A2F Consulting

Design Report

Independent Evaluation Services in Support of the Cape Verde Watershed Management & Agriculture Support

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ABBREVIATIONS / DEFINITIONS

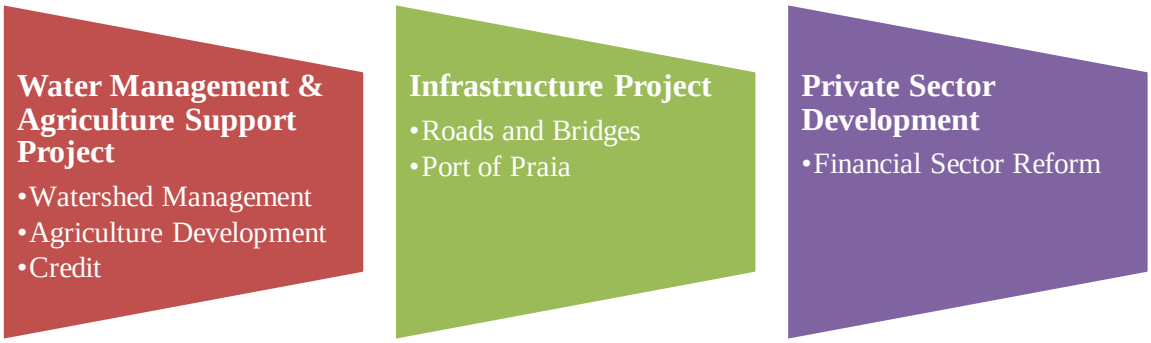
ANAS	Agência Nacional de Âgua e Saneamento
CAIXA	Caixa Económica de Cabo Verde
ERR	Economic Rate of Return
GDP	Gross Domestic Product
GoCV	Government of Cabo Verde
HVA	High-Value Agriculture
INE	Instituto Nacional de Estatística
IPG	Investment Policy Guidelines
IRB	Institutional Review Board
ITT	Indicators Tracking Tables
MAA	Ministério da Agricultura e Ambiente
MADRRM	Ministério do Ambiente Desenvolvimento Rural e Recursos Marinhos
MCC	Millennium Challenge Corporation
MCA	Millennium Challenge Account
MCA-CV I	Millennium Challenge Account for Cabo Verde Compact I
MFIs	Micro-Finance Institutions
PHC	Post-Harvest Center
WMAS	Watershed Management and Agriculture Support

1. INTRODUCTION

A2F Consulting was contracted by MCC to conduct an independent evaluation of the Cape Verde Watershed Management and Agriculture Support (WMAS) Project. This project was part of the first compact signed between MCC and the Government of Cape Verde (GoCV), on July 4, 2005. The Millennium Challenge Account - Cape Verde I (MCA-CV I) was responsible for the overall management of the Compact's implementation under the direction of the National Coordination, established by GoCV. This Evaluation Design Report is the culmination of a multi-step process that involved off-site meetings with key project informants in Washington DC as well as on-site fact-gathering missions using semi-structured interviews with WMAS stakeholders in Praia (Island of Santiago), Pául (Island of Santo Antão), and Mosteiros (Island of Fogo). Through this process, the evaluation team aimed to assess the evaluability of the project activities and evaluation design implication, which culminated in this report.

The MCA-CV I included three projects: (i) Watershed Management and Agriculture Support (WMAS), (ii) Infrastructure, and (iii) Private Sector Development (PSD), as shown in Figure 1 with the activities they entailed.

Figure 1: Projects included in the first Compact



The WMAS project was designed to increase agricultural productivity in three specific watershed areas through three key project activities. Namely: (i) improved water management and soil conservation (i.e. building reservoirs and small dams, boreholes, etc.), (ii) enhancing agribusiness development and marketing services (i.e. training on drip irrigation, packing sheds, quality control centers and other technical assistance), and (iii) increasing access to credit (i.e. training about loans, specifically for farmers to adopt drip irrigation). The three intervention areas included: Paúl (Island of Santo Antão), Fajã (Island of São Nicolau) and Mosteiros (Island of Fogo). The Compact ended in 2010. Potential beneficiaries for this project included actors along the supply chain, including farmers, farm laborers, micro and small-sized agribusiness, providers, users of transportation and distribution services, as well as farmer-based organizations.

The project also aimed to improve the existing irrigation water storage systems and to facilitate the growth of farmers through the transition to high-value agriculture. The goal was to assist farmers in overcoming constraints to accessing growing market opportunities for high value-added crops like fruits and vegetables and horticulture for both

domestic and local tourist markets. Project investments focused on increasing the capture, storage, and distribution of rain-fed, spring-fed, and well-fed water resources; thus, enabling farmers to irrigate their fields and increase agricultural productivity. Increases in irrigated land and water supply reliability were intended to facilitate a shift from low-value rain-fed subsistence agriculture (corn and beans) to high value horticultural and fruit crops.

During the design phase, the emphasis was on fact gathering directly from key stakeholders, as well as first-hand observation of the built infrastructure to inform the most suitable evaluation design. The A2F team traveled to meet with major WMAS stakeholders and service providers in Santiago (Praia), Santo Antão (Paúl), and Fogo (Mosterios). The stakeholders included MCA focal points, ANAS focal points, INE focal points, the WMAS project manager, key project informants in the Ministry of Agriculture (MAA) in Praia, former MAA delegates at the time of implementation and construction of the project, current MAA Delegates in each island, focal points from all the microfinance institutions (MFIs) involved in the third component (i.e. access to credit) of the WMAS project (ASDIS, OMCV, MORABI, SOL de FOGO), as well as focal points in CAIXA (Fund Management Entity. Formal and informal interviews were held with a number of beneficiary farmers on each island.

Additionally, the A2F team, accompanied by MAA delegates, visited several sites with infrastructure built under the WMAS project in Santo Antão and Fogo. In Santo Antão, the team visited a 1000 cubic meter spring-fed reservoir in Paùl (Fajã das Pombas) along with water distribution systems, and a number of farmers' plots utilizing drip irrigation. The team also visited the Post-Harvest Center (PHC) located in Porto Novo. In Fogo, the team visited three rain-fed systems: Achada Grande (1000 cubic meter), Monte Barro (500 cubic meter) and Boca de Crurral (200 cubic meter) along with catchment and other water distribution facilities. The PHC located in São Flipe, as well as the agriculture extension center built and equipped in Mosteiros were also visited. It was particularly critical to understand each stakeholder's perspective on the WMAS experience and gauge their openness and transparency with respect to the idea of a potential evaluation.

This report presents the proposed Design for the evaluation of the WMAS project. In Chapter II, we review the WMAS project and the activities it entails. The information presented was compiled through several rounds of desk reviews of project documentation, on-site visits to the infrastructure, as well as interviews with stakeholders[1]. In Chapter III, we present the findings from the preliminary insights from the assessment of project logic, data availability, and data quality, as well as conduciveness of the context. Chapter IV delineates our proposed overall approach, including the specific approach and data sources for evaluation of each activity. In Chapter V, we discuss several administrative aspects including Institutional Review Board (IRB) requirements, our dissemination plan, work plan, and evaluation team roles and responsibilities. Finally, a brief review of the literature, as well as the country context related to the WMAS project is presented in the Annex section of this document (i.e., Annex 1 and 2).

[1] Since WMAS project has been part of the first compact, this information could provide valuable context for general readers of this report.

2. OVERVIEW OF THE WMAS PROJECT

2.1. WATER MANAGEMENT & SOIL CONSERVATION ACTIVITY

The infrastructure building component of the project was targeted to improve the compensation irrigation system through the construction of dikes and reservoirs to retain and store irrigation water. Retention and torrential correction dikes and reservoirs were built with the aim of recharging water-tables, slowing erosion, capturing water and providing a reliable source of rain-fed, spring-fed, and borehole-fed irrigation water storage and distribution systems directed into the farm gates. This reliable source of irrigation water was expected to enable the farmers to transition from subsistence or low-value crop production to high-value crop production. This, in turn, would facilitate the adoption of drip irrigation, which is a more efficient form of irrigation concerning water application precision and reduction of loss and wastage of irrigation water.

MCA-CV I procured the construction of several dikes and reservoirs with a multitude of water storage capacities to recharge groundwater, control and regulate water distribution systems, and to create a reliable source of irrigation to enable drip irrigation farming of high-value crops. Apart from the Post-Harvest Center (PHC), all contract activities for works executed in Santo Antão (Paúl basin) were scheduled to be concluded before the Compact termination[2]The infrastructure work undertaken in the three watersheds (Mosteiros, Paúl and Fajã) consisted of infrastructure for water mobilization (catchment dikes, boreholes, etc.), storage (reservoirs capable of storing 200/500/1000 cubic-meters (m^3) of water) and distribution (distribution systems). The complete list of watershed infrastructure that was to be completed is shown in Table 1 below.

