International Relief & Development

Reduction of Drought and Cyclone Vulnerability in Southern Mozambique (COLHEITA)

Final Report

FROM THE AMERICAN PEOPLE

Award No: DFD–G–00-09-00138-00
May 5, 2009–April 8, 2012

Program Overview

Date:	July 6, 2012
Organization:	International Relief and Development, IRD
Headquarters Address:	1621 North Kent Street 4th Floor, Arlington, VA 22209 USA
Phone: Fax:	703.248.0161 703.248.0194
Contact:	Gideon Tesfay
Title:	Reduction of Drought and Cyclone Vulnerabilities in Southern Mozambique (Colheita)
Award No:	DFD-G-00-09-00138-00
Sector:	Agriculture and Food Security, WASH and Natural and Technological Risks
Geographic Areas:	Districts of Massinga, Funhalouro and Panda in Inhambane Province
Implementation Period:	May 5, 2009 – April 8, 2012
Program Goal:	To reduce drought and cyclone vulnerabilities in Inhambane province, Mozambique
Target Beneficiaries:	80,500
Actual Program Beneficiaries:	71,065[1]

[1] *See page 10 on number of people benefiting from seed systems/agricultural inputs activities for the reasons of not achieving the target beneficiaries.*

Contents

Executive Summary 4
Program Background and Justification 6
Summary of Program Achievements 8
Program Implementation 12
Agriculture and Food Security 12
Water, Sanitation and Hygiene 17
Natural and Technological Risks 25
Annex 1: Performance Monitoring Plan 28
Annex 2: Final Survey Report 31

Executive Summary

The Colheita program, (Portuguese for harvest) was implemented by International Relief and Development (IRD) from May 5, 2009 to April 8, 2012 in three districts of Inhambane Province, Southern Mozambique: Massinga, Funhalouro, and Panda. The overarching aim of the program was to build resilience against droughts and cyclones. This was achieved through a holistic program that addressed food security, agriculture, water, sanitation and hygiene, and community-level organization in response to disaster.

The program was funded by the U.S. Office of Foreign Disaster Assistance (OFDA) and, building on past experiences and lessons learned agriculture, food security, and WASH, was an expansion of previous activities to geographical areas that suffer from recurrent drought conditions, including coastal areas that are frequently affected during cyclone season.

Some of Colheita's key achievements included the following:

- Farmer adoption of conservation agriculture practices, increased percentages of farmers growing drought resistant crops, and a wider diversity of drought resistant crops grown by farmers.
- Incomes of $185-$220 per year for program apiculture beneficiaries. This is especially significant since this income is earned during November-December when many households are experiencing the "lean season" between crop harvests.
- A significant contribution of water and sanitation infrastructure projects including rooftop rainwater harvesting systems (RWHS) at schools, surface water catchments, and the installation of new hand pumps, which have had a tremendous, visible impact on people's lives.
- Complementary WASH services, particularly the creation and capacity building of local committees and sanitation and hygiene promotion that have improved health and sanitation of the targeted beneficiaries.
- Creation of community-level risk reduction committees (CL-GRC) and establishment of an early-warning and response system to improve the quality and effectiveness of emergency response reduce the impact of cyclones in target communities.

The program continued its attempts to maximize sustainability through adopting multiple strategies with different partners at all levels, from the communities to the Provincial government. Close government collaboration has been a key factor in the smooth implementation of our activities. Good and cordial relationships between the project, and various communities and their government structures, particularly with the Agriculture, Education, Emergency Reponse and Public Works departments at the district and provincial levels, were strengthened. Coordination meetings at different levels continued to take place with all involved stakeholders. IRD also worked with the local private sector as a way to promote local skills and improve its economy.

Some of the key constraints to project implementation included difficult access to project sites, logistics and procurement systems, and staffing problems, all of which were mitigated by IRD Mozambique staff through a variety of measures.

Field observations revealed that health outcomes such as diarrhea and skin diseases caused by lack of water and poor hygienic conditions are decreasing in operational areas. This corresponds with the results of the final survey, which showed more people in target communities have access to safe water, use and store water correctly, and practice good hygiene.

The end result was over 70,000 Mozambicans with access to services and skills that improved their livelihoods in a sustainable way.

Program Background and Justification

During the last 10 years, Inhambane province has experienced a number of severe cyclones and prolonged droughts that have led to a further deterioration of living conditions, chronic food insecurity, and increased poverty in the local communities. According to the 2008 vulnerability assessment (VAC 2008), Inhambane province had the highest number of people living in conditions of chronic food insecurity in southern Mozambique. These conditions are exacerbated and refueled by reoccurring droughts. Most households in Inhambane province practice subsistence farming, and due to the scarcity of surface water, rely solely on rain-fed agriculture. The high variability of precipitation that is linked to drought and cyclones has had a great impact on household agriculture production and livelihoods. Despite the prevailing conditions in Inhambane province, few projects have targeted drought mitigation, and the bulk of the limited resources are instead committed toward immediate, post-crisis response through seed and food distributions.

Water scarcity is a growing concern in rural, semi-arid areas of Inhambane province. Population growth and associated demands for domestic, farm, and animal use are increasing stress on limited water resources. Most of the schools in the three target districts don't have access to a protected water source within a radius of 500 meters. At schools with no access to water, students are required to bring water to school and spend hours walking to a water source (borehole or surface water) to do so.

Around 20% of installed boreholes in the target districts were not functioning. One of the reasons for nonfunctional boreholes was that pumps are installed at locations where water tables are beyond the elevation capacity of the pump. IRD, along with the Government of Mozambique, recognized that sustainability and access to water are directly related to the capacity of the communities to manage the water source. Weak water committees and lack of proper maintenance often cause pumps to break down.

The landfall of cyclones in recent years, such as cyclone Favio in 2007, revealed that coastal districts like Massinga do not have emergency plans for early warning and response. Although the district does have means of communication via megaphones and radio, prior to the program there was not an official strategy for warning at-risk communities in the event of an approaching cyclone. The need for disaster risk reduction activities is higher now than in the past due to increased food prices and the decreased value of remittances from the RSA. These two mechanisms have been the safety net for most families that were exposed to the risk of drought and cyclones and their reduction calls for the establishment of alternative long-term efforts to reduce vulnerability to drought and cyclones.

IRD has been working in the Massinga district since 2005 on drought mitigation programs, focusing on rainwater harvesting and the dissemination of drought resistant crops, such as cassava, pineapple, and cashew. In 2007, IRD expanded its drought mitigation activities to Funhalouro district and included the dissemination of conservation agriculture (CA) techniques to farmers in that district. IRD gained the support of local farmers for the expansion of conservation farming techniques by demonstrating the increase in agricultural

production. Rooftop rainwater harvesting systems and surface catchments have additionally brought a sustainable solution to water access at schools and communities.

Map of Inhambane Province

The Colheita program took a holistic approach to the reduction of drought and cyclone vulnerability in three districts of Inhambane province. Activities in the area of agriculture were meant to a) increase production of drought-resistant crops like sorghum, cassava, and legumes for consumption by affected households, b) increase linkages to markets for cash crops like vegetables and processed cassava in order for households to gain access to cash, and c) establish other cash-generating activities like apiculture and marketing of oil seeds. Agricultural activities were supported by increased water supply for multiple uses through improved water catchments, repaired water points using appropriate pump technology, and rooftop rainwater harvesting systems at schools. In addition to the agriculture and water supply activities that aim to improve livelihoods under drought and post-cyclone conditions, IRD also established an early warning plan for one province to reduce the potential negative impact of cyclones.

IRD built on successes and lessons learned from the implementation of OFDA-funded IRD programs in Inhambane since 2006. The program facilitated the expansion of conservation farming techniques along with diversification of crops, to include production and marketing of drought-resistant crops and high-nutrition vegetables as well as post-harvest storage and processing. IRD performed a value chain analysis and was programmed to implement in cooperation with the local farmers' interventions for cassava, honey, oil seeds, and vegetables with the aim of establishing sustainable income generation activities, given the challenges of recurrent droughts and frequent cyclones.

Summary of Program Achievements

Table 1 presents a summary of program indicator targets and achievements. Following the table, each indicator is analyzed in regard to over- and under-achievement.

Table 1. Summary of Indicators: Baseline, Target, Achieved, and Percentage of Target Achieved, by Indicator

Indicator	Baseline	Target	Achieved	Percentage of Target Achieved (%)
SECTOR 1: AGRICULTURE				
(Projected) increase in number of months of food self-sufficiency due to distributed seed systems/agricultural inputs for beneficiary families	6.0	+2.5	5.7	-
Number of people benefiting from seed Systems/agricultural inputs activities	n/a*	26,755	26,755	100
Accumulated number of liters of honey produced by Apiculture associations	n/a*	15,000	19,665	131
Number of households benefiting from Vegetable seed voucher distribution	n/a*	350	584	167
SECTOR 2: WASH				
SUB-SECTOR: WATER SUPPLY				
Number and percentage of household water supplies with zero (0) coliform bacteria Per 100 ml	n/a*	100%	100%	100
Average water usage of target population in liters per person per day prior to and after interventions	16.0	20.0	15.5	78
Percent of water points with measurable chlorine residual exceeding 0.2 mg/L	n/a*	0%	0%	0
Number of people with access to rehabilitated/established water points	n/a*	20,000	30,227	151
Number of students with access to rainwater harvesting systems	n/a*	5,655	6,115	108

*Not Applicable

Due to severe weather, there was no change in the number of months - During the survey, farmers indicated that the region received relatively low rainfalls in the months of October to March, while the months of April to September were drier. These conditions had a negative impact on crop performance and the realized yields, which affected food availability at household level.

Table 1. Summary of Indicators: Baseline, Target, Achieved, and Percentage of Target Achieved, by Indicator (Continued)

Indicator	Baseline	Target	Achieved	Percentage of Target Achieved (%)
SUB-SECTOR: HYGIENE PROMOTION/BEHAVIORS				
Percentage of target population demonstrating good hand washing practices	41%	61%	68%	111
Percentage of population demonstrating correct Water storage and usage	53%	73%	60%	82
Number and percentage of clean water points Functioning three months after completion	n/a*	35(100%)	35(100%)	100
SECTOR 3: NATURAL AND TECHNOLOGICAL RISKS SUB-SECTOR: DISASTER PREPAREDNESS, MITIGATION AND MANAGEMENT				
Number of people trained in disaster Preparedness, mitigation, and Management	n/a*	500	765	153
Percentage of beneficiaries retaining disaster preparedness, mitigation, and management knowledge two (2) months after training	n/a*	60%	0%	0
Number of hazard risk reduction plans, policies or curriculum developed	n/a*	1	100%	100

*Not Applicable

Notes on Targets Not Met

(Projected) increase in number of months of food self-sufficiency due to distributed seed systems/agricultural inputs for beneficiary families

This target was measured at the baseline (6.0 months) and then again during the final survey (5.7 months). Statistically, there was no significant difference between the two measurements, indicating that there had been no change based on the number of months of food self-sufficiency reported by beneficiary households. It is difficult to assign a reason for this failure to reach the targeted increase of 2.5 months of food self-sufficiency. However, during the final survey, seventy-five percent (75%) of households reported to have experienced a period of food shortage during the previous 12 months, and among those, ninety-three percent (93%) reported that the primary cause of household food shortage had been drought. The relatively low rainfall (reported by farmers) in the months of October to March and the drier period between April and September (also reported by

farmers) could have had a negative impact on crop performance and yields, which affected food availability at household level.

Number of people benefiting from seed systems/agricultural inputs activities
This beneficiary total target includes 7,500 beneficiaries that were not subtracted from the total when the oil-seed sales activities were officially dropped during the cost-extension phase of program implementation. If the 7,500 beneficiaries targeted for oil-seed sales are discounted from the total number of beneficiaries targeted (37,000), leaving a total of 29,500 beneficiaries, ninety-one percent (91%) of the life-of-activity agriculture sector beneficiary target was achieved based on the initial target.

Number and percentage of household water supplies with zero (0) coliform bacteria per 100 ml
Out of 35 boreholes with bluepumps installed, 28 were bacteriological tested with (0) coliform bacteria. Due to lack of reagents at the provincial laboratory in Inhambane City, the remaining 7 bluepumps and 6 Afridev pumps were not tested; therefore full results are not available for coliform bacteria in all 41 water pumps rehabilitated.

Average water usage of target population in liters per person per day prior to and after interventions
There was a decline in the quantity of water usage per person per day from 16 liters during the baseline to 15.5 liters on the final survey. During the final survey, it was noted that people had a hard time estimating accurately the quantity of water they consume. Also, due to the scarcity of water in the areas of our intervention, people are moving from their own water-scarce areas and approaching those places with water points, thus increasing the number of people there and reducing the quantity per person.

