88	15.38	13.53	14.69	12.93	11.88	10.45	11.88	10.45
3rd Post-planting weeding	day	0.88	9.38	8.25	9.00	7.92	0.00	0.00	0.00	0.00
Harvesting grain	day	0.88	9.78	8.61	9.40	8.27	14.34	12.62	14.34	12.62
Total labor			109.19	96.09	122.23	107.57	69.33	61.01	77.33	68.05
Total variable costs				134.64		176.65		92.41		128.61
C. Returns										
Gross margin	US\$/ha			473.36		535.35		70.60		48.19
Cost per kg	US\$/kg			0.09		0.10		0.25		0.32
Returns to labor	US\$/day			5.22		5.26		1.90		1.50
Labor productivity	kg/day			13.92		14.56		5.32		5.17