Table 1: Watershed Infrastructure planned to be built by the MCA-CV I Compact Under the WMAS Project

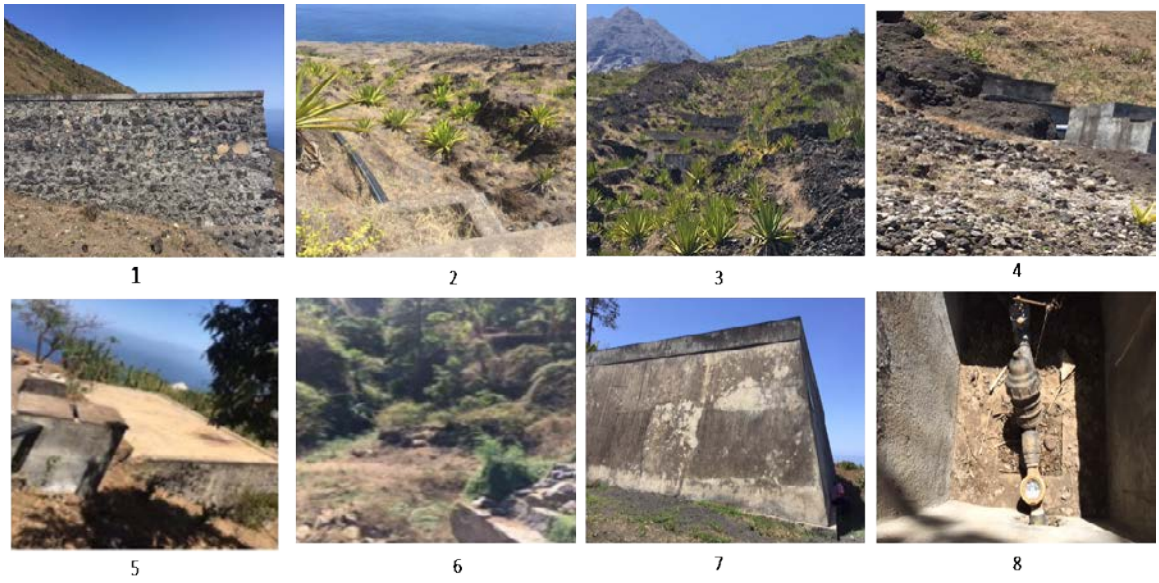
Description of the infrastructure	Quantity			Total
	Santo Antão	Fogo	São Nicolau	
Small dikes	-	43	-	43
Torrential Control Dikes	15	6	7	28
Catchment Dikes	12	5	9	26
Boreholes	3	-	-	3
1000 m^3 Reservoir	1	5	6	12
500 m^3 Reservoir	1	2	2	5
200 m^3 Reservoir	11	-	-	11
Water distribution systems	13	7	-	20

Source: Cape Verde Program Closure Plan – V1, November 22, 2009.

[2] Cape Verde Program Closure Plan – V1, November 22, 2009.

Over the course of three years (2007 to 2010), 28 reservoirs and 48 different types of dikes (torrential control, catchment and small dikes) were constructed to capture water, recharge water tables and decrease soil erosion. Reservoirs were intended to supply a reliable source of rain-fed, spring-fed, and well-fed water for the drip irrigation of 111.2 hectares for 337 farmers in three of the four islands with the highest agricultural potential for contributing to national food security[3]. Twelve 1000 m^3 reservoirs, five 500 m^3 reservoirs, and eleven 200 m^3 reservoirs were built. In Figure 2 and Figure 3, pictures from a number of these sites are displayed. These pictures were taken during the scoping mission of the A2F team to Cape Verde. Figure 2 shows a 1000 cubic meter and a 500 cubic meter rain-fed reservoir with associated mirror type rain catchment, along with a lower filtration dike in the island of Fogo; and Figure 3 shows a 1000 cubic meter spring-fed reservoir located in Paùl, Santo Antão.

Figure 2: Images from the site visit to Achada Grande system (1-4); Images from site visits to Monte Barro system (5, 6); Images of Boca de Curral system (7, 8) Fogo



Spring-fed water is relatively plentiful in the Paúl basin, and the built infrastructure was intended to help with managing and preventing significant water loss and inefficiency due to dilapidated infrastructure and lack of awareness on the part of the farmers. On the other hand, in Fogo, upland rain-fed water systems are a more common type of the built infrastructure. Originally, it was planned for farmers' associations to manage these systems (captation dike reservoir, distribution system) but currently, the Ministry of Agriculture (MAA) is considered the main entity responsible for operating and maintaining this infrastructure.

[3] Cabo Verde – Watershed Management and Agriculture Support Report
https://data.mcc.gov/evaluations/index.php/catalog/154/study-description

Figure 3: Images from site visits to Paùl

Some delays were experienced in the provision of the infrastructure, which were anticipated to surpass the end of the Compact timeframe. The watershed infrastructure, (as mentioned in the Community Based Water Management Plans [CBWMP] for each island and basin, created in April 2007) was meant to be constructed within the stipulated period of the Compact which ended in October 2010. There were delays with the work of lots 46 and 52 in Fogo Island, each consisting of the construction of 1000 m^3 reservoirs. The completion delays in the mentioned lots led to a subsequent delay in their final acceptance, beyond the timeline for the Compact. Table 2 and Table 3 below summarize the work in the island of Fogo and Sao Nicolau, where the guarantee period extended beyond the end of the Compact timeframe. It describes the activities that happened after the Compact ended, as well as the entities responsible for the follow–up of the closing out of the contracts.

Table 2: List of Delayed Construction of Infrastructure in Fogo

Fogo	Description of activities for contracts Closure	Entity responsible for implementing	Due date
Lot 46- Construction of reservoir 1000 m^3 – Rib. de Ilheu	Performance Certificate	Local team MADRRM	November 2010
Lot 52 - Construction of reservoir 1000 m^3 – Ach. Maurício	Performance bond	DGASP/MADRRM	December 2010

Source: Cape Verde Program Closure Plan – V1, November 22, 2009.

Table 3: List of Delayed Construction of Infrastructure in Sao Nicolau

São Nicolau	Description of activities for contracts Closure	Entity responsible for implementing	Due date
Lot 68- Construction of reservoir 1000 m^3 – Lompelado	Performance certificate	Local team MADRRM	January/February 2011
Lot 70 - Construction of reservoir 1000 m^3 – Canal de Nica I Lot 74- Construction of reservoir 1000 m^3 – Canal de Nica II	Performance bond	DGASP/MADRRM	February/ March 2011
Lot 69- Construction of reservoir 1000 m^3 – Morro Homem	Performance certificate Performance bond	Local team MADRRM DGASP/MADRRM	June 2011 July 2010

Source: Cape Verde Program Closure Plan – V1, November 22, 2009.

2.2. CAPACITY-BUILDING & AGRIBUSINESS DEVELOPMENT SERVICES ACTIVITY

Table 4: Outreach Efforts Before and After System Operation

Outreach Topics Before System Operation	Outreach Topics After System Operation
System purpose, benefits, user requirements (e.g., conversion to drip irrigation, cost to use water, etc.) location and construction details	System operation reporting
CBWMP implementation details	Water resource monitoring reporting
WRMP implementation details	Drip irrigation and other innovative and efficient agricultural technology transfer
The real cost of water (water as an economic resource)	Water conservation and efficiency
Drip irrigation technology	Water resource protection
Water conservation and efficiency	Agricultural extension activities related to irrigation, cash-crop production, growing, harvesting, storage, marketing, and exporting.
Water resource protection	Management, operation, maintenance of water systems
Agricultural extension activities related to irrigation, cash-crop production, growing, harvesting, storage, marketing, and exporting.	Community improvement and social program outreach
Management, operation, maintenance of water systems	–

Source: CBWMP Reports, Paúl, Faja, Mosteiros

The training component was intended to provide the farmers with the technical know-how to improve their business and productivity. The outreach efforts as a part of this component involved training on issues like agribusiness development and marketing techniques. The training also involved educating the farmers on issues like drip irrigation and high-value agriculture. Other aspects included the strengthening of agricultural extension services, provision of training and cooling, packaging and services to farmers and other agents along the value chain. According to the CBWMP reports, for each island

there were a number of planned outreach activities that were to take place before and after the watershed infrastructure system would become operational. These covered a variety of aspects as shown in Table 4.

Several local and country level entities were involved in the provision of training and outreach programs targeted at the program beneficiaries. MCC and MCA-CV I were in charge of overseeing the development of the implementation of the Water Commission and Community Based Water Management Plans for all three islands. The country-level entities involved in the outreach and training activities were the Water Commission, the National Ministry of Environment and Agriculture (MAA), and the Instituto Nacional de Gestão dos Recursos Hídricos (INGRH) which currently is referred as ANAS (Agência Nacional de Âgua e Saneamento). The Water Commission was responsible for the establishment of rules, policies and procedures, and overseeing the systems. The MAA and INGRH (only for Santo Antão) were responsible for extension services, project oversight, outreach, and training programs. The Municipalities for each basin were also involved in the same activities as MAA and INGRH. Following this, the Farmer Associations in each island were in control of the rainwater management system supported by Water Masters, who were responsible for the day-to-day operations of the systems for watershed infrastructure.

Table 5: Agribusiness Activity Plans and Executions Under the WMAS MCA-CV Compact

Description of Activity	Planned originally in the Compact	Executed	Final Reception Date
Rehabilitation and Equipment of Rural Extension Centers	3	3	Between January – May 2010
Construction of Post-Harvest Centers	3	1	May 2011
Agribusiness Technical Assistance	–	–	Closeout report July 2010.
Demonstration Farms	–	–	–

Source: Cape Verde Program Closure Plan – V1, November 22, 2009.