Percentage of population demonstrating correct water storage and usage
The most common type of water storage container – a narrow necked 20 liter jerry can called a *bidão* in Portuguese – was not included in the list of response options for the baseline questionnaire.

Percentage of beneficiaries retaining disaster preparedness, mitigation, and management knowledge two (2) months after training
There was no adequate information to enable the team decide on the percentage levels.

Table 2. Program Impact Indicators

Impact Indicators	Baseline	Final	p-value
Mean number of months of food self-sufficiency due to distributed seed systems/agricultural inputs for beneficiary families	6.0	5.7	0.345
Average water usage of target population in liters per person per day prior to and after interventions	16.0	15.5	0.897
Percentage of target population demonstrating good hand washing practices	21%	68%	0.000*
Percentage of target population demonstrating correct water usage and storage	53%	60%	0.068

*The difference between baseline and final survey values is statistically significant at 0.05 level.

1.0 Agriculture and Food Security

Beneficiaries and Percentages of Beneficiary Targets Achieved

During the life-of-activity, the agriculture sector successfully reached beneficiary targets in most activities (Table 1). Each of the sector activities is discussed in detail in this report.

Table 3. End of Project Summary of Beneficiary Targets, Actual Achievement, and Percentage of Target Achieved

Type of Activity	Targeted[a] Beneficiaries (Households)	Achieved Beneficiaries (Households)	Percentage Achieved
Conservation Agriculture Training (IRD) extensionist	10,000 (2,000)	12,280 (2,456)	123%
Conservation Agriculture Training Farmer-to-Farmer	15,000 (3,000)	9,685 (1,937)	65%
Vegetable Production Training	1,750 (350)	2,920 (584)	167%
Apiculture Extension	750 (150)	880(176)	117%
Jam Production and Canning	2,000 (400)	990 (198)	50%
Oil-Seed Sales	7,500 (1,500)	0 (0)	0%*
Total	**37,000 (7,400)**	**26,755 (5,351)**	**72%**

[a] The average household size is 5 members

* This activity was officially removed from the program during the cost extension phase, but the associated beneficiary target was not removed from the overall life-of-activity beneficiary target. If the 7,500 beneficiaries targeted for oil-seed sales are discounted from the total number of beneficiaries, ninety-one percent (91%) of the life-of-activity agriculture sector beneficiary target is achieved.

Conservation Agriculture

During the life-of-activity, 2,456 households (or about 12,280 individuals[2]) benefited from conservation agriculture training conducted by IRD extensionists, or 123% of the targeted 2,000 households (10,000 individuals) (Table 2). Another 3,000 households (15,000 individuals) were targeted to receive farmer-to-farmer training, but only an estimated 1,937 households (9,685 individuals), or sixty-five percent (65%) of the target was reached.[3] Thus in total, 4,393 households (21,965 individuals), or eighty-eight percent (88%) of the targeted 25,000[4] conservation agriculture beneficiaries were reached.

During the life-of-activity there was a continuous effort to encourage female participation in conservation agriculture activities, and the percentage of females benefitting steadily increased during each year of project implementation, starting at fifty-one percent (51%) in

[2] The average household size is 5 members, thus 2,456 x 5 = 12,280

[3] According to the final survey results, 82% of farmers trained reported to have implemented the promoted Farmer Field School conservation agriculture practices in their own fields and 37% of those reported to have used their own CA plots to train an average of 2.6 other farmers each about conservation agriculture practices. Thus, ((2,456 x 0.82) x 0.37) x 2.6)) or an estimated 1,937 people were trained through farmer-to-farmer networks.

[4] (2,000 IRD trained farmers + 3,000 famer-to-farmer trained) x 5 per household = 25,000 beneficiaries

Year 1 and ending with sixty-five percent (65%) in Year 3 (Table 2). Sixty percent (60%) of the farmers trained in conservation agriculture practices were women (Table 2).

Table 4. Ag Sector Training, Seed, and Tool Beneficiaries, by Year and Sex

Year	Number of farmers trained	Female	Male
		Number (%)	Number (%)
Year 1	800	408 (51%)	392 (49%)
Year 2	200	112 (56%)	88 (44%)
Year 3	1,456	946 (65%)	510 (35%)
Total	2,456	1,466 (60%)	990 (40%)

The focus of program activities changed during the course of implementation, moving from largely seed and tool distribution in Year 1 to conservation agriculture in Years 2 and 3. In Year 1, farmers were approached individually and provided with 5 kilos of sorghum, four kilos of cowpea, 2,500 cassava cuttings, a hoe, and a machete. Following the seed and tool distribution, extensionists were to provide conservation agriculture training to farmers on an individual basis, but given that each extensionist was responsible for approximately 100 farmers, little one-to-one training could be provided.

During the latter half of Year 2 and then in Year 3, interested farmers were encouraged to join together under the umbrella of community-based Farmer Field Schools, and then worked with the guidance of IRD extensionists to establish conservation agriculture learning plots that they could plant and manage as a group to gain firsthand experience with the new farming practices. These communal plots provided a greater opportunity for communication and exchange about the new practices among farmers, while at the same time allowing extensionists to spend more "quality time" with their farmers. During this phase, farmers were still provided with seeds, but this was only one-half to one kilo per crop as an incentive to replicate the Farmer Field School demonstration plots on their own farms. This enabled them to gain a deeper, firsthand experience and judge for themselves how well the new techniques would perform with each of their own situations of land, time, and labor. They also used these on-farm plots to introduce and teach other farmers about the

Figure 1- Farmer field School members plant their learning and demonstration plot (note their large compost heap in the background). They will continue to gather there to mange the plot and observe the results of the new techniques throughout the growing season

practices and benefits of conservation agriculture. Crops used during Farmer Field School activities include sorghum, millet, maize, cowpea, pigeon pea, groundnuts, and cassava.

The primary conservation agriculture principles promoted during Farmer Field School activities were:

1. Minimize the disturbance of soil during land preparation by using planting basins that are enriched with manure or compost before planting.
2. Develop and maintain a continuous layer of soil covering by retaining all crop residue on the field and, when possible, using cover crops to protect the soil.
3. Practice crop rotation of grains and legumes. During the program final survey, eighty-two percent (82%) of beneficiary farmers reported to have used at least one of these practices on their own farms during the past year, and almost half of them (43%) reported to have used all three (see page 13 of the Final Survey Report in the Appendix).

Based on the final survey results, the impact indicator "(Projected) Increase in number of months of food self-sufficiency due to distributed seed systems/agricultural inputs for beneficiary families" was not achieved. Statistically, there was no difference between the mean number of months of food self-sufficiency from own farm produce between the baseline survey (6.0 months) and the final survey (5.7 months). Still, clear success in the promotion, adoption, and dissemination of conservation agriculture practices and the production of drought resistant crops was achieved.

Figure 2 - A Farmer Field School member Preçiosa Mario (left) shows her own farm where she has replicated the conservation agriculture techniques learned from the IRD extensionist (right) to grow drought resistant cowpea

In addition to the eighty-two percent (82%) adoption rate for conservation agriculture practices noted above, according to the final survey results, significantly higher percentages of households also reported to have produced drought resistant crops during the past year. Specifically, between the baseline and final surveys there were reported increases in the percentage of households producing cassava (+15%), sorghum (+14%), bambara nut (+12%), and millet (+8%). The mean number of drought resistant crops produced by farmers had also increased from 3.5 crops to 4.2 crops. Thus, according to the information received from beneficiary households, more farmers are producing drought resistant crops and beneficiary households have also changed their farming systems to include a greater diversity of drought resistant crops.

Vegetable Production Training

During the life-of-activity, 584 farmers (2,920 individuals) benefited from training and inputs provided by IRD. This is 167% of the 350 participants targeted for vegetable production training, and, sixty-eight percent (68%) of those trained were female. Originally, vegetable promotion activities were planned to include only one district, but during Years 2 and 3, this activity was expanded to include all three program districts, thus a higher number of beneficiaries was achieved than was originally proposed. Crops promoted included tomato, lettuce, carrot, cabbage, onion, and collards. Improved seedling nurseries was a major focus of the activity, providing farmers with the skills needed to construct simple but more effective nurseries using the same materials they traditionally use; and then encouraging them to control the plant spacing and nursery shading to produce more vigorous and hardy seedlings, leading to less wastage of valuable seed and a higher survival rate after the seedlings are transplanted into the field. Improved transplanting techniques, the use of mulching, and less frequent but heavier watering to promote deeper and stronger root growth were also demonstrated on farmer fields.

Apiculture Promotion and Training

During life-of-activity, 243 beekeepers (1,215 beneficiaries) received training and on-going technical support from the IRD beekeeping specialist. Although beekeeping is a traditional income generation activity, the traditional practices employed do not produce honey of export or commercial marketing quality standards. However there is a strong demand for honey among local and Maputo-based consumers, and strong informal markets exist to satisfy that need. Program area apiculturists were well linked into those market channels and resisted attempts to link them with bulk buyers offering them significantly less money per liter than they receive through their own individual networks.

Figure 3- Beekeepers learn to move a hive of been from a traditional log hive (right rear) to a new Langstroth hive.

In addition to offering training about hive and brood establishment and management, IRD introduced Langstroth hives, beekeeping protective suits, and other simple hive management tools to beneficiary beekeepers. In total, 50 Langstroth hives and fifty (50) sets of protective suits and hive tools were distributed among the members of apiculture training groups.

Among the 176 beekeepers that received training, 40 were new during the final year and had not yet harvested honey by the close of activities. Among the 136 that had harvested

honey, a total of 19,665 liters of total production was reported during the life-of-activity, or an average of 144 liters per household. With the exception of very small quantities that were kept for home consumption, all honey was reported to have been sold. This would translate into 48 liters per household or, once sold, $185-$220 per household per year.[5] This is especially significant since the bulk of honey is harvested during November and December which coincides with the "lean period" when households have begun to exhaust the previous season's harvests and new crops are just starting to grow.

This activity surpassed the targeted number of beneficiaries by seventeen percent (17%) and surpassed the targeted production of honey by thirty-one percent (31%). Among all beekeepers participating in IRD activities, a little over one-fourth (28%) were female.

Other Activities

Jam Making and Canning

During Year 1, 194 people participated in trainings about homemade jam making and canning. As part of this training, each participant received five canning jars and lids. Although the canning of fruits and vegetables could provide a valuable means of food preservation in areas that lack refrigeration capacity, neither the jars nor the one-time use lids[6] are available on the local markets and required importation. Due to the lack of sustainability in this approach and the inability to identify other local solutions for jars, this activity was not continued.

Bio-Oil Seed Sales

Prior to beginning program implementation, it was planned that a local start-up business, Bio-oils of Maxixe, would provide training and then purchase oil-seeds of Mafura (*Trichilia emetica*) and Marula (*Sclerocarya birrea*) from 1,500 Colheita program farmers for the local manufacture of soap, balms, and cosmetics.

In the proposal, it was stated that as a private sector partner, Bio-Oils of Maxixe would:

- Provide sustainable harvesting and seed preparation skills training to participating associations
- Provide a consistent market to participating association members for sustainable-harvested, locally-available oil seeds

Ultimately, however, Bio-Oils of Maxixe was unable to carry out this expectation (neither training nor seed purchasing services could be provided) and the activity was officially dropped during the Colheita program cost extension phase. The 7,500 beneficiaries targeted by this activity (20% of the 37,000 total beneficiaries targeted during the life-of-activity) were not subtracted from the program indicator "Number of people benefiting from seed systems/agriculture input activities", however, at the time it was agreed with USAID/OFDA that the activity would be dropped.

[5]The price of honey remained steady at around 100-120 meticais, or $3.85-$4.60 per liter in local markets during the life-of-activity.

[6]The canning jar lids had "USE LID ONCE ONLY" printed on them by the manufacturer.

2.0 Water, Sanitation and Hygiene

Access to water is among the most urgent needs that the local communities face in the semi-arid regions of Inhambane Province and is one of the key factors contributing to the appalling hygiene conditions and health status of the majority of the population. The majority of existing water infrastructure is currently non-functional. Complicated by years of conflict and lack of resources, the dominant problem remains to be the lack of proper operation and maintenance systems and the lack of a supply chain for spare parts. Users, and the local water authorities, do not have the technical and/or financial capacity to repair or maintain water sources without external assistance. In addition, significant numbers of water sources have dried up in the areas mainly affected by recurrent drought.

A combination of poor infrastructure and drought make almost all areas of the three Colheita program districts extremely vulnerable to humanitarian emergencies. Poor access to safe drinking water and sanitation facilities as well as limited awareness on safe hygiene practices can result in an enormous public health challenge. In fact, the leading cause of death in this area is diarrhea followed by malaria.

Figure 4 Students during a class in Chivalo. The school has benefited from a RWHS and 4 latrines

The water, sanitation and hygiene (WASH) program improved people's capacity to manage catastrophic events by providing training in the importance of hygiene and access to safe new and refurbished water sources. The activities included water harvesting techniques (surface run off and roof catchment); repair of water points using appropriate pump technology; sanitation, including construction of latrines at schools and in the community; hygiene promotion activities; and enhancing the capacity of the local key stakeholders in the establishment and maintenance of water and sanitation facilities.

The main achievements during the life of the project for the WASH sector are shown in Table 5 below and include the completion of 24 rain water harvesting systems (RWHS) in schools, rehabilitation–including installation of geo-membranes–of 5 water catchments, 81 new and improved latrines in schools, installation of 35 bluepumps at previously non-functioning water sources, and rehabilitation of 6 Afridev pumps. This has resulted in more people at schools and the community at large having greater access to water and benefiting from improved sanitation.

Figure 5- Awarding jerry cans to the households that have built their own latrines. The jerry cans are used to collect and conserve drinking water.

In these three Districts in Inhambane Province, more students and families, or about 36,342 people, now have access to safe drinking water (see Table 6). With the increased availability of water points in communities, there is also a reduction of the time needed to haul water from distant water sources. Previously, women and girls traveled long distances to fetch water and now they are able to spend more time on other productive activities like farming, small business, and leisure.

After their training, most of the water committees improved not only on issues related to WASH fund management, but also enhanced their potential to undertake other community development activities.

Table 5. WASH – Water, Sanitation and Hygiene Sector Outputs

	LOA Target	Massinga District	Panda District	Funhalouro District	Total
RWHS at schools	**20**	**4**	**8**	**12**	**24**
New bluepumps installed	**35**	**14**	**8**	**13**	**35**
Rehabilitation of Afridev pumps	**-**	**3**	**-**	**3**	**6**
Surface Water Catchments	**5**	**5**	**-**	**-**	**5**
School latrines	**80**	**16**	**33**	**32**	**81**
Household latrines	**0**	**1471**	**578**	**585**	**2,634**

Table 6. WASH Beneficiaries

Beneficiaries	Target	Achieved
Students benefiting from school water	**5,655**	**6,115 (108%)**
People benefiting from water (Pumps, Catchments, and RWHS)	**20,000**	**30,227 (151%)**
People benefiting from Sanitation and Hygiene training	**0**	**7,203**
Total		**43,545**

Rooftop Rainwater Harvesting Systems (RWHS)

Under the Colheita program, IRD planned the installation of rainwater harvesting systems at 20 schools located throughout the districts of Panda, Massinga, and Funhalouro. This will provide practical benefits by relieving the burden on students to collect water before attending school. It will also provide a source of good quality water in the village around the schools and will demonstrate a simple technology that the local population can replicate with basic household materials. By the end of the program, a total of 24 systems were constructed, with 5 being made with concrete tanks, 11 fitted with plastic tanks, 7 with metal tanks, and 1 using an Aquadam.

The collection system is a simple, user-friendly design. The corrugated sheet roofing is fitted with a gutter which connects to pipe work feeding to a tank. For concrete tanks, typically measuring 5m by 5m in plane and 3.5m deep, the upper meter of the cistern protrudes from the ground to place the hand pump at a convenient height. The storage cistern is covered and has two access hatches for maintenance and inspection. This design is currently in use in other locations in Inhambane Province.

Figure 6 – A completed RWHS fitted with plastic tanks in Inhaloia school - Massinga

Taking into consideration a recommendation from Harlan Hale, Principal Regional Adviser for OFDA Southern Africa, IRD worked on a pilot scheme to install metallic rainwater harvesting tanks in 7 schools in Funhalouro district. The metal tanks were imported from South Africa and are similar to those being used in another IRD project in Zimbabwe. These tanks were overwhelmingly accepted and praised by the Provincial Department of Public Works, the District government and Education authorities as well as the hosting schools and communities. IRD has since been approached several times by different stakeholders interested in knowing the technology and costs of these metal tanks. Though the tanks have received much acclaim, until the tanks can be produced in country, IRD does not believe this is a sustainable solution due to the high costs of importation and manufacturing.

Of the three solutions adopted by IRD during the project, concrete tanks were the most cost effective. Even though the metal tanks are very reliable and durable, they must be imported and are consequently very expensive to install in remote areas. The plastic tanks are cheaper and readily available, but their lifespan is too short, especially when installed in public places such as schools.

In the original proposal, the estimated number of students that would benefit from the rain water harvesting systems to be built at schools was 8,000. This number turned out to be inaccurate once specific schools were identified, so IRD has revised it to reflect the actual

number of students enrolled in the 20 schools where rainwater catchment systems are being constructed. The total number has thus changed to 5,655 students. At the end of project, 6,115 students were benefiting from RWHS water in Panda, Funhalouro and Massinga districts.

Borehole Repairs

As in many provinces across the country, Inhambane Province has a widespread problem with boreholes fitted with broken pumps. It is believed that in many cases, the cause of the breakdown is due to the use of Afridev pumps extracting water from depths greater than 35 meters. The Afridev pump is robust for use on a water table at shallow depths but less reliable for deeper water tables. With the approval of the Mozambican government, IRD installed new hand pumps (blue pumps) to replace the broken Afridev pumps throughout Inhambane province. These blue pumps are suitable for boreholes with a depth of up to 100m. They have fewer moving parts and therefore are less prone to break. Their special design allows for a high water output and light pumping which is important for women and children, who are the primary users.

Figure 7 – New bluepump installed in Macangane community in Massinga

A total of 35 new hand pumps (blue pumps) were installed in the three districts and rehabilitation was carried out on an additional 6 Afridev hand pumps. Maintenance of non-functional hand pumps and establishment or reactivation of water committees at each water point in the area were also part of the activities carried out in each site.

At each location where a replacement pump is installed, IRD has trained community-identified committees about hygiene and sanitation related to water collection, storage, and usage, and about pump maintenance and repair. In consultation with their communities, these committees set rules for pump usage and collect small usage fees which will be used to purchase materials needed for maintenance. Communities trained also received safes to manage funds and some have already started collecting and registering the money.

Prior to installation, water tests were performed to ensure it is safe for consumption. Due to high rates of salinity, nitrates, and fluoride often found in the northern part of Massinga and Funhalouro districts, it was incredibly challenging and time consuming to find sources with adequate water quality. With this constraint, several water points had to be abandoned and replaced with those presenting good water qualities.

Rehabilitation of Surface Water Catchment Systems

During the IRD project prior to Colheita, eight rainwater catchments were constructed in remote areas of Massinga District with a high scarcity of water. These catchments are open tanks constructed with the top of the tank at ground level and intended to impound rainwater and ground water runoff with an average capacity of 2,500 cubic meters. Five of those catchments were identified for rehabilitation during this current program. A geo-membrane lining was used to eliminate losses through infiltration. Refurbishment work also included the installation of solar pumps and the repair of filter and storage tanks for the provision of clean water access.

Figure 8 – Rehabilitated surface water catchment with geomembrane lining in Mabihali.

IRD sub-contracted Collins Ltd., a Maputo based contractor, to complete installation of the geo-membrane using heavy equipment and village manual labor. The pilot site at Nhanchengue was completed with success and followed by the remaining four sites in Bambatela, Liondzuane, Mabiali and Muludjane. Members of the community and local skilled people were involved in the work, giving them the basic skills needed for future maintenance of the catchments. IRD contracted a water catchment consultant who was involved with the implementation and supervision of the work carried out by the sub-contractor.

Success Story: Vicente's growing garden

Figure 9 – Mr. Vicente Alfiado on his plot in Mabihali

Vicente Alfiado Penga, 35 years old, lives in Mabihali, Massinga district. The area is very dry and the nearest water source is 15 kilometers away. IRD built a surface water catchment that is now serving about 1,050 people who live nearby. The land is fertile, but due to the lack of water in the area, many local people have little success with gardening.

"When the catchment was built, I decided to plant a small vegetable garden. Just in the first year I produced a lot of vegetables that we ate at home and sold locally and even at Massinga market. I earned some 10,000 Meticais ($370) and used the money to build a new house and send my older

son to school. This year I am expanding my garden and in addition to vegetables, I am also planting corn and fruit trees, especially papaya and banana. This year has been a happy year for me. The catchment was rehabilitated and now we have enough water to use during the upcoming dry season."

Vicente thanked OFDA and IRD for making it possible for his community to have water nearby. "I am really pleased with the result of this project and I hope it continues. It is really benefiting my children and me. I am so proud that we are no longer hungry and that I am earning a living to support my family."

Sanitation and Hygiene

Sanitation structures have poor coverage across the three districts. Not only is the physical infrastructure missing but the local cultural practices are not supportive of the use of latrines. Open defecation around the household properties, in the bush and in shared water systems (streams, swamps) is responsible for the high level of contamination in those communities. This has the high potential to create water borne diseases.

Figure 10 – Pupils learn how to use tippy taps during a sanitation and hygiene training in Massalane, Panda

The combination of unsafe water, lack of sanitation facilities, and poor hygiene awareness creates a dangerous public health situation in Funhalouro, Panda and Massinga. Given the fact that existing health facilities have inadequate service provision, the local population remains highly affected by endemic and preventable diseases such as diarrhea.

IRD accompanied each water infrastructure project with an appropriate training course in Community Led Total Sanitation (CLTS) for the responsible water committee as well as the community in general. CLTS not only encourages beneficiaries to see that it is in their interest to adopt good hygiene practices, but also demonstrates that good public health is a shared responsibility. The CLTS approach has worked extremely well in all the villages of the three districts. A key part of the WASH program has been the complimentary health and hygiene promotion work.

IRD health promoters worked in target communities to raise awareness and to mobilize and organize community members in water and sanitation activities. Health promoters have carried out specific work on major topics such as the safe disposal of excrement, hand washing at critical times, disposal and use of waste water, safe handling of water, water treatment and filtration, food hygiene, and domestic and environmental hygiene. The health promoters also carry out community mobilization activities and training regarding construction and use of water sanitation facilities.

The health education and sanitation program has brought about positive change for communities as they adopt proper hygiene behavior in their day to day lives. All the committees at the rehabilitated infrastructure sites have been reactivated and trained. IRD also distributed jerry cans for water storage as an award to those households that built latrines.

During the implementation period there has been emphasis on latrine construction at selected schools, and disseminating hygiene information to increase public awareness of these issues as well as empowerment of the communities to solve their own sanitation problems without creating excessive resource dependency on outside agencies. Advocacy work with local leaders and at district level government departments has been carried out in order to coordinate and improve approaches to sanitation and hygiene issues.

Figure 11 – An IRD staff demonstrates during a training session how to filter water at household level for participants in Morrungulo, Massinga

For the first time since the project began, no cases of cholera were reported from any areas where the program is working during the 2010 and 2011 period. However, other diseases such as malaria continue to impact these areas. It was a priority to sensitise community members and raise awareness to reduce the negative effects of water borne diseases, such as cholera, through adherence to appropriate sanitation measures.

“The Sanitation and Hygiene promoters continued to encourage people to boil their drinking water. At the beginning we faced resistance from some families who found it as extra work fetching firewood for boiling the water, but over time they realized the benefits of it.” said Sergio Chongola, IRD Sanitation and Hygiene Promoter.

According to the final survey, eighty-four percent (84%) of beneficiary households reported to purify their household drinking water, a significant increase from only eight percent (8%) of households reported at the beginning of the project.

A total of 81 latrines were built at 20 schools in Panda, Funhalouro, and Massinga districts. These latrines are fitted with tippy taps for easy hand washing. An additional focus was the promotion of household latrines, which included training on construction, use, and maintenance of household latrines. A total of 2,634 households built their own latrines.

From the three districts of the program area, 7,203 people benefitted from hygiene and sanitation trainings using CLTS methodology. Apart from the CLTS training to water committees and communities, promotion activities specific to teachers and children were conducted at schools. The objective was to improve hygiene knowledge and enable behaviors for teachers and students in 24 primary schools in Panda, Funhalouro and Massinga. One key finding from the final survey found an increase–from twenty-one percent (21%, baseline) to sixty-eight percent (68%)–of respondents reporting to have washed their hands with soap after defecation and before eating. As a result of IRD's strong sanitation component, community involvement in latrine construction was a success as communities took the initiative to build their own latrines using their own resources.

Figure 12 – School latrines fitted with tippy taps in Mathale school, Funhalouro

Case Study: Community-Led Total Sanitation in IRD intervention's areas

The Community-Led Total Sanitation (CLTS) is a new approach to sanitation promotion that encourages community self-analysis of existing defecation patterns and threats, and promotes local solutions to reduce and ultimately eliminate the practice of open defecation. CLTS initiatives focus on helping communities and individuals understand the health risks of open defecation and use "disgust" and "shame" as triggers to promote action, which ultimately lead to the construction and exclusive use of locally-built, low-cost household latrines. The ultimate goal of CLTS is for communities to achieve and maintain "open defecation-free" status and improve hygiene practices. IRD has introduced CLTS in Funhalouro, Massinga, and Panda Districts.