Technical and field research-based training was provided to farmers and extension agents through the outreach activity of the WMAS project, which also included the provision and strengthening of extension and outreach related infrastructure. Improvements in agricultural extension centers and farm demonstration sites were carried out. Efforts were oriented towards building capacity for export requirements. To achieve these, a post-harvest center for providing training, grading, packaging, cooling and inspection services to farmer households was constructed. As per the NORC Evaluation Design report (2011), research done by Millipede played an instrumental role with regards to policy by lifting a 25-year embargo on inter-island agricultural exports from Santo Antão. This enabled the construction of the post-harvest center which provided much-needed training to 31,776 farm households[4]. A total of 549 farmers received technical assistance and training (68.6% of end-of-compact target completed) in five core agricultural disciplines. In addition, three rural extension centers were modernized offering farmers access to internet and technical training materials. Demonstration farms were also under

[4]Cabo Verde – Watershed Management and Agriculture Support Report
https://data.mcc.gov/evaluations/index.php/catalog/154/study-description

construction and scheduled to be completed by the end of the MCA-CV Compact[5].

An important element of the Agribusiness Activity, besides the outreach and infrastructure provision, was the successful handover of the project activities to competent entities to ensure their sustainability after the end of the project. After the completion of the Compact, Millipede Research was due to take over the responsibility of providing technical assistance to farmers. Community-based water management plans and water resources monitoring Plans were supported by MADRRM and have continued through their programs as a routine activity. However, the construction of a Post-Harvest Center in Porto Novo, Santo Antão extended beyond the end of the Compact to May 2011, and it was eventually privatized in two phases. One out of three post-harvest centers was built within the timeline of the Compact. After the Compact end, all activities were expected to be supervised by the Ministry of Agriculture (MAA) until its final acceptance. All activities funded under the Agribusiness Activity that were terminated by August 2010 are summarized in Table 5.

Figure 4: Post-Harvest Center images, Porto Novo (S. Antão)

After the end of the compact, two more post-harvest centers were constructed in the Island of Fogo (São Filipe) and in the island of Santiago (Praia). The GoCV funded these centers. However, the blueprint and the list of equipment were provided as part of the Compact. During the inception mission, the team visited both post-harvest centers in Porto Novo and São Flipe. Both centers are functional and fully equipped. The center in Santo Antão provides chlorine for pools and certification for the products to be exported to Sao Vicente, Sal, and Boa Vista, among which only the last two require certificates. In Fogo, the center's main focus is solely on packaging, cooling, and storing facilities. Figure 4 and Figure 5 show a few pictures of these centers in Santo Antão and Fogo, respectively, which were taken during the scoping mission by the A2F team.

[5] Cape Verde Program Closure Plan – V1, November 22, 2009.

Figure 5: Post-Harvest Center Images, São Filipe

2.3. INVESTMENT COMPONENT - ACCESS TO CREDIT ACTIVITY

The credit component was intended to provide farmers with sustainable access to financial resources to enhance their access to inputs necessary for improved technology in irrigation and agricultural practices in general. This activity was complementary to the provision of watershed infrastructure and the technical training, which was planned to provide the necessary technological base for improvements in agricultural productivity through the transition from low-value to a high-value production of fruits, horticultural crops and so forth.

Under the Compact, USD 450,000 had been made available to the beneficiaries by CAIXA through five participating micro-finance institutions (MFIs). These institutions were Organizacão das Mulheres de Cabo Verde (OMCV), ASDIS Microfinancas, Morabi, AMUSA, Sol de Fogo. MCA-Cape Verde signed a credit line agreement with Caixa Economica de Cabo Verde (CAIXA), one of the largest banks in Cape Verde, on May 12, 2008. The purpose of the credit line was to fund partnering microfinance institutions (MFIs) that provided loans for drip irrigation equipment, agricultural inputs, and agribusiness expansion in watershed areas. CAIXA disbursed the funding to MFIs in two separate tranches: (i) Tranche 1 in the amount of USD 200,000 in August 2008 and (ii) Tranche 2, in the amount of USD 250,000, in June 2009.

Five participating micro-finance institutions (MFI) provided 209 farmers and agribusinesses with USD 584,829 in rural loans at competitive market rates. Financial incentives (i.e., 10% discount for each timely payment) were offered to farmers and agribusinesses that provided timely and early loan repayment. The Ministry of Agriculture collaborated with the MFIs to assist farmers in the development of business plans and provide direct technical assistance for the implementation of agricultural capital investments. The detailed account on the Access to Finance Activity was reported and supported through a performance report prepared by Planet Finance.

Additionally, technical assistance was provided to participating microfinance institutions to increase their operational and financial functions for supporting the demand for rural agricultural credit for financing drip irrigation, working capital, and agribusiness investment in the three watershed intervention zones. Upon completion of the Compact, these support activities were assigned to the stakeholders and monitored by MADRRMM/Local Delegations and INGRH.

Table 6: The expected number of beneficiaries[6]

Beneficiaries	Santo Antão (Paúl)	São Nicolau (Fajã)	Fogo (Mosteiros)	Total
Number of farmers expected to gain increased access to water and credit to install drip irrigation	229	59	49	337
Number of people expected to be impacted directly by drip irrigation activities	1145	295	245	1685
Number of farm households on the islands expected to receive benefits from the agriculture development services	6789	513	1289	8591
Number of people in farm households on the islands	31769	9222	28691	69689
Total number of people on the islands	48761	12940	37798	99499

[6] Cape Verde Monitoring & Evaluation Plan, V III, October 11, 2010.

3. INSIGHTS FROM PRELIMINARY ASSESSMENT

3.1. PROGRAM THEORY OF CHANGE

There was a need to elaborate a specific Theory of Change for the WMAS project. The latest M&E plan (2010) presents a Compact result chain that includes all the projects under the compact and shows only the project outcomes, objectives, and compact goals. It does not demonstrate the causal link from inputs to outputs and outcomes to possible impacts to show how inputs were correctly designed to lead to the expected goals under specific projects. The M&E plan was revised twice, but none of these iterations included a clear results chain that shows the logical sequence of activities under the WMAS project. Therefore, the ex-post elaboration of the results framework is essential prior to initiating the design phase. To support the causal link, an extensive review of existing literature on the developmental impact of watershed management and agriculture support program is needed (see Annex 2).

Academic research provides evidence that drip irrigation can lead to poverty reduction through increased crop production and increased farming income. Karlberg et al. (2007) provide evidence of an increase in tomato yield in South Africa from drip irrigation, using saline water. Jha et al. (2016) show that in comparison to furrow irrigation systems, drip irrigation leads to improved productivity for fodder crops and higher economic security of smallholder farmers in Nepal. Drip irrigation has been found to reduce labor requirements for cultivation in India; this is because the water is supplied to the crops directly, which reduces labor costs (Narayanamoorthy 2004). Drip irrigation reduces the cost of production and increases productivity. Data from experimental plots in India shows that drip irrigation, in comparison to furrow irrigation, increases the productivity of vegetable crops by 40 percent (Narayanamoorthy 2005).

While the number of rigorous evaluations of agricultural training programs has been limited, studies have reported mixed results (IEG 2011). Measuring performance metrics regarding the provision of agricultural training programs has been the main focus of the literature and previous evaluation (Waddinton et al. 2010). For example, Kabir and Uphoff (2007) reported positive and large spillover effects of agriculture training programs. The majority of farmers in the village adopted the new techniques only three years after the implementation of the training program. On the other hand, Feder et al. (2014) found no sign of a concrete increase in crop yields or farmer income levels. Nonetheless, they reported an increase of participating farmers.

The impact of increased access to credit on poverty has been evidenced through several studies. Helms (2006) shows that credit constraints prevent people from implementing investments with high marginal returns, which eventually would lead them out of poverty. Alleviating these credit constraints can make a substantial contribution to the fight against poverty and allowing micro and small businesses to grow. Gonzalez (2014) argues that microfinance enables people to pull themselves out of poverty by giving them access to working capital, together with improvement in human capital through education, training and enhancing social capital through local organization building. However, Meyer (2011) stresses the need to understand better the demand for and use of agricultural credit to develop effective products, institutions, market infrastructure, and

policies. Hollinger (2011) describes an innovative loan package, which allows for more flexible disbursement and repayment schedules around the seasonal nature of agriculture. They also include less rigid collateral requirements, where, besides immovable property, a borrower could use farm equipment or even livestock.

The A2F team reconstructed the following result framework based on the available project documents and insights from the scoping mission. Overall Project investments focused on increasing the capture, storage and distribution of spring fed and rain fed water resources, thus enabling farmers to irrigate their fields and increase agricultural productivity. The main medium-term objective (outcome) of the WMAS project was to increase water availability, soil retention & conservation, agriculture productivity, agriculture capacity, as well as agriculture value added that resulted from the horticulture and fruit production made possible by the investments in watershed management. Project Activities, to a great extent, are interconnected, which also have an important implication for the project evaluation as it signifies that, while each Activity can be measured at the output and outcome level, the project performance needs to be evaluated as a whole.

As noted, the logic model emphasizes the complementary nature of many of the project Activities, especially in islands where the full package of activities was implemented. In these areas, the program logic suggests that increased access to affordable and well-managed drip irrigation equipment will enable farmers to invest in the production of high-value crops, whereas the training and agribusiness activities will enable these farmers to understand better and meet market requirements for these crops. The program logic suggests that the loan component of the WMAS project activity will further enhance the ability of farmers to adopt the new approach and eventually migrate to practice High-Value Agriculture (HVA) and benefit from higher prices through improved access to post-harvest infrastructure. Together, these activities are intended to increase agriculture productivity, agriculture capacity, and agriculture profitability and ultimately to increase household incomes and reduce poverty.