In February 2012, the Project with support from the mobilization sector from DPOPH (Provincial Public Works Department) carried out an assessment in three communities in Funhalouro that benefited from CLTS training with the objective of assessing efficiency, effectiveness, and relevance, and to identify ways to improve CLTS in Inhambane Province. The main finding was the CLTS approach has generally been very successful in promoting significant reductions in the practice of open defecation. The project was remarkably successful in promoting the construction of latrines: the three communities progressed from a total of 36 latrines before CLTS was initiated to 324 over an eight month period. Other key findings included significant improvements in the environmental sanitation of communities, better personal hygiene, improved security and dignity for girls and women (who no longer have to walk to the bush in the early morning or night to defecate), and most importantly, a sense of empowerment amongst community members who took ownership of CLTS. Finally the assessment found that hygiene and sanitation practices such as hand washing are easily adopted when there is a source of water nearby.

“Villagers now know the relationship between dirty water and diarrhea, as well as latrine use and better health. We’re motivated to continue implementation of CLTS training in all our intervention areas.” said Catarina Numaio, IRD Colheita Sanitation and Hygiene Project Officer.

3.0 Natural and Technological Risks

Mozambique is affected by various natural disasters such as floods, drought, and cyclones due to its geographic location and long coastline. Inhambane is also a high risk coastal province vulnerable to cyclones that cross the Mozambique Channel–cyclone Lisette in 1997, Eline in 2000, and Japhet in 2003 are examples of cyclones that have hit northern Inhambane. In 2007 cyclone Favio reached Inhambane province as a category four cyclone, devastating the municipality of Vilanculos and the coastal areas of the northern districts of the province.

The objective of the natural and technological risks component was to develop a district cyclone early warning and response system. IRD established an early-warning and response plan in coordination with district authorities and other NGOs operating in the district, in order to improve the quality and effectiveness of any emergency response, therefore reducing the negative impact of cyclones in the target communities.

In 2009 IRD established a partnership with the Massinga district administration, the INGC (National Institute for the Management of Disasters), and other NGOs operating in project areas. An evaluation of the available resources of all administrative bodies, private institutions, and NGOs operating in the area was undertaken, aimed at evaluating resources which could be used for the creation of a district cyclone early-warning and response system.

In July 2009, an inter-ministerial coordinating body in the district of Massinga was created, and a plan was developed to mitigate, prevent, and manage future disasters. The creation of the district coordination body involved a two day conference held by IRD and INGC in Massinga district. All district government departments were represented as well as other relevant actors, NGOs, and tourism operators. The objective of the conference was to disseminate the concept of risk reduction, create a district early-warning and response system, and design a plan of action for the next steps. The creation of the permanent planning and coordinating body enhanced the inter-ministerial dialogue and participation of all actors involved in the process of risk and disaster reduction in the district of Massinga. IRD took a lead role in Inhambane Province by facilitating monthly inter-agency disaster response and planning meetings.

A map of the most risk-affected communities and their accessibility to possible shelters was developed. Results showed that the following six communities were at risk: Manhenge, Chilácua, Chipongo, Hanhane, Rio das Pedras and Pomene. In each of these areas, community-level risk reduction committees (CL-GRC) were established. Their primary aim is to motivate and mobilize communities to organize their preparation and response to potential disasters.

Building on the success of the six community-level risk reduction committees (CL-GRC) in Massinga, IRD was requested by INGC to form four new groups in the communities of Mavume and EPC Mucuine in Funhalouro district, as well as Inhasume and EPC Panda-Sede in Panda district. As the key risk in these areas is drought rather than cyclones, kits were not required and trainings were modified accordingly with approval from INGC.
Monthly coordination meetings were held involving all institutions in the area of disaster risk reduction and mitigation and monitoring visits were conducted by INGC and IRD to the communities implementing the Colheita program.

All CL-GRCs were then trained in the areas previously identified. These trainings held by INGC and IRD involved equipping the committees with materials and tools needed in the event of an emergency or natural disaster. The training discloses the INGC approved plan and roles that each committee member will carry out before, during, and after the cyclone. Following the trainings, practice drills took place to test the capabilities of each newly trained committee.

Figure 13 – Mrs. Joana Tamele (center) is a member of Hanhane Community-level Risk Reduction Committee.

In December 2010, and in preparation for the new cyclone season, simulation exercises were carried out at the national and provincial level. The provincial simulation exercises were very beneficial as they demonstrated a good level of commitment and organization at the community level. It was also useful in highlighting some logistical shortcomings of the disaster mitigation at the district level.

During FY2011, 350 members of Community Disaster Risk Reduction committees were trained on vulnerability assessments, the Mozambique cyclone alert system, and the roles and responsibilities of committee members in mobilizing citizens to prepare for and respond to natural disasters. During the life-of-activity, a total of 765 people were trained, or one hundred and fifty three percent (153%) of the 500 direct beneficiaries targeted. All of the committees formed, especially those in cyclone prone areas of Massinga district, were showing good levels of participation by reporting local issues to the district government and IRD by the end of this program activity.

Table 7. Summary of DRR sector targets and achievements

Indicator	LOA Target	Achieved	% of LOA Target Achieved
Number of people trained in disaster preparedness, Mitigation, and Management	**500**	**765**	**153**
Number and percentage of beneficiaries retaining on disaster preparedness, mitigation and management knowledge 2 months after training	**300 (60%)**	**-**	**-**[7]
Number of hazard risk reduction plans, policies or curriculum developed	**1**	**1**	**1**

[7] Task not performed 2 months after training. To be carried out at the same time with the baseline survey for Colheita 2

Annex 1: Performance Monitoring Plan

Indicator	Indicator Definition and Unit of Measurement	Data Source	Method/Approach of Data Collection or Calculation	Schedule/ Frequency	Analysis, Use and Reporting	Targets	Actual & Percentage Achievement
Goal: Reduce vulnerability to drought of targeted households and communities in Southern Mozambique							
Sector: Agriculture and Food Security							
Subsector: Seed Systems and Agricultural Inputs							
Indicator 1: (Projected) Increase in number of months of food self-sufficiency due to distributed seed systems/agricultural inputs for beneficiary families	Additional months of food self-sufficiency as a result of project agriculture activities. (months)	Beneficiary households	Household survey	Baseline Survey 2009 Endline Survey 2012	Evaluate project impact on goal	EOP: + +2.5 months from6(baseline)	5.7(n/a)
Indicator 2: Number of people benefiting from seed systems/agricultural input activities	People benefiting includes direct beneficiaries and their families. Project assumes average household size is five persons. (number)	Beneficiary farmers	Monitoring form	Quarterly	Quarterly reports to OFDA	Yr..1: 11,500 Yr. 2: 3,500 Yr. 3: 22,000 EOP:37,000	26,755 people (72%)[8]
Indicator 3: Accumulated number of liters of honey produced by apiculture associations	Liters of honey produced by beneficiaries trained in apiculture. (liters)	Reported by Beekeepers to Extension workers	Monitoring form	Annually	Annual reports to OFDA	Yr..1: 4,000 Yr. 2: 5,000 Yr. 3: 6,000 EOP: 15,000	19, 665 liters (131%)
Indicator 4: Number of families benefiting from vegetable seed voucher distributions	Families that have at least .3 ha planted with vegetables from seeds received from IRD. (number)	Beneficiary farmers	Monitoring form	Annually	Annual reports to OFDA	Yr.1: 350 Yr. 2: 0 Yr. 3: 0 EOP: 350	584 families (167%)

[8] The BioOil activities were removed from the program but the target number of beneficiaries remained, leaving the program unable to meet the target without those activities

Sector: Water, Sanitation and Hygiene							
Subsector: Water Supply							
Indicator 1: Number and percentage of household water supplies with 0 coliforms bacteria per 100ml	Mozambique government standard to test water for coliform bacteria at rehabilitated boreholes (Number and percent: water supply from pumps with 0 coliform bacteria per 100ml)	Rehabilitated boreholes	Water test for bacteria; monitoring form	After completion of water point	Annual reports to OFDA	Yr.1: 5 (100%) Yr.2: 10 (100%) Yr.3: 20 EOP: 35 (100%)	35 water supplies/ 100% (100%)
Indicator 2: Average water usage of target population in liters per person per day prior to and after interventions	Liters of water a family consume the previous day divided by the members of the family, and averaged from all households surveyed. (average liters per person per day)	Beneficiary households	Household survey	Baseline Survey 2009 Endline Survey 2012	Baseline and Final	EOP: +25% average increase from baseline	15.5 liters per person per day (78%) [9]
Indicator 3: Number and percentage of water points with measurable chlorine residual exceeding 0.2 mg/l	Mozambique Government and Sphere Standard to measure chlorine residual in project water points. (Number and percent: water points with measurable chlorine residual exceeding 0.2 mg/l / total water points supported x 100)	Rehabilitated boreholes	Water test for chlorine residual; monitoring form	After completion of each water point	Annual report to OFDA	Yr.1: 0 (0%) Yr.2: 0 (0%) Yr.3: 0 (0%) EOP: 0 (0%)	0%[10]
Indicator 4: Number of people with access to rehabilitated/established water points	Access refers to people served from a rehabilitated/established water point. Number of beneficiary households x 5 average people per household (number)	Beneficiary households	Water committee form, direct observation	Annually	Annual reports to OFDA	Yr.1: 2,500 Yr.2: 5,500 Yr.3: 12,000 EOP: 20,000	30,227 people (151%)
Indicator 5: Number of students with access to rainwater harvesting systems	Students at schools with functioning rainwater harvesting systems. (number)	Beneficiary schools	Monitoring form, direct observation	Annually	Annual reports to OFDA	Yr.1: 2,000 Yr. 2: 3,000 Yr.3: 3,000 EOP: 5,655	6,115 students (108%)
Subsector: Hygiene Promotion/Behaviors							
Indicator 1: Percentage of target population	Good hand washing practice means to wash hands after	Beneficiary households	Household survey	Baseline Survey 2009	Baseline and Final Report	EOP: +20% increase	68% (111%)

[9] Estimating yesterday's water consumption in liters would likely be a "foreign" concept to most people and akin to asking someone how many grams of food they ate yesterday. They would probably have a hard time estimating it accurately. As worded, this question has a wide latitude for error and the responses received would probably be guesswork, at best

[10] Coliform bacteria tests performed in boreholes were negative and there was no need for disinfection.

demonstrating good hand washing practice	using a latrine and before eating. (percent: number beneficiary demonstrating good hand-washing practice / total target population x 100)			Endline Survey 2012		from 41% baseline	
Indicator 2: Percentage of target population demonstrating correct water usage and storage	(percent: number beneficiary households that store water in closed, clean containers with narrow necks / total beneficiary households x average household size x 100)	Beneficiary households	Household survey	Baseline Survey 2009 Endline Survey 2012	Baseline and Final Report	EOP: +20% increase from 53% baseline	(82%)[11]
Indicator 3: Number and percentage of clean water points functioning three months after completion	(number and percent: no. clean water points at boreholes functioning three months post completion / total inspected water points x 100)	Rehabilitated boreholes	Borehole inspection	Once 3 month after completion		Yr..1: 5 (100%) Yr. 2: 10 (100%) Yr.3: 20 (100%) EOP: 35 (100%)	35 water points/100% (100%)
Sector: Natural and Technological Risks							
Subsector: Disaster Preparedness, Mitigation and Management							
Indicator 1: Number of people trained in disaster preparedness, mitigation and management	People that have successfully completed IRD disaster preparedness, mitigation and management training. (number)	Beneficiaries trained	Attendance sheet; training reports	Annually during Yr.1-Yr.2		Yr..1: 300 Yr. 2: 200 Yr. 3: 0 EOP: 500	765 people (153%)
Indicator 2: Number and percentage of beneficiaries retaining on disaster preparedness, mitigation and management knowledge 2 months after training	(number and percent: no. beneficiaries retaining disaster preparedness, mitigation and management knowledge 2 months after training / total trained beneficiaries x 100)	Beneficiaries trained	Post training questionnaire	Endline Survey 2012		Yr..1: 0 Yr. 2: 0 Yr.3: 300 (60%) EOP: 300 (60%)	n/a
Indicator 3: Number of hazard risk reduction plans, policies or curriculum developed	The project will work with one district to develop a hazard risk reduction plan. (number)	Massinga District Authorities	Project activity report	Annually during Yr.1		Yr..1: 1 Yr. 2: 0 Yr. 3: 0 EOP: 1	1

[11] The most common type of container–bidao–was not included in the list for response options on the baseline survey.

Annex 2. Colheita Program Final Survey Report

Final Survey Report

COLHEITA 2009-2012

Reducing the drought and cyclone vulnerability of communities and households in southern Mozambique

Prepared by Steve McSween
June 2012

Contents

1. Background: Description of Program and Program Area 4

2. Impact Indicators 4

3. The Baseline Survey 4

4. The Final Survey 4

Scope of the Survey
Sampling Procedure
Survey Instrument and Survey Topics
Selection and Training of Interviewers and Supervisors
Survey Logistics
Data Entry and Analysis
Limitations of the Survey

5. Descriptive Findings 7

Household Demographics
Vulnerability Status of Beneficiary Households
Food Security, Hunger Period Coping Strategies, and Non-Farm Income Sources House Construction Materials and Radio Ownership
Primary Sources of Household Water Supply
Agricultural Land Preparation and Seed Supply

6. Baseline / Final Comparison of Impact Indicators 11

7. Other Indicators 12

Baseline / Final Survey Comparison of Selected Variables Related to Agriculture
Percentage of households growing promoted drought tolerant staple crops
Mean number of drought tolerant staple crops grown by households
Knowledge, Practice, and Dissemination of Conservation Agriculture Techniques

Baseline / Final Survey Comparison of Selected Variables Related to WASH Activities
Use of Water Purification Techniques
Principal sources of drinking water during the rainy season
Household water storage

8. Conclusions 17

Appendix 1. Impact Indicators, corresponding baseline survey questions, and Comments about the limitations of baseline survey questions 19

Appendix 2. SPSS Data Analysis Output Tables for Impact Indicators 20

Appendix 3. English translation of Colheita Project Final Survey Questionnaire 23

List of Tables

Table 1. Reported civil status of heads of households, by sex of head of household 7

Table 2. Reported vulnerability factors, by percentage of households 8

Table 3. Reported hunger season coping strategies, by percentage of households 8

Table 4. Reported types of non-farm income generating self-employment activities, by percentage of households 9

Table 5. Principle source of households water supply during the rainy and dry season, but percentage of households 10

Table 6. Percentage of household reporting to have purchased seeds or given seeds to others during the previous 12 months, and the types of seeds purchased or given 11

Table 7. Baseline and Final Survey Comparison of Impact Indicators 12

Table 8. Baseline / Final comparison of percentage of respondents reporting to have grown promoted staple crops during the previous 12 months 13

Table 9. Baseline/Final Comparison of the mean number of drought tolerant stale crops grown during the previous 12 months 13

Table 10. Percentage of households implementing conservation agriculture practices 14

Table 11. Number of key practices conservation agriculture practices that beneficiaries report to have implemented on their own farm during the previous 12 months, by percentage of beneficiary households 15

Table 12. Treatment of drinking water and types of treatment reported, by percentage of households 15

Table 13. Principal source of water during rainy season by percentage of households 16

Table 14. Types of water storage containers used to store water inside the home, by percentage of households 17

Table 15. Reported uses of soap yesterday, by percentage of households 17

1. Background: Description of Program and the Program Area

The *Colheta*[12] program was implemented by International Relief and Development (IRD) from April 2009 to April 2012. Program activities were conducted in Massinga, Funhalouro, and Panda Districts of Inhambane Province that had previously been identified to be especially vulnerable to natural disasters (cyclone and drought).

Overall, the objective of the Colheita program was to "to reduce drought and cyclone vulnerability of communities and households in southern Mozambique" through the provision of clean water sources, transmission of effective drought mitigation strategies for farmers, and the promotion of alternative income generation activities such as beekeeping and vegetable production. Specific intermediate objectives include:

- Reduce food insecurity under drought conditions and post-cyclone conditions
- Improve hygiene practices and expand access to safe water for multiple uses
- Develop a district cyclone early warning and response system

2. Impact Indicators

Before program implementation began, four impact indicators were established to objectively measure the changes required to meet program objectives. These indicators were to be measured through household surveys at the beginning of the program and again at the end. These four impact indicators are:

- The projected increase in number of months of food self-sufficiency due to distributed seed systems / agricultural inputs for beneficiary families
- Average water usage of target population in liters per person per day prior to and after interventions
- Percentage of target population demonstrating good hand washing practices
- Percentage of target population demonstrating correct water usage and storage

3. The Baseline Survey

The Baseline Survey was conducted over a twelve day period during September and October of 2009. According to the consultant Terms of Reference, the primary objectives of the survey were to provide a food security and livelihood assessment of the target area and a set of recommendations for the Colheita Program approach and activities. As such, the questionnaire was not specifically designed to measure the program impact indicators, and this weakness would be carried over into the final survey when, for statistical integrity, the same questions were used to collect data related to program impact indicators. See Appendix 1 for a table listing the program impact indicators, indicator definitions, related survey questions, and brief notes about the limitations of the questions is included as Appendix 1.

4. The Final Survey

Scope of the Survey

The Colheita program final survey was conducted during 19-23 March, 2012, by IRD/Colheita staff, and a total of 359 respondents were interviewed. Among the

[12] *Colheita* is Portuguese for harvest.

respondents interviewed, 199 had participated in Agriculture extension activities and 184 had participated in WASH activities.Among the 359 respondents interviewed, twenty-four (24) indicated that they had participated in both agriculture and WASH activities.[13]

Sampling Procedure

A survey sample of 400 households was selected for face-to-face interviewing. This sample included 200 Ag sector beneficiary households and 200 WASH sector households.

The sampling methodology employed was a systematic random sampling of clusters. In total, twenty (20) cluster communities were selected for the survey sample. These were ten (10) Agriculture sector beneficiary communities and ten (10) WASH beneficiary communities. The ten (10) Ag sector beneficiary clusters were randomly selected from a list of 54 farmer field school groups, and the ten (10) WASH sector beneficiary clusters were selected from among 20 WASH groups. Twenty (20) households were then randomly selected in each of the 20 clusters using IRD lists of names of program beneficiary households. When available two extra names were selected from each cluster to serve as alternatives for informants that were not present or for other reasons could not participate.

Among the 400 households selected, 200 were located in Massinga District, 140 were located in Panda District, and 60 were located in Funhalouro District

Survey Instrument and Survey Topics

The face-to-face household survey questions were designed for the head of household or spouse. The questions included “Yes” or “No”, open-ended and closed questions with multiple choices, in some cases, allowed them to express multiple responses to the same question.

The questionnaire comprised of the following categories:

- Beneficiary status
- Household vulnerability status
- Crop production and sales during the previous 12 months
- Household food self-sufficiency and self-provisioning from own harvest during the previous 12 months
- Household self-employment income earning activities and household economic status
- Knowledge, practices, and dissemination of conservation agriculture techniques
- Access to seeds
- Quantity of water used by households yesterday and types of storage containers
- Principal sources of water
- Hand washing practices
- Hygiene and sanitation practices

[13] Farmer Field School and WASH activities overlapped in only three survey communities: Mabial, Mubique Chigave, and Panda Sede.

Although a new questionnaire form was developed for the final survey, for consistency and statistical comparability the final survey questionnaire included impact indicator questions that were worded exactly as they were worded on the baseline questionnaire.

Selection and Training of Interviewers and Supervisors

Sixteen interviewers and four team leaders were selected from among IRD field staff. The 16 interviewers were divided into four teams of four enumerators each, and a team leader was assigned to each group. The team leaders did not act as interviewers, but, instead, were trained to backstop interviewers in the field, and ensure that the questionnaires were completed and filled out properly.

A two day interviewer training took place on 17-18 March, 2012.? During the training period, the enumerators became familiar with the questionnaire and response recording procedures, and they discussed, and decided upon, the best ways to verbally translate the Portuguese language questionnaire on-the-spot into local language*Xitswa* when conducting the households interviews.

Survey Logistics

A logistics plan was developed to organize and guide survey team movement, and to coordinate vehicle movement for transportation. Each of the four survey teams was equipped with 100 pre-numbered questionnaires, 10 additional unnumbered forms, a list of each cluster's contact household names, pencils, erasers, pencil sharpeners, a marker for labeling, and envelopes for collecting and storing completed survey forms.

Prior to leaving for the field each morning, team leaders were responsible for verifying that each team member was equipped for the day's work. At the end of the day, team leaders ensured that all completed questionnaires were collected into an appropriately labeled envelope.

Data Entry and Analysis

The survey data were analyzed using Statistical Program for Social Sciences (SPSS) 14.0. Pearson's Chi-square correlation test (2-tailed) and Analysis of Variance (ANOVA) were used to identify statistically significant differences between Baseline and Final Survey data for the Impact Indicators. See Appendix 2 for some of the analysis.

Data Limitations

The questionnaire was written in Portuguese and translated on-the-spot into *Xitswa* by the interviewers in the field. Even though training was provided to discuss the translation of technical terms and concepts, translations may have varied, potentially impacting the reliability of some data.

The questionnaire was thirteen pages in length and, on average, took about 30 minutes to administer. This may have resulted in both interviewer and respondent fatigue during the interview and throughout the day.

Portions of the survey were recall-based and this could have had an impact on the accuracy of estimates provided by respondents. In some sections, respondents were asked to recall

within a time frame extending back one year. Respondent fatigue may also have impacted the accuracy of their recall. Respondents were also asked to estimate some information, and as estimates, these were not objectively verifiable.

5. Descriptive Findings

Household Demographics

Among the 359 households surveyed, 199 reported to have participated in IRD Farmer Field School(FFS) activities and 184 reported to have participated in IRD WASH activities. Among them, 25 respondents reported to have participated in both FFS and WASH activities. The descriptive findings reported in this section is a combined summary of data collected from both FFS and WASH households.

Among all households interviewed, seventy-one percent (71%) were reported to be headed by a male and twenty-nine (29%) were reported to be headed by a female.

Among male heads of household, ninety-five percent (95%) were reported to be married, three percent (3%) were reported to be widowed, two percent (2%) were reported to be single, and none were reported to be separated/divorced (Table 1).

Among female heads of household, twenty-four percent were reported to be married, forty-one percent (41%) were reported to be widowed, nineteen percent (19%) were reported to be separated/divorced, and sixteen percent (16%) were reported to be single.

Table 1. Reported civil status of heads of households, by sex of head of household

	Sex of Head of Household	
Civil Status	Male	Female
Married	95%	24%
Single	2%	16%
Widowed	3%	41%
Separated/Divorced	0%	19%
Total	100%	100%

Vulnerability Status of Beneficiary Households

Among all households, thirty-six percent (36%) reported to caring for an orphan, fifty percent (50%) reported to be caring for a child whose parents were living but residing outside the household, nineteen percent (19%) reported to contain an elderly person that required living assistance, fifteen percent (15%) reported to contain an individual that is mentally or physically handicapped, and twenty-seven percent (27%) reported to contain a household member that had been gravely ill and unable to work for three months or longer during the previous 12 months (Table 2).

Table 2. Reported vulnerability factors, by percentage of households

Type of Vulnerability	Percentage of Households
Caring for an orphan	36%
Caring for a child with parents living outside the household	50%
Caring for an elderly person that requires living assistance	19%
Caring for a mentally or physically handicapped individual	15%
A household member was gravely ill for 3 months or more during the previous year	27%

Food Security, Hunger Period Coping Strategies, and Non-Farm Income Sources

Among all households surveyed, seventy-five percent (75%) reported to have experienced a period of food shortage during the previous twelve months, and on average, this period of food shortage was reported to be 3.9 months (range 0-12 months). Among households reporting to have experienced a period of food shortage, ninety-three percent (93%) stated that the primary cause had been drought.

The most common hunger period mitigation strategies reported by households were purchase food (82%), work in exchange for food (47%), receive food from family/friends (24%), temporary labor (17%), sell livestock (16%), and hunted or ate wild plant foods (11%) (Table 3).

Table 3. Reported hunger season coping strategies, by percentage of households

Reported Coping Strategy	Percentage of Households
Buy food with money	82%
Work in exchange for food	47%
Gift from family or friends	24%
Temporary work	17%
Sell animals	16%
Hunt and/or eat wild foods	11%
Eat fewer meals per day	6%
Ask for food on credit	6%
Harvest early	3%
Receive food from Gov't/NGO	3%
Send family members to eat elsewhere	2%
Other	3%
Sell household goods	1%
Eat smaller portions	1%

Sixty-nine percent (69%) of households reported to have some type of non-farm source of income, with the most common being make and sell homemade beverages (41%), cut and sell thatching materials (19%), buy and sell non-meat or fish food products (15%), buy and

sell non-food products (12%), and cut and sell firewood or construction poles (12%) (Table 4). Households reporting non-farm income earning activities, reported to have an average of 2.3 different types of income earning activities (range 1-8).Twenty-one (21%) of households reported to have received monetary remittances from someone living outside the home during theprevious twelve months.