It is also important to note that the expected project outcomes relied on critical assumptions. The project assumes, for instance, that all the targeted farmers will adopt drip irrigation; that farmers on irrigated land will grow horticulture and cultivate twice a year; that there is a sufficient market to absorb the increased farm production; that the process will remain constant, etc. The terms of the loans provided through the Access to Credit Activity are also relevant for their impact. Delays in the construction can also affect the adoption rate. Similarly, external factors such as access to market, unfavorable market mechanisms, unexpected weather conditions (e.g., droughts, hurricanes) can restrain the beneficiaries from realizing the expected impacts. For instance, even if the agricultural production of farmers increased because of the intervention, it will be important to check whether they were able to sell their products on the market and turn the increased agricultural production and productivity into increased income.

Table 7: WMAS Project Logic

Activities	Outputs	Outcome	Medium-term outcomes	Impact
Watershed Management & Soil Conservation	• Number of reservoirs constructed • USD value of irrigation construction contracts signed	• Volume of available water • Tons of solid material retained through soil conservation infrastructure • Hectares under improved or new irrigation • Number of farmers that have applied new techniques • Increase agricultural productivity in the intervention zones o Productivity (Horticulture (ton /ha) o Value-added for farms o Number of Crop Cycle • Better Access to Credit to improve agriculture activities.	• Sustainable watershed management • Increase agriculture productivity • Increase agriculture capacity • Increase financial capacity of participants • Increase in farm profit • Increase in farm wage	8591 beneficiaries of the project Increase in income after five years and ten years.
Enhanced Agribusiness Development & Marketing Services	• Number of farmers trained • Number of farmers that have applied new techniques • Volume of water saved due to adoption of drip irrigation • Number of infrastructure built (i.e., post-harvest centers, extension centers)			
Increased Access to Credit	• Number of loans disbursed			

Source: A2F Consulting

3.2. DATA QUALITY & AVAILABILITY

There is a lack of baseline data on farmers and agribusinesses. Baseline data on demographics and socioeconomic variables, outcome and impact variables and other important control variables are vital in estimating the impact of any development intervention at a later period. The M&E plan shows that three surveys, i.e., watershed baseline survey, baseline socioeconomic survey, and agribusiness survey were planned at the beginning of the Compact. However, those were not implemented in due course. The A2F team carefully reviewed the existing public databases and assessed the possibility of developing a baseline dataset during the design phase. While it is not feasible to develop a rigorous baseline dataset for impact evaluation purposes, the team intends to use secondary sources of information such as countrywide agriculture and agribusiness surveys carried out by INE as the baseline for assessing the performance and contribution of the project,

particularly with respect to the outcome indicators at the regional level.

Indicator Tracking Table (ITT) can limit the ability to assess the project's progress over time for a few mid-term outcome indicators. During the country visit, the team obtained the latest version of the ITT from the MCA-CV office. This provides a better and more complete picture of the indicators and their progress over time than the previous version provided to the team. Yet, actual values are missing for a number of objective and outcome indicators. Furthermore, some of these indicators have not been tracked during the project. These indicators primarily include productivity, value added for farms, number of crop cycles. For instance, currently, there is no recorded number for the indicator "number of crop cycles" in the ITT. This is possibly due to the lack of high-quality baseline or follow-up data on the beneficiaries. Therefore, to assess the project's performance, actual data will be required to compare those with the target to assess whether the targets were achieved as expected.

Data quality issues can be compensated by collecting primary data from farmers for indicators mentioned above. Beneficiaries are an important source of information on the completed activities, and they can describe their individual experiences with the project activities. This will provide the beneficiaries' perspective on the project's performance and the challenges they faced to participate in the project activities. For example, it would be important to assess whether the loans they received from MFIs were adequate; whether they were satisfied with the services; whether the training helped them market their products, as well as, the quality of the training; to what extent they could use the Post-Harvest Center, etc. This will not only provide insights into the project's performance and sustainability; but also ensure that the farmers' perspective on the project is reflected, which will translate into valuable lessons and future recommendations.

Furthermore, there is a need to conduct interviews with key informants and utilize the secondary sources, which was to a great extent addressed during the first field visit. There is limited availability of project documentation, which will have to be compensated with stakeholder interviews and secondary sources. The A2F team interviewed and met with key project stakeholders during the design phase to obtain all project documents. MCC and MCA office in CV provided the team with project documentation (e.g., implementation reports, progress reports, etc.). However, such documents appear to be relatively limited or insubstantial for a post compact evaluation. To supplement the available information, in-depth interviews were conducted during the country/scoping visit with the majority of the stakeholders. Because of the long lapse of time, there were some biases, but overall the information collected could be considered reliable and consistent. This issue will be further addressed by using a mixed-methods approach, combining quantitative data and qualitative data.

Visiting the sites and infrastructure is also important. The Watershed Management and Agriculture Support is an old project, which ended more than seven years ago. As a result, there are some variations between stakeholders' opinions about the project, particularly regarding the functionality and relevance of the project's component. This issue was mainly flagged when the evaluation team traveled to the islands and noticed the deviation between stakeholders' opinion about the functionality and performance of different pieces

of the project and the real situation on the ground such as operability and performance of the infrastructure, performance of the post-harvest center, functionality and use of extension centers, and use of these components by farmers. However, it is worthwhile to note that during the inception mission the team covered many areas and such visits during the design phase will be more focused and selective. This issue will be discussed in more detail in the next chapter.

3.3. CONDUCIVENESS OF THE CONTEXT

The conduciveness of the context was assessed during the first field visit. The issues that were taken into consideration comprised the timing of the evaluation, external and internal factors, which might affect the availability and willingness of key stakeholders to participate. The MCC office in CV, as well as MCA-CV office provided support to the evaluation team to identify all the available stakeholders. Given that the compact has expired, initially, there was a risk that some key stakeholders might become unavailable. The team conducted meetings with the majority of the stakeholders involved during the design, implementation, and monitoring of the WMAS project activities during the compact. The team also held several meetings with entities and individuals that are currently in charge of day-to-day operations of the infrastructure and facilities within the Ministry of Agriculture in Praia, and delegation offices in Fogo and Santo Antão. The team successfully obtained the documents and established the contact points (see Annex 3).

These meetings collectively provided the A2F team with a unique and first-hand account of all aspects of the project activities. The results of the scoping missions and document review indicate that an evaluation would yield useful and insightful analysis that informs decision making for future Compact agreements and projects. WMAS project activities entail a number of sub-activities, which make it complicated and thus cannot be explained by any one factor. Furthermore, the project was rather unique in structure, design, intent, and outcomes. Each element played a role in the overall performance of the project along with other contextual factors. Valuable lessons are to be learned from assessing what worked well and what didn't for each activity and examining the interrelationships between them. This approach would yield a performance attribution analysis, pinpoint performance drivers, and lead to the construction of a holistic performance review. Table 8 shows the full list of the stakeholders and the project's informants consulted during the scoping mission.

The possibility of collecting primary data, the wide availability of secondary sources of data, as well as the accessibility of key stakeholders, make the project conducive to an evaluation. Local stakeholders indicated interest in the evaluation and willingness to work with and support A2F during the evaluation phase. Based on discussions with delegates, MCC, and MCA, there is a strong desire for an independent evaluation of the WMAS project. An overall combination of the existing documents along with quantitative and qualitative data to be collected in the future will facilitate an in-depth performance analysis. It is important to note that during the inception mission the team collected large volumes of administrative data on various aspects of the project; particularly the credit component piece. An overall combination of documents provided, substantial secondary

sources of data on the availability of stakeholders and the possibility of collecting primary data makes the project conducive for the evaluation.

Table 8: List of all Persons and Entity Consulted during Design Evaluation phase

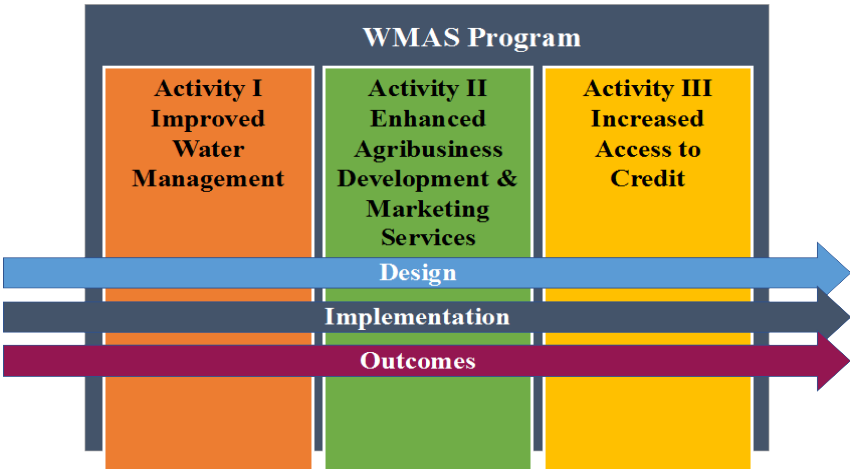
Name	Entity	Position	Island
Joana Brito	MCC	Deputy Resident Country Director	Santiago
Sónia Schofield	MCC	Program Analyst	Santiago
Deolinda Dos Reis	MCA	M&E Consultant	Santiago
Migual Angelo Barreto da Moura	ANAS	President	Santiago
Celso Soares Ribeiro	INE	Vice President	Santiago
Regina Fortado	Caixa Economica de Cabo Verde	Micro Credit Coordinator	Santiago
Nelita Sanches	OMCV	Micro Credit Coordinator	Santiago
Eneida Rodrigues	MAA	Coordinator MCA-CV I WMAS projects	Santiago
Inussa Bari	MAA	MAA Statistic Director	Santiago
Iria Neves	MAA	MAA Statistic Direction	Santiago
João Gonsalves	MAA	Former Delegate Fogo	Santiago
Lúcia Passos	MORABI-MFI	Former President	Santiago
Francisco Tavares	ASDIS-MFI	President	Santiago
Orlando Delegado	MAA Paúl	Delegate	S. Antão
Orlando Freitas	MAA Paúl	Former Delegate	S. Antão
Emerson	Paúl Farmer	Farmer	S. Antão
Nelson Andrade	MAA P. Novo	Inspector of Post-Harvest Center	S. Antão
Jaime Pina	MAA Fogo	Delegate	Fogo
Orlando Araújo	MAA Fogo	Mosteiros Agriculture Responsible	Fogo
Manuel da Luz	Sol Di Fogo-MFI	President	Fogo

4. PROPOSED EVALUATION DESIGN

4.1. OVERALL APPROACH

Performance evaluation is adopted as the main approach to evaluate the project performance and potential impact on beneficiaries. The performance evaluation will rely on a theory-based approach. This involves the review of (i) the validity of the program logic and its assumptions (*Project Design*), (ii) the extent to which planned activities were implemented and factors that affected implementation (*Project Implementation*), and (iii) the extent to which expected outcomes were achieved as well as lessons that can be learned from project implementation (*Outcome and Lessons Learned*). Furthermore, the sustainability and effectiveness for each Activity will be assessed across its design, implementation, and its outcomes. These aspects will be analyzed across all three components of intervention to create an understanding of the overall performance of the program (see Figure 6).