Table 4. Reported types of non-farm income generating self-employment activities, by percentage of households

Type of self-employment activity	Percentage of Households
Make and sell homemade beverages	41%
Cut and sell thatching materials	19%
Buy and sell other food items	15%
Buy and sell non-food items	12%
Cut and sell firewood	12%
Cut and sell construction poles	12%
Collect and sell wild plant foods	8%
Produce and sell charcoal	7%
Buy and sell meat or fish	7%
Make mats, winnowers, or baskets	6%
Work as a craftsman, carpenter, or woodworker	4%
Hunt and sell meat	3%
Work as a tailor	3%
Repair telephones, radios, bicycles, watches, etc.	3%
Collect and sell honey	2%
Catch and sell fish	1%

House Construction Materials and Radio Ownership

Among all households, the most common house construction materials were thatch walls (42%), with a thatch (55%) or zinc sheet roof (44%). Other important wall construction materials included waddle-and-daub (24%) and wooden poles (16%).

Thirty-nine percent (39%) of households reported to own a radio and among them, seventy-eight percent (78%) reported that the radio was in working order, eleven percent (11%) reported that their radio worked but did not currently have batteries, and eleven percent (11%) reported that their radio did not work.

Primary Sources of Household Water Supply

When asked about their most important source of water during the rainy season, among all households the most commonly reported sources were a cistern (32%), an unprotected well (20%), a borehole with manual pump (17%), and a river or lake (11%). When asked about the most important dry season water sources, households reported their primary sources to be a borehole with manual pump (52%), an unprotected well (24%), and a protected well (12%) (Table 5).

Table 5. Principle source of household water supply during the rainy and dry season, by percentage of households

	Percentage of households	
Principal source of water	Rainy season	Dry season
Borehole with a manual pump	17%	52%
Protected well	9%	12%
Unprotected well	20%	24%
Rain water in cistern	32%	2%
Rainwater in puddles	8%	0%
Rainwater in reservoir	2%	3%
River/Lake	11%	6%
Public tap	1%	1%
Total	100%	100%

Agricultural Land Preparation and Seed Supply

The majority of households (73%) reported that that prior to the most recent planting season they hadplowed their land with hand hoes. The remaining twenty-seven percent (27%) reported to have plowed their farmland using animal traction.

Slightly more than half (56%) of all the households survey reported that they had not had enough seeds during the most recent planting season, but less than one percent (0.4%) had reported this as the most important cause household food insecurity during the previous 12 months. The most important sources of seed during the last planting season were reported to be seeds saved from the previous harvest (41%) and purchase of seeds (39%).

Among households that said they had purchased at least some portion of the seeds they used during the previous planting season (65%), the most commonly purchased seeds were groundnut (77%), maize (64%), cowpea (56%), and other types of bean seed (14%). When asked, thirty-eight percent (38%) of households reported to have given seeds to someone during the past year and among them, the most commonly given seeds were maize (65%), groundnut (36%), cowpea (34%), vegetable seeds (11%), and sorghum (10%). Twelve percent (12%) reported to have given “other” types of seeds, with the most commonly reported “other” being cassava cuttings (Table 6).

Table 6. Percentage of household reporting to have purchased seeds or given seeds to others during the previous 12 months, and the types of seeds purchased or given

	Percentage of households	
	Purchased Seed	Gave seed to others
Household purchasing seed	65	--
Household giving seeds to others	--	38
Types of seeds purchased or given		
Groundnut	77	36
Maize	64	65
Cowpea	56	34
Other bean	14	5
Vegetables	9	11
Sorghum	4	10
Other seed or planting material	3	12*

*Cassava planting material was the commonly reported "Other"

6. Baseline / Final Comparison of Impact Indicators

A statistical comparison (ANOVA) of survey data indicates that there is no significant difference in the mean number of months of food self-provisioning from own harvest between the baseline (6.0 months) and final survey (5.7 months) means (Table 7).

Likewise with WASH indicators, there is no statistically significant difference between the baseline and final indicator values for the mean number of liters of water used per person in households yesterday (baseline 16 liters, final 15.5 liters) or the percentages of households reporting to store their water in closed jerry cans (baseline 53%, final 60%).

This is a statistically significant difference in the percentage of respondents demonstrating good hand washing practices. The percentage of respondents reporting to have washed their hands both after defecating and before eating or cooking yesterday increased by forty-seven percent (47%) from twenty-one percent (21%, baseline) to sixty-eight percent (68%, final).

Table 7. Baseline and Final Survey Comparison of Impact Indicators

Impact Indicators	Baseline	Final	p-value
Mean number of months of food self-sufficiency due to distributed seed systems/agricultural inputs for beneficiary families	6.0	5.7	0.345
Average water usage of target population in liters per person per day prior to and after interventions	16.0	15.5	0.897
Percentage of target population demonstrating good hand washing practices	21%	68%	0.000*
Percentage of target population demonstrating correct water usage and storage	53%	60%	0.068

*The difference between baseline and final survey values is statistically significant at 0.05 level.

7. Other Indicators

Baseline / Final Survey Comparison of Selected Variables Related to Agriculture

This section compares the final survey results reported by Farmer Field School participants with the results recorded in the baseline survey. Only households reporting to have participated in Farmer Field School activities are included in this set of comparisons with baseline survey results.

One focus of the Colheita program agriculture activities was the promotion of drought tolerant staple crops as a drought mitigation strategy. Crops promoted through Farmer Field School activities for their drought tolerance included cassava, sorghum, millet, bambara nut and pigeon pea. At the final survey, a significantly higher percentage of households reported to have produced these crops during the previous twelve months than had been reported by baseline survey respondents. As shown in Table 8, during the final survey, fifteen percent (15%) more households reported to have produced cassava, fourteen percent (14%) more households reported to have produced sorghum, twelve percent (12%) more household reported producing bambara nut, and eight percent (8%) more households reported to have produced millet.

Table 8. Baseline / Final comparison of percentage of respondents reporting to have grown promoted staple crops during the previous 12 months

Staple Crops Produced	Baseline	Final	% change	p-value
	Percentage of Households			
Cassava	67%	82%	+15	<0.0001*
Sorghum	12%	26%	+14	<0.0001*
Bambara nut	25%	37%	+12	<0.0002*
Millet	2%	10%	+8	<0.0001*
Pigeon pea	16%	18%	+2	0.2292
Groundnut	81%	83%	+2	0.57
Maize	91%	87%	-4	0.0693
Cowpea	85%	80%	-5	0.113

*The difference between baseline and final results for these crops is statistically significant (Chi-Square 0.05 level)

Agriculture sector beneficiary households also reported having produced a significantly greater diversity of staple crops during the previous twelve months (Table 9). During the baseline survey, farmers reported to have produce a total of 3.5 different staple crops during the previous year and during the final survey farmers reported to have produced a total of 4.2 staple crops. Although the final survey collected production information about a greater number of staple crops than had been included in the baseline survey, only crops included in the baseline survey were used for this comparison.

Table 9. Baseline/Final Comparison of the mean number of drought tolerant stale crops grown during the previous 12 months

	Baseline	Final	Difference	p-value
Mean number of staple crops produced	3.5	4.2	+0.7	0.0001*

*The difference between baseline and final result is statistically significant (ANOVA 0.05 level).

Knowledge, Practice, and Dissemination of Conservation Agriculture Techniques

Among respondents reporting that they had participated in IRD Farmer Field School activities, eighty-two percent (82%) said that they had implemented conservation agriculture techniques on their own farms during the previous planting season (Table 10). Among those, thirty-seven percent (37%) reported that they had used their own farms to teach an average of 2.6 other farmers each about conservation agriculture practices. About three-fourths (71%) of those teaching others about new practices reported that their "students" had implemented the techniques on some portion of their own farms.

Among those beneficiaries reporting to have used conservation agriculture techniques on their own farms during the past year, ninety-six percent (96%) reported to have made panting basins in lines, and ninety-one percent (91%) reported to have added manure or compost to the basins before planting. Over half of the farmers reported that the left the residue from the previous crop in the field during land preparation (59%), and fifty percent (50%) of farmers reported to have practiced frequent weeding. Forty-three percent of farmers reported to have practiced crop rotation during the previous panting season.

Eighteen percent (18%) of Farmer Field School participants reported that they did not use any of the promoted conservation agriculture practices on their own fields during the previous year. Among them, the most common reasons given for non-implementation were: didn't have manure or compost (54%), didn't have time (26%), and the practices involve a lot of work (17%). An important "other" (33%) was they had learned about the new techniques after the planting season had passed.

Table 10. Percentage of households implementing conservation agriculture practices

	Percentage of households	
	Practiced	Did not practice
Households practicing CA technique	82%	---
Households not practicing CA techniques	---	18%
CA Practices that were implemented		
Make planting basins in lines	96%	
Add manure/compost to basins	91%	
Leave crop residue after the harvest	59%	
Frequent weeding	50%	
Crop rotation	43%	
Reasons for not implementing CA practices		
Don't have manure/compost		54%
Don't have time		26%
CA practices require a lot of work		17%
Traditional practices are better		0%
Didn't understand the practices		6%
Didn't like the practices		0%

Among farmers that reported to have used conservation agriculture practices on their own farms during the previous planting season, forty-three percent (43%) reported to have used all three of the key conservation agriculture practices promoted by IRD during Farmer Field

School activities[14], thirty-five percent (35%) reported to have used two of the practices, and4% reported to have used only one of practice (Table 11).

Table 11. Number of key conservation agriculture practices that beneficiaries reported to have implemented on their own farm during the previous 12 months, by percentage of beneficiary households

Number of key CA practices implemented	Percentage of households
Implemented all 3 key CA practices	43%
Implemented 2 key CA practices	35%
Implemented 1 key CA practice	4%
Did not implement any of the 3 key CA practices	18%
Total	100%

Baseline / Final Survey Comparison of Selected Variables Related to WASH Activities

This section compares the final survey results reported by WASH sector participants with the results recorded in the baseline survey. Only households reporting to have participated in WASH sector activities are included in this set of comparisons with baseline survey results.

Use of Water Purification Techniques

The reported use of water purification techniques differed greatly between baseline and final surveys. Among households responding to the baseline, only eight percent (8%) reported to use some method of water purification for their household drinking water, while in the final survey, eighty-four percent (84%) of WASH beneficiary households reported to purify their household drinking water (Table 12). Among WASH households that reported to treat their drinking water, the most commonly reported purification practices were boiling (92%), filtering water through a piece of cloth (48%), use of a filter (35%), use of *Certeza* or other chlorine-based disinfectant (25%), and allowing the solids to settle before drinking (24%).

Table 12. Treatment of drinking water and types of treatment reported, by percentage of households

	Percentage of households	
	Baseline	Final
Reporting to use some type of water treatment	8%	84%
Types of water treatment used		
Boil water	3%	92%
Filter water through a piece of cloth	--	48%

[14] The three key conservation agriculture practices promoted by IRD are 1) minimal soil disturbance, 2) keep the soil covered throughout the year with crop residues and/or cover crops, and 3) crop rotation.

Use filter	0.8%	35%
Use *Certeza* or other chlorine based disinfectant	3%	25%
Allow solids to settle before drinking	--	24%
Solar disinfection	0.4%	4%
Use *moringa* leaves as a flocculent	--	3%

Principal sources of drinking water during the rainy season

Among baseline households, the most commonly reported primary source of drinking water during the rainy season was an unprotected well (48% of households). During the final survey, among WASH beneficiary households the reported primary sources of rainy season drinking water were reported to be a cistern (41%) or borehole with a manual pump (28%). Only eight percent (8%) of final survey WASH beneficiary households reported to use an unprotected well as their primary source of drinking water during the rainy season (Table 13).

Table 13. Principal source of water during rainy season by percentage of households

	Percentage of households	
Sources of drinking water	Baseline	Final
Cistern	20%	41%
Borehole with manual pump	--	28%
Puddles	--	9%
Unprotected well	48%	8%
Protected well	23%	5%
River/Lake	5%	5%
Reservoir/Dam	1%	4%
Public tap	2%	--
Piped water	0.8%	--
Spring	0.1%	--
Total	100%	100%

Household water storage

During the final survey, WASH households were asked about the various types of containers they use to store their water, and whether or not each type had a cover. Many households reported to use more than one type of storage container, and the most commonly used were jerry cans (66%), 200 liter drum (48%), bucket (33%), clay pot (26%), and cistern (16%) (Table 13).

Among the various types of containers used in each household, seventy-two percent (72%) of households reported that all of their containers had a cover.

Table 14. Types of water storage containers used to store water inside the home, by percentage of households

Type of container	Percentage of households
Jerry can	66%
200 liter drum	48%
Bucket	33%
Clay pot	26%
Cistern	16%
Bottle	4%
Basin	3%

Uses of soap

Among final survey WASH beneficiary households, ninety-eight percent (98%) reported to have used soap on the day prior to the survey; excluding the use of soap to wash clothes (54%), the most commonly reported uses were to bathe (99%), to wash hands after defecation (60%), to wash hands before eating (45%), to wash hands before cooking (38%), to bath child (28%), to wash child after it has defecated (20%), to wash hands before feeding a child (15%), and to wash own hands after cleaning child following defecation (14%) (Table 15).