Figure 6: Proposed Evaluation Framework



With respect to project design, the team will assess whether the project was correctly designed to achieve the expected outcomes. To this end, the team will take a holistic approach with a focus on relevancy and the need/demand for the project activities, which was flagged during the scoping mission. For instance, during the field mission, it was observed that both post-harvest centers in Fogo and Santo Antão are not currently in use due to the lack of demand for these facilities. This was also true for extension centers, which was not because of lack of demand, but due to lack of MAA technical and financial capacities. Also, as part of the design, the team will examine the project logic and proceed with assessing the validity of the assumptions. We will look at any perceived risks and any mitigation strategies put in place to manage those risks, as well as whether contextual factors were taken into account.

With respect to project implementation, the team evaluates the overall adherence to the design both in terms of quality and quantity. One interesting angle in this respect is the monitoring component which seems to have been suboptimal. During the inception mission, it was noticed that implementation is even more critical for the infrastructure

components of the project, as quite a large number of infrastructures are not working properly. This is due for various reasons mostly related to poor quality of the construction procedure, which itself has several underlying causes. Therefore, it is important to assess whether the intervention was carried out as planned and in the same way everywhere within one island and across islands. From this perspective, the A2F team will pay attention to several factors but in particular quality of the construction, procurement procedures, supervision, choice of regions, environmental conditions, and the role of different entities and their coordination in the implementation process, as well as follow-up procedures.

With respect to project outcomes, the team will evaluate whether the expected results were achieved (i.e., effectiveness), and whether these results have been sustainable during the post-compact period. The evaluation team was able to collect a large volume of administrative data on all the project activities during the mission. However, to capture a full picture and complete the performance trail of the project, the team will direct the focus of the primary data collection efforts toward beneficiary and community level entities such as farmer associations. The importance of this aspect was also flagged during the scoping mission. It will be crucial to understand how the three activities under the WMAS project interacted with each other along with contextual factors to achieve the Compact's goal to capture a complete picture of the project's performance. In addition, a qualitative assessment of whether any systemic impacts occurred as a result of the spillover effects of the project could be informative.

The issue of attribution will be addressed through contribution analysis. As noted, the attribution issue for the WMAS project is heightened by the limited scope of the project, lack of baseline data and lack of a valid counterfactual. Only 229 farmers in Santo Antão, 59 farmers in São Nicolau and 49 farmers in Fogo were for instance expected to gain increased access to water and credit to install drip irrigation. The proposed contribution analysis addresses causal inference by looking for consistency of outcomes with the program theory while assessing / ruling out alternative explanations[7]. The notion of contribution stems from the view that an intervention works alongside contextual factors to produce the observed outcomes. The attribution question can, therefore, be equivalent to asking what difference the program makes in bringing about the observed outcomes and assesses whether the program played any catalytic role that resulted in a specific outcome.

Finally, a synthesis of the performance evaluation of all the three project activities will be carried out to assess the outcomes of the WMAS project. A consolidated performance assessment will be designed by consolidating the findings while accounting for the links and interrelationships between each project activity.

[7] Mayne, John. 2001. "Addressing Attribution through Contribution Analysis: Using Performance Measures Sensibly." Canadian Journal of Program Evaluation 16 (1):1–24.

4.2. APPROACH BY PROJECT ACTIVITY

4.2.1. ACTIVITY 1: IMPROVED WATER MANAGEMENT AND SOIL CONSERVATION

To assess the project design, the A2F team will build on the collective evidence from the literature, reports, and available data to test specific aspects. Such aspects include (i) the need and relevance of infrastructure component (dikes, dams, reservoirs, wells), as well as sufficiency of such components; (ii) the design of training components associated with water management strategy; (iii) context-related aspects relating to water availability including climate and rainfall during the year, available surface and groundwater resource, distance of water source to fields to be irrigated, variability of water resources (fluctuations in depth and quantity) between islands; (iv) suitable soils and land to be irrigated in terms of levelness and fertility in the three islands; (iv) types of crops suitable for drip irrigation; (v) cost-benefit analysis of crops to be produced under irrigation; (vi) considerations for investment and operational costs of the irrigation technologies; as well as (vii) the costs of agricultural inputs and market values of the crops to be produced; and (viii) structural interaction between water management components and other project activities (i.e. agricultural development strategies and increased access to credit).

To assess the project implementation, we will carefully analyze whether there were deviations from the original implementation designs and, if yes, what were the reasons for those changes. We will map the planned activities pertinent to the project implementation against their targets, and carefully document the risks, challenges, rewards, and surprises in the field during the project implementation. In this context, we will assess the engineers' performance in terms of both quantity and quality in delivering project outputs. Quality, in particular, is important, as during the scoping visits the team noticed poor construction quality at several sites which affected the availability of water to farmers for drip irrigation. In addition, the sufficiency of funds for completing all the activities will be assessed under this component.

The following table outlines the possible analytical questions under this activity with the focus on effectiveness and sustainability of the activity.

Table 9: Research questions on the first activity

Focus	Research Questions	
Effectiveness	• To what extent productivity of farmers (Ton/Ha) has increased in the treated areas (Mosteiros and Paúl) as the result of the infrastructure? • Did the new water infrastructure allow farmers to have, at least, two crop seasons? • To what extent, farmers have migrated to cash crops products? • Are farmers producing only at subsistence level, or are they producing in a larger scale? • Are farmers in treated areas aware of post-harvest center, do they use it? Do they export it to other islands (Sal and Boa Vista)? If yes, how often they do it? If not, why? • Are beneficiaries satisfied with the drip irrigation?	• Number of farmers that adopted drip irrigation • Number of households that benefited from the program • Total population of each island • Other interventions or development programs (if any) that were underway during this activity • Quantity of infrastructure constructed • Quality of infrastructure constructed
Sustainability	• Is the new infrastructure currently functional and used by the farmers? If yes, is the amount of water sufficient for their needs? And do they receive it in a timely manner? • Did farmers pay and are they still paying for the received water and services? • What are the responsible entities for managing (Operating & Maintenance) the water management services? • Are the systems being repaired and maintained properly when is necessary?	

4.2.2. ACTIVITY 2: ENHANCED AGRIBUSINESS DEVELOPMENT AND MARKETING SERVICES

To assess the project design of this activity, the A2F team will build on the collective evidence from the literature, reports, available data and data to be collected from the field to test specific aspects of the current design. This would include aspects such as: (i) relevancy and need of infrastructures (i.e. post-harvest center, extension center); (ii) relevancy and need of training syllabus and its accord with the Cape Verdean context; (iii) sustainability of training program (e.g. ongoing operation of the extension centers); (iv) adequacy of these training programs and technical assistance; (v) complementarities between agricultural development components and other project activities taken into account in the design phase, etc.; (iv) other contextual factors such as language barriers that could affect the training program (this issue was raised during the scoping visit).

To assess project implementation of this activity, we will carefully assess whether it was implemented as planned and if not, what factors hampered implementation. In particular, we will assess aspects such as: (i) whether training programs were able to fulfill its objectives in a timely and efficient manner; (ii) whether on-farm demonstration and hands-on practices by farmers were done properly and adequately; (iii) whether the qualifications of the staff and trainers were adequate; (iv) whether there were training facilities with required and needed equipment; (v) whether the number of farmers trained varied from the original target; (vi) whether demonstration plots for farmers on high-value crop substitution and cropping intensity were established; (vii) whether the project implementation affected the complementarities between agricultural development components and other project activities; and (viii) how communication, administrative procedures, and processes helped or hindered the implementation, etc.

Finally, we will investigate the outcomes on this component and if the training was sustainable and farmers continued using the skills for agriculture. Furthermore, we will assess the systemic impact of the training program to identify if untargeted farmers also learned about the training and its benefits from their fellow target farmers and started adopting the new technology and whether they have shifted to high-value agriculture as a result. The following table outlines the possible analytical questions under this activity with the focus on effectiveness and sustainability of the activity.