Table 15. Reported uses of soap yesterday, by percentage of households

Uses of soap	Percentage of WASH households
Used soap to bathe	99%
Used soap to wash own hands after defecation	60%
Used soap to wash clothes	54%
Used soap to wash hands before eating	45%
Used soap to wash hands before cooking	38%
Used soap to bathe child	28%
Used soap to wash child after defecation	20%
Used soap to wash hands before feeding child	15%
Used soap to wash hands after cleaning child	14%
Used soap to wash child's hands	9%

8. Conclusions

Although a statistical comparison of impact indicator data from the baseline and final surveys indicates beneficiary households were statistically no better off and the end of the program than they had been in the beginning, an of the data beyond those particular indicators clearly shows that beneficiary households have progressed toward achieving disaster risk reduction gains through their participation in program activities.

Among beneficiary households that have participated in Farmer Field School activities, a significantly higher percentage of farmers reported to have produced drought tolerant crops during the previous 12 months than had been reported at the baseline. Those same farmers also reported producing a significantly wider diversity of drought tolerant crops.

Eight out of ten beneficiary farmers reported having used the new conservation agriculture practices on their own farms during the previous cropping season, and almost half (43%) of them reported having used all three of the key techniques. Over a third of those farmers also reported to have used their own farms to teach others about conservation agriculture practices, and three-fourths of those (71%) reported that their "students" had begun experimenting with the new techniques on their own farms.

The percentage of beneficiary households reporting to use some method of water purification for their household drinking supply rose from eight percent (8%) during the baseline to eighty-four percent (84%) among WASH beneficiary households during the final survey. A higher percentage of program beneficiary households (67%) reported using safe water sources (cistern or borehole with a manual pump) during the rainy season than had been reported during the baseline (20%) and fewer reported using unprotected wells (baseline 48%, WASH beneficiary final 8%). Sixty-six percent (66%) of WASH beneficiary households reported that they store their household drinking water in as narrow-mouthed jerry can, and among the various types of water storage containers used by households seventy-two percent (72%) report that all of their containers are equipped with lids.

The percentage of respondents reporting to have washed their hands with soap after defecation AND before eating also significantly increased from twenty-one percent (21%) (baseline) to sixty-eight percent (68%) following households participation in WASH activities.

Final survey data also clearly indicates that IRD has successfully reached the most vulnerable households with agriculture and water, sanitation and hygiene messages. Twenty-nine percent (29%) of beneficiary households were reported to be headed by a female, and overall, thirty-six percent (36%) of households reported to be caring for an orphan, or to have a household member that was seriously ill and unable to work for three months or more during the previous year (27%).

Appendix 1. Impact Indicators, corresponding baseline survey questions, and comments about the limitations of baseline survey questions

Impact Indicator	Definition	Baseline Question	Possible Responses	Limitation of Baseline question
The projected increase in number of months of food self-sufficiency due to distributed seed systems / agricultural inputs for beneficiary families	Additional months of food self-sufficiency as a result of project agriculture activities. (months)	During which months of the past year did your family eat cereals (maize, sorghum, millet) or cassava produced on your farm without having to purchase any to feed your household?	Jan, Feb, Mar, Apr, May, June, July, Aug, Sept, Oct, Nov, Dec	In areas where both cassava and grains are grown, cassava is both a staple food and a safety net food that households rely on when their store of grains has become depleted. Asking about grain self-provisioning and cassava self-provisioning in separate questions and then overlapping the result would have been a better approach.
Average water usage of target population in liters per person per day prior to and after interventions	Liters of water a family consumed the previous day divided by the members of the family, and averaged from all households surveyed. (average liters per person per day)	Yesterday, how many liters of water did your household use for drinking? ---------- Yesterday, how many liters of water did your household use for bathing, washing clothes, or other purposes?	Estimated number of liters for each question	Estimating yesterday's water consumption in liters would likely be a "foreign" concept to most people, and akin to asking someone how many grams of food they ate yesterday. They would probably have a hard time estimating it accurately. As worded, this question has a wide latitude for error and the responses received would probably be guesswork, at best.
Percentage of target population demonstrating good hand washing practices	Good hand washing practice means to wash hands after using a latrine and before eating. Percentage = (Number beneficiary demonstrating good hand-washing practice ÷ total target population) x 100	Did you wash your hand after the last time you visited the latrine? ---------- Did you wash your hand before the last time you ate or prepared food?	Yes, with water only Yes, with soap and water Yes, with ash No	
Percentage of target population demonstrating correct water usage and storage	Percentage = ((Number beneficiary households that store water in closed, clean containers with narrow necks x average	In what types of containers does you household store drinking water?	Bottles (garrafa) with tops Barrel with a lid Clay pots	The most common type of water storage container – a narrow necked 20 liter jerry can called a *bidão* in Portuguese – was not included in the list of response options for the baseline questionnaire. Under a separate question

	household size) ÷ (total number of beneficiary households x average household size)) x 100		Bucket / basins Cistern	on the final survey, 66% of households reported to store their water in a bidão.

Appendix 2. SPSS Data Analysis Output Tables for Impact Indicators

Mean Number Months of Food Self-Provisioning from own harvest

Mean number of months of food self-provisioning

Ate_own_food

BASELINE	Mean	N	Std. Deviation
Baseline Survey	5.9754	1543	3.47000
Final Survey	5.7323	198	2.91749
Total	5.9477	1741	3.41180

Oneway

ANOVA Comparing Baseline and Final Mean Number of Months of self-provisioning from own harvests

Ate_own_food

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.366	1	10.366	.890	.345
Within Groups	20243.877	1739	11.641		
Total	20254.244	1740			

Mean Number of Liters of Water Used Per Person Yesterday

Mean Baseline and Final Comparison of Mean Number of Liters of water used per person yesterday

Water_used

Survey	Mean	N	Std. Deviation
Baseline Survey	15.6913	1532	14.72745
Final Survey	15.5357	154	8.38346
Total	15.6771	1686	14.26388

Oneway Mean Number of Liters of Water Used Per Person Yesterday

ANOVA Mean Number Liters of watr used per person yesterday

Water_used

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.387	1	3.387	.017	.897
Within Groups	342823.7	1684	203.577		
Total	342827.1	1685			

[

Crosstabs Baseline and Final Comparison of Percentage of Respondents Demonstrating Good Hand Washing Practices

Washed_hands * Survey Crosstabulation

Count

		Survey		
		Baseline Survey	Final Survey	Total
Washed_hands	.00	1225	59	1284
	1.00	318	122	440
Total		1543	181	1724

Chi-Square Tests Baseline and Final comparison of precentage of respondents demonstrating good hand washing practices

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	186.615[b]	1	.000		
Continuity Correction[a]	184.161	1	.000		
Likelihood Ratio	159.983	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	186.507	1	.000		
N of Valid Cases	1724				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 46.19.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.329	.027	14.458	.000[c]
Ordinal by Ordinal	Spearman Correlation	.329	.027	14.458	.000[c]
N of Valid Cases		1724			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Crosstabs Baseline and Final Comparison of percentage of households reporting to store water in covered jerry cans

Mode of storage of drinking water * Survey Crosstabulation

Count

		Survey		
		Baseline Survey	Final Survey	Total
Mode of storage of drinking water	0	719	73	792
	closed bottles	818	111	929
Total		1537	184	1721

Chi-Square Tests of Baseline and final survey comparison of percentage of households reporting to store water in covered jerry cans

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.340[b]	1	.068		
Continuity Correction[a]	3.060	1	.080		
Likelihood Ratio	3.368	1	.066		
Fisher's Exact Test				.072	.040
Linear-by-Linear Association	3.338	1	.068		
N of Valid Cases	1721				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 84.68.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.044	.024	1.828	.068[c]
Ordinal by Ordinal	Spearman Correlation	.044	.024	1.828	.068[c]
N of Valid Cases		1721			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

COLHEITA PROGRAM (2009-2012)

FINAL SURVEY QUESTIONNAIRE

7-11 March 2012

Survey of Agriculture and Food Security & Water, Sanitation, and Hygiene

PARTICIPATION ADVISORY
Your participation in this survey is entirely voluntary. All information you provide is confidential, and your name will not be associated with any answers or any part of the survey process.

AF	Household number	
PROV	Province	INHAMBANE
DIST	District	
ALD	Village	
Data	Date	_____ March 2012
Nome	Name of person being interviewed	
Inq	Enumerator's name	
Lider	Team leader's Name and signature	

1. Participation in Colheita Program Activities

Q1	Have you participated in Farmer Field School activities with the IRD agricultural extensionist?	Yes..... 1 No..... 2
Q2	Have you, or someone in your family, participated in activities about water, sanitation, or hygiene with IRD, for example well, cisterns, latrines, or other training?	Yes..... 1 No..... 2

2. Head of Household and Household Vulnerability Status

Q3	What is the sex of the person being interviewed?	Male ..... 1 Female..... 2	
Q4	What is your civil status?	Married ..... 1 Single..... 2 Widowed..... 3 Divorced or separated..... 4	
Q5	Are you the head of your household?	Yes..... 1 No..... 2	→Q9
Q6	What is your relation to the head of household?	Spouse..... 1 Child ..... 2 Parent..... 3 Other family 4	
Q7	What is the sex of the head of household?	Male ..... 1 Female..... 2	
Q8	What is the civil status of the head of household?	Married ..... 1 Single..... 2 Widowed..... 3 Divorced or separated..... 4	
Q9	Has the head of household lived in the home continuously during the previous 12 months, without being absent for more than three consecutive months during this period?	Yes..... 1 No..... 2	
Q10	Are there any orphans in your household?	Yes..... 1 No..... 2 Don't know..... 3	
Q11	Are there any children in your household whose parents are living, but living outside your household?	Yes..... 1 No..... 2 Don't know..... 3	
Q12	Are there any elderly people in your household that need assistance?	Yes..... 1 No..... 2 Don't know..... 3	
Q13	Are there any physically or mentally handicapped persons that need assistance in your household?	Yes..... 1 No..... 2 Don't know..... 3	
Q14	Is there anyone in your household that has been seriously ill and unable to work for three or more months during the past year?	Yes..... 1 No..... 2 Don't know..... 3	

3. Crop production and sales during the past 12 months

Q15 Crops	1 Did your household PRODUCE any [..name of crop..] during the last 12 months? Yes = 1 No = 2 → skip to next crop	2 Did your household SELL any [..name of crop..] during the last 12 months? Yes = 1 No = 2
1 Maize		
2 Rice		
3 Sorghum		
4 Millet		
5 Peanut		
6 Bambara nut		
7 Black-eyed pea		
8 Butter bean		
9 Pigeon pea		
10 Cassava		
11 Sweet potato - white		
12 Sweet potato - orange		
13 Irish potato		
14 Onion		
15 Tomato		
16 Pumpkin/Squash		
17 Okra		
18 Cucumber		
19 Bell pepper		
20 Chili pepper		
21 Garlic		
22 Cabbage		
23 Lettuce		
24 Kale/Collard greens		
25 Amaranth		
26 Melon		
27 Sesame		
28 Sunflower		

4. Household food self sufficiency during the previous 12 months

Q16	During the previous 12 months, has you household experienced any period of food shortage?	Yes..... 1 No ..... 2 Don't know 3	→Q20

Q17 In which months of the last year yead your household not have sufficient food?

Enumerator: Write "1" under the months that they say they did not have enough food.

Jan/11	Feb/11	Mar/11	Apr/11	May/11	Jun/11	Jul/11	Aug/11	Sep/11	Oct/11	Nov/11	Dec/11

Q18	What was the MOST IMPORTANT cause of your household food shortage during the past year? **RECORD ONLY ONE ANSWER**	Drought .....1 Flood.....2 Illness in the family.....3 Crop pests or disease.....4 Sold too much of the harvest .....5 Didn't have enough seeds .....6 Produce loss during storage .....7 Lack of labor .....8 Other _____ 9
Q19	During the periods of food shortage, how did your household obtain the food needed? MARK ALL THAT APPLY	Gift from family or friends ..... 1 Purchased food with money ..... 2 Worked in exchange for food ..... 3 Hunted or ate wild foods ..... 4 Sold livestock ..... 5 Sold household goods..... 6 Ate fewer meals per day ..... 7 Ate smaller portions..... 8 Harvested crops early ..... 9 Asked food on credit..... 10 Sent family members to eat with other household..... 11 Temporary work to earn cash..... 12 Gov't/NGO food distribution ..... 13 Other_____ 14

Q20 During which months of the past year did your family eat cereals (maize, sorghum, millet) or cassava produced on your farm without having to purchase any to feed your household?

Enumerator: Write "1" under the months that they say the household ate the produce from their own farm without having to purchase any cereals or cassava.

Jan/11	Feb/11	Mar/11	Apr/11	May/11	Jun/11	Jul/11	Aug/11	Sep/11	Oct/11	Nov/11	Dec/11

5. Non-Farm Self-Employment Activities and Household Economic Conditions

I'd like to know if any members of your household were self-employed with the following activities during the last 12 months. During the past 12 months, did anyone in your household […read the type of activity...]

Q21	Cut and sold firewood	Yes.....1 No 2
Q22	Produced and sold charcoal	Yes.....1 No 2
Q23	Cut and sold thatching materials	Yes.....1 No 2
Q24	Cut and sold sticks for construction	Yes.....1 No 2
Q25	Made and sold drinks	Yes.....1 No 2
Q26	Harvested and sold honey	Yes.....1 No 2
Q27	Collected and sold wild plants or fruits	Yes.....1 No 2
Q28	Hunted animals for sale	Yes.....1 No 2
Q29	Fished and sold fish	Yes.....1 No 2
Q30	Bought and sold meat or fish	Yes.....1 No 2
Q31	Bought and sold other food products	Yes.....1 No 2
Q32	Bought and sold non-food products	Yes.....1 No 2
Q33	Made mats, winnowers, or baskets for sale	Yes.....1 No 2
Q34	Made and sold clothing	Yes.....1 No 2
Q35	Worked as a craft maker, carpenter, or furniture maker	Yes.....1 No 2
Q36	Repair of cell phones, radios, bicycles, watches, etc.	Yes.....1 No 2
Q37	Other types of self-employment	Specify: _____

Q38	Was the quantity of food available within your household during the past year different than it was two years ago?	Yes..... 1 No ..... 2 Don't know..... 3	→Q42
Q39	If yes, was the quantity of food your household had during the past year more or less than it was two years ago?	More ..... 1 Less 2	→Q41
Q40	What were the reasons your household had more food during the past year? MARK ALL THAT APPLY	Good harvest ..... 1 New agricultural practices ..... 2 Planted a larger farm ..... 3 Sold more produce ..... 4 Got a better price for the produce .. 5 Participation in IRD activities ..... 6 Good rain ..... 7 Remittances from outside ..... 8 Other _____ 9	
Q41	What were the reasons your household had less food during the past year? MARK ALL THAT APPLY	Poor harvest..... 1 Drought..... 2 Crop pests and disease ..... 3 Family illness..... 4 Planted smaller farm..... 5 Poor soil fertility..... 6 Lack of seeds..... 7 Poor quality seeds..... 8 Other _____ ... 9	
Q42	Do you think your household is in better, the same, or worst economic conditions that you were two years ago?	Better ..... 1 Same ..... 2 Worse..... 3 Don't know..... 4	
Q43	If your household economic condition is better, why is that? MARK ALL THAT APPLY	Increased farm productivity..... 1 Better access to crop markets ..... 2 Livestock rearing and sales ..... 3 Small business activities..... 4 Better access to agriculture inputs .. 5 Better family health ..... 6 Remittances from outside ..... 7 Other _____ 8	
Q44	Does your household have a radio?	Yes..... 1 No ..... 2 Don't know..... 3	→Q46
Q45	Does the radio work?	Yes..... 1 Yes, but don't have batteries..... 2 No ..... 3 Don't know..... 4	
Q46	What is the roof of your household's main house made of?	Thatch ..... 1 Metal sheets ..... 2 Tiles..... 3	

		Plastic sheeting ..... 4 Other_____ 5
Q47	What are the walls of your household's main house made of?	Sticks ..... 1 Thatch ..... 2 Waddle-and-daub ..... 3 Mud blocks (unfired)..... 4 Cement or fired blocks..... 5 Metal sheets ..... 6 Other _____ 7
Q48	During the past 12 months, has your household received any money, food, or other goods from anyone living outside the household?	Yes..... 1 No ..... 2 Don't know..... 3

6. Knowledge, Use, and Dissemination of Conservation Agriculture Practices

Q49	Before planting your crops during this past year, was most of the farm plowed by hand using a hoe, or was the land plowed using animal traction?	Plowed by hand with a hoe..... 1 Plowed with animal traction..... 2	
Q50	Have your heard of "Conservation Agriculture"? The type of agriculture where seeds are planted in basins after manure or compost has been added.	Yes..... 1 No 2	→Q59
Q51	Where did you learn about this practice?	IRD Farmer Field School..... 1 Family member ..... 2 Friend/neighbor ..... 3 Government extensionist ..... 4 Radio ..... 5 Other _____ 6	
Q52	Have you used any conservation agriculture practices on your own farm during the past 12 months?	Yes..... 1 No ..... 2 Don't know..... 3	→Q54
Q53	If yes, which practices?	Make planting basins .....1 Use manure/compost in basins .....2 Keep crop residue in the field.....3 Prevent weed from going to seed.....4 Rotate cereals with legumes.....5 Other _____ 6	
Q54	If no, why not?	Don't have manure/compost.....1 Takes too much time .....2 Takes too much work.....3 Traditional practices are better .....4 I wasn't sure how to implement.....5 I didn't like the new practices.....6 Other_____ 7	
Q55	Have you taught anyone else about the		

	conservation agriculture practices you've learned?	Yes..... 1 No 2	→Q59
Q56	How many people?	_____ People	
Q57	Have any of the people you taught tried the practices on their own farm?	Yes..... 1 No ..... 2 Don't know..... 3	
Q58	How many people?	_____people	

7. Access to seeds

Q59	During the most recent planting season, did your household have enough seeds?	Yes..... 1 No ..... 2 Don't know..... 3	
Q60	What was the major source of seeds used during the most recent planting season?	Previous harvest .....1 Worked in exchange for seeds.....2 Purchased seeds .....3 Received as gift from government.....4 Given by family/friends.....5 Received from IRD .....6 Received from other NGO.....7 Other _____ 8	
Q61	Has your household purchased any seeds during the past 12 months?	Yes..... 1 No 2	→Q63
Q62	If yes, which types of seeds were purchased? MARK ALL THAT APPLY	Maize ..... 1 Black-eyed pea..... 2 Beans ..... 3 Peanut..... 4 Sorghum..... 5 Vegetables ..... 6 Other _____ 7	
Q63	Did your household give seeds to anyone during the past 12 months?	Yes..... 1 No 2	→Q65
Q64	If yes, which types of seeds? MARK ALL THAT APPLY	Maize ..... 1 Black-eyed pea..... 2 Beans ..... 3 Peanut..... 4 Sorghum..... 5 Vegetables ..... 6 Other _____ ... 7	

8. Liters of water used yesterday by the household

Q65	How many people are regularly present in your household to use water for drinking, bathing, or other purposes??	_____ people
Q66	In what types of containers does you household store drinking water? MARK ALL THAT APPLY	Bottles with tops ..... 1 Drum with a lid..... 2 Clay pots..... 3 Buckets/basins ..... 4 Cistern 5
Q67	Yesterday, how many liters of water did your household use for drinking?	1_____ liters 2Can't estimate..... 1
Q68	Yesterday, how many liters of water did your household use for bathing, washing clothes, or other purposes?	1_____ liters 2Can't estimate..... 1
Q69	What types of containers does your house use to store water? MARK ALL THAT APPLY	25 liter jerry can with a top..... 1 25 liter jerry can without a top ..... 2 20 liter jerry can with a top..... 3 20 liter jerry can without a top ..... 4 10 liter jerry can with a top..... 5 10 liter jerry can without a top ..... 6 5 liter jerry can with a top..... 7 5 liter jerry can without a top ..... 8 20 liter bucket with a lid ..... 9 20 liter bucket without a lid..... 10 12 liter bucket with a lid ..... 11 12 liter bucket without a lid..... 12 5 liter bottle with a top ..... 13 5 liter bottle without a top..... 14 1.5 liter bottle with a top ..... 15 1.5 liter bottle without a top..... 16 Clay pot with cover ..... 17 Clay pot without cover..... 18 210 liter drum with cover ..... 19 210 liter drum without cover..... 20 Basin with cover..... 21 Basin without cover ..... 22 Cistern with cover ..... 23 Cistern without cover..... 24
Q70	How many of each type of container did your household use yesterday?	125 liter jerry can _____ 220 liter jerry can _____ 310 liter jerry can _____

	Write the number of containers of water, of each type, that was used by the household yesterday MARK ALL THAT APPLY	4 5 liter jerry can _____ 5 20 liter bucket _____ 6 12 liter bucket _____ 7 5 liter bottle _____ 8 1.5 liter bottle _____ 9 210 liter drum _____ 10 Other (number of liters _____)	
Q71	Do you use any method of treatment for you household drinking water?	Yes..... 1 No ..... 2 Don't know..... 3	→Q73
Q72	If yes, which type of treatment do you use? MARK ALL THAT APPLY	Certeza or other disinfectant..... 1 Boiling ..... 2 Filter..... 3 Put in the sun..... 4 Let the sediment settle out..... 5 Strain through a cloth ..... 6 Add moringa leaves ..... 7 Don't know..... 8	
Q73	If no, can you mention any ways that other people use to treat their household drinking water? MARK ALL THAT APPLY	Certeza or other disinfectant..... 1 Boiling ..... 2 Filter..... 3 Put in the sun..... 4 Let the sediment settle out..... 5 Strain through a cloth ..... 6 Add moringa leaves ..... 7 Don't know..... 8	

10. Principle sources of water

Q74	What is your main source of water during the rainy season?	Borehole with manual pump..... 1 Protected well ..... 2 Unprotected well..... 3 Rain water in cistern..... 4 Rain water (surface collection)..... 5 Dam or reservoir ..... 6 River/Lake/Stream ..... 7 Public faucet or fountain..... 8 Other 9
Q75	What is your main source of water during the dry season?	Borehole with manual pump..... 1 Protected well ..... 2 Unprotected well..... 3 Rain water in cistern..... 4 Rain water (surface collection)..... 5 Dam or reservoir ..... 6 River/Lake/Stream ..... 7 Public faucet or fountain..... 8

		Other 9	
Q76	Has the distance you must travel to get water changed during the past 2 years?	Yes ..... 1 No 2	→Q80
Q77	Has the distance you must travel to get water increased or decreased?	Increased ..... 1 Decreased 2	
Q78	If the distance increased, why has it increased?	Broken pump ..... 1 Previous source dried up ..... 2 Lack of rain ..... 3 Price of water increased ..... 4 Other _____ ... 5	
Q79	If the distance decreased, why did it decrease?	Broken pump was fixed ..... 1 New borehole and pump installed .... 2 Reservoir was repaired ..... 3 Constructed a family cistern system . 4 Plenty of rain ..... 5 Improvements to public water system ..... 6 Other_____ 7	

11. Hand washing practices

Q80	Did you use soap today or yesterday?	Yes.....1 No 2	→Q82
Q81	When you used soap what did you use it for? **Don't read the answers. Ask them to be specific and record all responses that are given** MARK ALL THAT APPLY	Wash clothes.....1 Bathe.....2 Bathe child .....3 Clean child after defecating .....4 Wash child's hands .....5 After visiting latrine.....6 After cleaning child .....7 Before feeding a child .....8 Before cooking.....9 Before eating .....10 Other _____ 11	

		Don't know 12
Q82	Please mention all the times when it is important to wash your hands with soap and water **Don't read the answers. Ask them to be specific and record all responses that are given.** MARK ALL THAT APPLY	Before eating .....1 After eating .....2 Before feeding a child .....3 Before cooking .....4 After using the latrine .....5 After cleaning a child .....6 When hands are dirty .....7 After cleaning the latrine .....8 Other _____ .....9 Don't know 10
Q83	Did you wash your hand after the last time you visited the latrine?	Yes, with water only ..... 1 Yes, with soap and water ..... 2 Yes, with water and ash..... 3 No 4
Q84	Did you wash your hand before the last time you ate or prepared food?	Yes, with water only ..... 1 Yes, with soap and water ..... 2 Yes, with water and ash..... 3 No 4

12. Hygiene Practices

Q85	Normally, where do the people in your household go to relieve themselves?	The bush ..... 1 Latrine..... 2
Q86	Does you household have a latrine?	Yes ..... 1 No 2
Q87	Where does you household normally dispose of household refuse?	Put it in a refuse pit ..... 1 Put it in a pile beside the house ..... 2 Other _____ 3
Q88	When the refuse pit gets full, what do you do with it?	Cover it with soil..... 1 Burn the refuse..... 2 Spread it on the farm (compost) ..... 3 Leave it without doing anything..... 3 Other _____ 4

End of the interview. Thank the respondent for their participation.