Table 10: Research questions on the second activity

Focus	Research Question	Considerations
Effectiveness	• How do farmers in the treated areas sell their agricultural products? Do they sell in local markets or organized markets? • Are farmers in treated areas aware of post-harvest centers, do they use them? Do they export to other islands (Sal and Boa Vista)? If yes, how often? If not, why? • Did the implemented training programs lead to widespread adoption of new irrigation practices and resorted to new marketing strategies? • All farmers were chosen for training, if not, what were the criteria? • What was the timeline and frequency of such training programs? Did farmers at the time of training already adopt the new irrigation practices? • Was there any spillover effect? If so, to what extent, did it reach other communities?	• Role of communications and administrative procedures and processes in helping or hindering the implementation • Level of interest from those beneficiaries, who adopted new irrigation systems in participating in training programs (compared to those who already had) • Number of farmers receiving training • Efficiency and timeliness of the programs • Challenges encountered by beneficiaries in participating in the program
Sustainability	• Is the PHC currently functional and used by the farmers & traders? • In the post-compact period, do farmers receive any extension services from the Ministry of Agriculture, for example how to operate and maintain drip irrigation systems? Are extension centers currently operating? • In the post-compact period do farmers apply agribusiness and marketing practices that were taught over the course of the compact?	

4.2.3. ACTIVITY 3: INCREASED ACCESS TO CREDIT

To assess project design under this activity, the evaluation will start with the review of the design of the Agricultural Credit Fund established to manage the loan disbursement to the three islands. In this context, the design of the loan, selection of target beneficiaries and their characteristics, and selection of Microfinance institutions (MFIs) will be important for the project outcomes. Further, the assessment would include aspects such as (i) eligibility criteria to qualify for a loan and if gender was considered in the design of loan; (ii) terms of loans for recipients, (iii) complementarities between this activity and other project activities; (iv) incentives (if any) built into the program to encourage participation of microfinance institutions, as well as farmers; (v) eligibility criteria for financial institutions, particularly microfinance institutions to participate in the program; (vi) quality of loan applications and availability of financial information; and (vii) whether there was a detailed analysis of the socio-economic profiles and financial needs of the end beneficiaries (e.g., income level, type of crop and value chain positioning and links, etc.)

To assess project implementation, we will carefully analyze whether there were deviations from the original designs and, if yes, what were the reasons for those changes. In this context, the institutional and operational set up of the Fund such as the investment portfolio, cost structure and rate of return, etc. will be critical factors to be considered. The assessment will further include the number and volume of loans given to farmers and the way farmers were informed about the opportunity. Interviews with Fund management staff, microfinance institutions, borrowers, and other entities involved to assess and document all the challenges, constraints, and deviations from the original plan, as well as solutions and mitigation strategies devised to overcome these challenges during implementation of increased access to credit are essential.

To assess project outcomes and lessons learned, the team will assess the outcomes of this activity on the financial capacity of farmers and how it helped to adopt drip irrigation for agriculture development. The sustainability of loans is another important aspect to assess in this respect. Besides covering research questions listed below we also include a small number of open-ended questions to qualitatively capture issues such as the extent to which the borrowers would have made these investments without the loans, and the challenges they have faced in making these investments.

Table 11: Research questions on the third activity

Focus	Research Questions	Considerations
Effectiveness	• What were the criteria for acquiring micro-credit? • Did they receive the credit needed to adopt new methods of water management and irrigation? • Did farmers use the credit for the intended purposes? • What was the overall experience of beneficiaries with these financial products?	• USD value of agricultural and rural loan • Volume and number of loans disbursed • Number of farmers who received credit
Sustainability	• In the post-compact period, are the financial institutions still lending money to farmers? • What is the current reimbursement rate? Are there more farmers applying for credit for drip irrigation proposes? • What are these funds used for? • What has been the effect of this component on the participating MFIs.	

4.3. DATA COLLECTION:

4.3.1. SAMPLE AND SURVEY DESIGN

The evaluation will be carried out in Fogo and Santo Antão. Amongst the three islands, Santo Antão (Paùl) is the one with the largest number of both direct and indirect beneficiaries. However, having pine forests and lush valleys, its geographical climate is rather different from the other two islands. Fogo and São Nicolau on the other hand share more similarities, both in terms of geographical features and the scope of implemented activities. Therefore, in consultation with the MCC team, Fogo was selected as the second island to be covered by the evaluation team. As noted, the evaluation will examine the project design, implementation, and outcomes with a focus on effectiveness and sustainability for all project Activities in the selected islands, including Access to Credit. The Access to Credit component typically plays a critical role in the success of the overall project. In this respect, the evaluation team will particularly focus on potential lessons for designing effective and sustainable agriculture finance programs.

As previously noted, during the design mission, it became clear that a survey of beneficiary farmers (survey of participating farmers) is critical for the evaluation team to get a balanced and fair picture of the project performance. Initially, the evaluation team intended to conduct several focus group discussions with farmers as part of the data collection effort in intervention areas within each island. However, after observing several sites, and speaking with farmers, it was decided to adopt a more rigorous method of data collection as focus groups may not provide a full picture of the situation on the ground. There seems to be a mixed situation on the ground regarding adopting drip irrigation and converting to high-value agriculture products; also a number of external factors such as drought, seasonal hurricanes, the extent MAA provided support to the

farmers after Compact end has played important roles in recent years. Furthermore, there is a high degree of dependencies between implemented activities and, as a result, the survey provides a better and more structured framework to obtain the information.

A representative sample will comprise of about 100 beneficiaries in Santo Antão and 25 beneficiaries in Fogo. There are about 229 and 49 direct beneficiaries in Paùl and Mosteiros respectively. Collecting data on 100 beneficiaries in Paùl, as well as collecting the same on 25 beneficiaries in Mosteiros will provide a representative picture of the project performance in those areas (see Annex 3). The sample size for this study is not calculated based on calculating minimum detectable impact but is calculated based on the representativeness of the collected sample.

The survey will cover farm households operating in the treatment areas. The sample will be drawn from a list of direct beneficiaries held by the local offices of the Ministry of Agriculture in Mosteiros and Paùl. All farms are small scale so there will be no need to further categorize farmers by plot size. The farmer survey will collect data on basic household characteristics, together with a range of outcome measures, including the main project outcomes such as the use of drip irrigation, cultivation of cash crops, use of the post-harvest center, use of extension center, water payment. The survey is expected to cover the following modules:

Table 12: Survey of Farmers' Main Modules

Module
Household roster
Farm information
Household farm and community characteristics
Farm production, revenue, and cost
Drip irrigation management, satisfaction, usage, challenges, etc.
Agriculture training
Crop and post-harvesting practices/equipment
Credit
Employment, income, productivity

4.3.2. SECONDARY SOURCES

The data collected from the farmer survey will be coupled and analyzed along with the secondary sources of quantitative data. This will include national surveys, the Performance Indicator Table, available documents pertaining to the project activities, administrative data, and data provided by MCA-Cape Verde and MCC. Administrative data from MCA, MCC, MAA was collected during the inception mission. Also during interviews with stakeholders in INE, and ANAS, it was agreed to provide the team with relevant information and national level data and statistics as needed. Potential data sources from national surveys include General Census of Agriculture (2004 and 2015), Family Vulnerability Tracking Survey, National Expenditure, and Family Revenue, Unified Questionnaire on Well-being Indicators, Agriculture Reference Survey, Agribusiness

Reference Survey, Annual Agricultural Cycle Survey, Socio-Economic Survey of Basque Hydrographs and Support to Agriculture.

Table 13: Sources of Quantitative Data and Indicators

Primary Sources for Quantitative Data	Indicators
Survey of farmers and borrowers	• Adoption of drip irrigation • Conversion to cash crops • Number of crop cycles • Use of extension center • Use of PHC • Productivity • Agribusiness and marketing activities • Employment • Water availability • Use of credit
Survey of General Census of Agriculture (2005 and 2015)	• Agriculture productivity at the municipality level (Paùl, Mosteiros) • Wage level at the municipality level • Unit volume produced • Marketing activities.
Agribusiness Reference Survey (2005 and 2015)	• Main agriculture products produced in each island • Unit volumes produced, exported, and imported to and from other islands • Pricing • Quality • Unit volumes produced; unit sales; unit costs; unit pricing; inventory management; efficiency indicators

The evaluation team will examine secondary sources and identify variables and indicators that can be used as concrete references for the evaluation during both baselines around (2005 or before) and follow-up (2010 and after). However, it is important to note that information obtained from the secondary sources must be used carefully as in most cases the data is collected at the aggregate level and might not provide the level of detail (geographically) required to analyze the changes that can be attributed solely to the project activities. Nonetheless, simultaneous analysis of the primary and secondary information will yield additional insights into potential spillovers of the WMAS activities, and it will help the team during the contribution analysis.

4.3.3. KEY INFORMANT INTERVIEWS

Main sources for the key informant's interviews will be qualitative / semi-structured interviews with project stakeholders, community associations, extension staff, CAIXA, microfinance institutions, as well as observing intervention areas and infrastructure sites. The team will conduct one round of comprehensive interviews with heads of associations, and semi-structured interviews with MAA agriculture delegates in Paùl and Mosteiros. Both delegates and associations have been playing instrumental roles during the life of the Compact, as well as the post Compact. During interviews with WMAS project managers, it was reported that the project was designed in close consultation with associations and aligned to their needs at the time of the project; also a number of infrastructural facilities were constructed by these associations. On the other hand, supervisory efforts during the compact, as well as maintenance efforts post compact, all have been under the direct supervision of MAA delegates. Therefore they have critical information regarding all aspects of the project.

However, interviews during the design phase will be more focused, covering specific aspects flagged during the first field visit. This is because during the first field mission the team members were able to successfully cover many areas, meet with all the major stakeholders (except association leaders). For instance, the team met with MFIs, CAIXA informants and collected all the data required for the purpose of the evaluation, amongst others, on the number of loans, the value of loans, reimbursement rates, interest rates applied to these loans, duration of the loans, current agricultural loan profiles, as well as qualitative information such as the level of satisfaction with the quality of the training provided by the Planet Finance. Therefore, the interviews in the second round will be smaller in scope, but more focused on covering specific aspects that need a higher level of attention. It is also important to note that several delegates have served throughout the life of the compact and post compact and it is important to interview all the delegates involved throughout the life of the compact and afterward.

The team will develop semi-structured interview guidelines that elicit participants' perceptions of the design, implementation activities, as well as outcomes and that promote open discussion of both benefits and drawbacks of the changes in their communities. Our semi-structured instruments for key informant interviews will allow us to gather targeted information to understand project implementation and outcomes while permitting expanded conversations that can lead to unanticipated insights. During these interviews, the focus will be on the performance of the built infrastructure post compact, water availability and adequacy in intervention areas and issue of timeliness, payment for water, management and maintenance either in the past or in the future, and other relevant research questions. Acquiring data from multiple perspectives in the same municipality will allow us to triangulate information and understand the reasons and mechanisms for the outcomes we do or do not find. In addition, if possible we will interview service providers and contractors, at least those with main offices in Praia on drip irrigation and water management facilities to further complement our analyses.

Table 15 displays our proposed qualitative data collection sources, collection methods, as

well as key focus areas. All data sources will be sampled from treatment areas of communes in the Paúl and Mosteiros. Also, it describes in more detail the focus of each type of interview, the sampling method, and the selection criteria we will use.

Table 14: Data sources of qualitative information

Data Source	Method	Key areas of focus	Comments
Associations	Semi-structured interviews	• Design, Implementation, sustainability of the project, PHC, extension center • Implementation and status of the infrastructure and equipment. • Maintenance • Perceived success and challenges • Perception of sustainability	We will interview leaders / active member of associations in Paúl and Mosteiros, to learn more about whether and how water use has changed, how the roles of the associations have changed, and whether water availability, access, and supply have changed. Questions about changes in the amount of irrigated land will also be probed.
Delegates	Semi-structured interviews	• Design, Implementation, sustainability of the project, post-harvest centers, extension centers • Implementation and status of the infrastructure and equipment. • Maintenance • Perceived success and challenges • Perception of sustainability	The team will interview MAA delegates in Santo Antão and Fogo. These interviews include both existing and former delegates and during which the team will explore all aspects of the project including design, implementation, and outcomes, as well as issue of sustainability.
Traders/Intermediaries Foreign and domestic buyers, Exporters	Semi-structured interviews	• Use of post-harvest centers • Changes in quantity and quality of produce, and prices • Changes in type of buyers and the ability to meet buyer needs. • Awareness and perception of Cape Verdean agriculture products • Changes in the regulatory environment and certification process. • Changes in the quantity, type, season, and destination of exports • Remaining barriers to export • Interaction with the project beneficiaries; particularly the recipients of the agribusiness, training and marketing activities.	Perception of traders is important as they typically have a better understanding of the project impact on quantity and quality of the agricultural products within each island. This is particularly important in Santo Antão.

Watershed management infrastructure and facilities, as well as drip irrigation equipment	Observation	• Operability • Sustainability • Maintenance • Management	Along with the project's irrigation engineer, we will observe key features of the boreholes, reservoirs, dikes and irrigation implementation, and whether distribution systems are still functional and maintained. In addition, if water has been used for drip irrigation purposes.
Microfinance Institutions and Fund Management Staff (CAXIA)	Semi-structured interviews	• Sustainability	Interviews (if needed) will be more focused and shorter in scope and will be conducted based on the further need for data collection and insight obtained after analysis of the previously collected data during the scoping mission.

4.4. DATA ANALYSIS

We will analyze both quantitative and qualitative data to identify patterns of consensus, instances of divergent or contradictory views, and variation across local areas and different samples. We will use three primary analysis methods to address our research questions: (i) thematic framing (ii) data triangulation, (iii) and data mining and exploratory analysis. Upon conducting these analyses, the team will proceed with contribution analysis.

- **Thematic framing.** The purpose of thematic framing is to discover patterns and themes in the data. This is a very effective method in analyzing qualitative data. To this end, the team will develop a coding scheme with an order of conceptual categories linked to the research questions and the logical framework. This framework will be continuously refined and updated throughout the analysis. Quantitative analysis of the secondary data also informs the developed coding schemes. The information will be organized as per the developed coding scheme, which enables us to access data on a specific topic efficiently and compile supporting or contradictory evidence for each theme. Developing such a structure will allow us to uncover different perspectives in a concrete and accessible manner. It will also facilitate further analysis of the qualitative data by gender, geographic location, or other relevant characteristics readily available.

- **Data triangulation.** Due to lack of data, the evaluation team plan is to obtain all relevant data, to the extent possible, from several different sources, including secondary sources such as national surveys, primary data of farmers, key informant interviews, administrative data, project documentation. Therefore, triangulation of the data is paramount to uncover consistencies and inconsistencies in findings across data sources as well as to strengthen the overall evaluation results. This process also facilitates confirmation of patterns or findings. Triangulation of data together with thematic framing will help to integrate quantitative results and apply quantitative attributes to qualitative data and support triangulation across data sources and types.

- **Data mining and exploratory analysis.** Descriptive analyses will be mostly applied to secondary sources of the quantitative data obtained from the Department of Statistics, Ministry of Agriculture, Ministry of Water and Environment, etc. It will provide descriptions of levels of key outcome indicators delineated previously across the time and subgroups of the population in the regions exposed to the intervention, as well as the regions that are not exposed to the intervention but could be considered similar to the treated areas, if possible. To this end, scatter plot, and two-way tables would be appropriate, possibly combined with some measures of association and the use of a chi-square test statistic. One informing aspect of descriptive analysis could be comparing the national trends with regional trends in the treated areas (upon the possibility and data availability). If national trends regarding the rate and magnitude fall behind the regional trends, particularly in the treated regions, although polluted, it still might be a hint for some program impact

in those areas which can be subsequently investigated in more detail through contribution analysis.

– **Contribution Analysis.** At the final level of analysis, we aim at assessing the extent to which any changes observed could be attributed to the WMAS project. To address the attribution problem properly, we will rely on a theory-based approach. In essence, the contribution analysis involves the following steps: (i) develop (i.e., elaborate upon) the results chain; (ii) assess the existing evidence on the results; (iii) assess the alternative explanations; (iv) assemble the performance story; (v) seek out additional evidence; (vi) revise and strengthen the performance story.

5. ADMINISTRATIVE

5.1. IRB REQUIREMENTS

The evaluation design and related protocol will adequately address possible risks to participants including psychosocial stress and related risks.[8]

The selection of the participants will respect the **principle of equity** since participants will be randomly selected among project beneficiaries based on the regional distribution. By its nature, the study will not involve participants belonging to vulnerable categories.

The study procedures will fulfill the principles of **voluntary participation** and **informed consent**. Before participating in the survey, informants will be given sufficient information to decide whether they wish to participate in the survey/focus groups/interviews. It will include a description of reasonably foreseeable risks and benefits expected from the research, and a statement clarifying that participation is voluntary and may be discontinued at any time without penalty. The recruitment text and the context in which the recruitment takes place will be reviewed and approved by the IRB. To recruit survey participants, A2F will conduct calls of potential end-beneficiaries to obtain their consent to the interview. Bank management and branch staff, BDS providers and project management staff will all be contacted via email before the interview.

All material will be translated into Portuguese and interviews will be conducted in Portuguese. Interviewees who cannot communicate in Portuguese will be interviewed in the local language of Creole**.**

The study will ensure that the confidentiality of information obtained from or about human participants is maintained. The A2F team will carry out a **data anonymization**[9]Exercise (detailed in the next section), as well as ensure that the data is stored on a secured server to which limited access will be strictly granted to key project personnel only. Furthermore, personal identifying information will be kept separate from the data. A2F will submit both anonymized and non-anonymized datasets to MCC, for public and internal use respectively.

8 "The probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests." (45 CFR 46.102(i))

9 Data anonymization is the process of encrypting and/or removing personally identifiable information from data sets so that the people whom the data describe remain anonymous.

5.2. PREPARING DATA FILES FOR ACCESS, PRIVACY, AND DOCUMENTATION

In addition to the original research question for which they were collected, sensitive data often has other important legitimate uses. For example, researchers might be interested in surveys from developing countries for policy research. While these additional uses of data are important and should be supported, the privacy of individuals to whom the data is related should be guaranteed. Data anonymization helps address the competing demands of transparency for the data and the protection of privacy for individuals and is a key step in preparing data for secondary use.

The first step of the data anonymization process involves assessing the risk of re-identification, which is whereby a statistical unit is identified, and the values of sensitive variables are uncovered. Disclosure risk can be affected by:

- The presence of identifying variables in the dataset
- The potential value of re-identification: for example, in the case of business data, re-identification can afford financial gains to a potential intruder.
- The cost of re-identification: the higher the level of effort and cost involved in re-identification, the lower the incentive for an intruder.

Thus, it is important to define a disclosure scenario as a first step to the anonymization process, which can be classified as follows:

- Internal information: the intruder (i.e., the person or group attempting re-identification) has personal knowledge of a statistical observation(s), which (s)he can use in re-identifying survey respondents.
- External information: the intruder can link records from the released dataset with records from another dataset, which contains direct identifiers.

5.2.1. Risk Mitigation

The next step in the process of data anonymization consists of applying risk mitigation strategies. Several tools are available to minimize the risk of re-identification in the data. In most cases, a combination of these different methods will be used to minimize disclosure risk. To maintain the dataset for internal as well as external use, data anonymization processes should be conducted in parallel with the original data.

The data collected from the survey of end-beneficiaries will use the following set of tools to reduce the existence of individuals with unique or rare identifiers in the data:

a) **The removal of direct identifiers**: direct identifiers are variables such as names, addresses, or identity card numbers. They directly identify a respondent but are not necessary for statistical or research purposes and will, therefore, be removed from the published dataset.
b) **Global recoding**: this consists of aggregating the values of a variable into pre-defined groups (such as recoding age into five-year age groups). This method can

be used for continuous or discrete numerical variables. In the case of categorical variables, the global recoding method collapses similar or adjacent categories.

c) **Top and bottom coding:** this is a type of global recoding applied to numerical or ordinal categorical variables. As the highest and lowest values of a variable can be rare and therefore identifiable, top and bottom coding at a particular threshold obscure unique values while leaving other values intact.
d) **Removing records:** this method can be used when other protection techniques are insufficient to prevent identification. For example, an individual might be the only one involved in a particular profession in an area. In such cases, it is best to remove this particular instance rather than removing the identifying variable from the dataset. However, as this method can significantly impact the statistical properties of the data, it will be used infrequently.

5.3. DISSEMINATION PLAN

A workshop in Washington, DC will be held to present the results of the evaluation and receive final inputs and comments. A draft report will be submitted to MCC before dissemination. Inputs collected during dissemination activities will be integrated into the evaluation results before the presentation in Washington DC to MCC and other relevant stakeholders. The final high-quality version to be published will then be submitted with all related documents (e.g., databases, evaluation protocols, etc.).

5.4. EVALUATION TEAM ROLES AND RESPONSIBILITIES

Table 15: Overview of Evaluation Team

Name of Staff	Role	Responsibility
Dr. Modibo Camara	Lead Evaluator/Access to Finance Expert	Project Management, Quality Control, Desk Review, Study Design, Interviews of Financial Institution Officials, Data Analysis, Report Writing
Dr. Andrey Skotnikov	Water Management and Irrigation Expert	Desk Review, Study Design, Data Analysis, Report Writing, Technical Interviews with Project Stakeholders.
Dr. Rebati Mendali	Agricultural Expert	Desk Review, Study Design, Questionnaire Design, Data Analysis, Report Writing.
Dr. Alireza Joukar	Qualitative and Quantitative Methods Expert	Desk Review, Questionnaire Design, Interviews of Stakeholders from Water Management Entities, Interviews with other Project Stakeholders. Data Quality Control, Data Cleaning & Analysis, Report Writing,
Ms. Kate Ivey	Data Analyst / Gender Specialist	Data Quality Control, Data Cleaning, Data analysis, Reporting.
Local Survey Company	Data Collection	Data Collection including both quantitative and qualitative. Logistical support and facilitation

5.5. PROPOSED EVALUATION TIMELINE

Project Activities & Deliverables	May				June				July				August				September				October				November				December				January				February			
	w 1	w 2	w 3	w 4	w 1	w 2	w 3	w 4	w 1	w 2	w 3	w 4	w 1	w 2	w 3	w 4	w 1	w 2	w 3	w 4	w 1	w 2	w 3	w 4	w 1	w 2	w 3	w 4	w 1	w 2	w 3	w 4	w 1	w 2	w 3	w 4	w 1	w 2	w 3	w 4
Evaluation Implementation																																								
Document Review and secondary data analysis																																								
Field Data Collection																																								
Data Analysis																																								
Draft Evaluation Report																																								
Draft Evaluation Report Submission																																								
MCC Review																																								
Revised Draft Evaluation Report																																								
Dissemination Activities																																								
Presentation to MCC																																								
Comments Integration																																								
Final Report																																								

On-site
Off-site
Deliverables
Review

ANNEX 1: COUNTRY CONTEXT

Cape Verde is an island country in the West Africa region, consisting of ten fragmented islands. Out of these ten islands, nine are inhabited. The population of the country is estimated at 540,000. Arable land constitutes 10% of the country. Climate change and natural disasters such as rising sea levels are the main sources of natural risks facing the country. Also, Cape Verde has an active volcano on the island of Fogo, which last erupted in November 2014. Although the most contributing sector to the country's economic growth remains tourism, agriculture is a sector of importance and strategic for the development of Cape Verde. An arid climate reduces the potential for agriculture; therefore, sustainable and integrated management of water resources has been a crucial component of any agricultural support activities implemented by the GoCV, or other multilateral organizations. While there is potential for agribusiness and fisheries, the limited level of processing of agricultural products and the lack of food and handling safety certifications remains a constraint[10].

Agriculture development in Cape-Verde is primarily constrained by its extremely fragile ecosystem, and its contribution to Gross Domestic Product (GDP) is very limited. Agriculture covers a small portion of the country area and represents only 8% of GDP[11]. The improvement of agricultural production in Cape Verde is severely hampered by the lack of arable land - less than 20%[12] of the land area is suitable for crop production (which only 5% was used for irrigation production, before the WMAS project implementation) - and lack of water. Rainfall in Cape Verde is erratic, with a short rainy season between August and October, during which the country normally experiences torrential downpours or very little rain like last year (2017). This results in about 83% of rainfall being lost through evaporation and runoff. Productivity in the agricultural sector thus remains low. The otherwise arid climate reduces the potential for agriculture. Moreover, Cape Verde is vulnerable to climate change, rising sea levels, and natural disasters, which severely affect the agricultural sector.

Agriculture in Cape Verde is dominated by micro-farms, which reduces the scope of increasing economies of scale. Average farm size of these micro farms is 1-1.5 hectares (ha). This is further distributed within the family resulting in even smaller areas of cultivation. Most crops are dry-crops, and only 7% of the total crops are high-yield irrigated crops. A large number of farmers are landless, and the land tenure system in Cape Verde includes mainly leasing and partnership. Approximately 70-85% of the farms do not produce sufficient output for consumption, leading to food deficits. Furthermore, limited access to market and access to credit further inhibits agricultural production. In addition, inadequate farming practices by farmers result in soil erosion, which also hampers agriculture.

[10] World Bank County Overview (2017). http://www.worldbank.org/en/country/caboverde/overview
[11] https://tradingeconomics.com, March 2018
[12] http://www.fao.org/countryprofiles, March 2018

The three islands, Santo Antão, São Nicolau, and Fogo, substantially vary from each other concerning socioeconomic and geographic conditions. Santo Antão has a geographic area of 779 sq. Kilometers (km) with a population of 48,761 and is the second largest island in the country. São Nicolau covers an area of 388 sq. Km and has 12,940 inhabitants, whereas Fogo has an area of 476 sq. Km and a population of about 40,000. Population density is highest in Fogo followed by Santo Antão and São Nicolau. About 8,800 ha in Santo Antão, 5900 ha in Fogo, and only 2000 ha in São Nicolau are arable land. Poverty incidence is higher in Santo Antão and Fogo as compared to São Nicolau. Furthermore, in as much as the transport infrastructure in the country is in good condition, infrastructure connecting the islands is poor. As a result, access to the market for producers on these islands proves to be significantly problematic.

The soil and water quality varies across islands and can affect agricultural development. Soils in Cape Verde were formed from volcanic and sedimentary rocks. Due to its volcanic nature, the soil is generally not well-suited for agriculture. The soil use further differs from island to island. For instance, the soil is good for sylvi-pasturing in Santo Antão, the soil in São Nicolau is good for dry agriculture and the soil in Fogo is good for irrigated agriculture. Furthermore, the groundwater quality also varies across islands. The Paúl basin in Santo Antão receives on average 700 mm of rainfall annually, followed by 600 mm in the Mosteiros basin of Fogo and 330 mm rainfall in the Fajã basin of São Nicolau. Furthermore, the aquifer in Paúl and Mosteiros basins are more susceptible to contamination from agriculture and septic waste as compared to Fajã basin. The different soil and water quality have varying effects on agriculture in the three islands.

ANNEX 2: LITERATURE REVIEW

Water Management and Soil Conservation Activity

Agriculture is increasingly becoming dependent on technology which can raise productivity, under resource constraint. Water is an important input in the agricultural sector and is also a scarce resource in many parts of the world, like India, Africa, western part of USA, etc. Water scarcity and increasing costs of water procurement have led to extensive research and development in the field of water efficient technology. An important contribution in this domain has been the introduction of drip irrigation. This technology keeps the plant roots moist through targeted watering at the plant roots and reduces water wastage and thereby farmer irrigation costs. Drip irrigation spread from Israel where it was first implemented, to other countries like Australia, North America, South Africa by late 1960s (DiGennaro 2010).

The literature suggests that drip irrigation has a significant impact on water use efficiency, at the same time increasing productivity and farmer income. Evidence of reduction in water use and a rise in water use efficiency from use of drip irrigation has been documented in many dry and arid regions of the world. Jha et al. (2016) shows that water use reduces by 73 percent in off-monsoon dry periods in different elevations in Nepal. Results from Tamil Nadu, India (Kumar and Palanisami 2010) suggest that adoption of drip irrigation leads to a 51 percent rise in crop production per unit of water. Evidence from other research in India shows that water-use efficiency increases up to 100 per cent in a properly designed and managed drip irrigation system (INCID 1994; Sivanappan 1994). Studies from Sub-Saharan African countries like Zimbabwe (50 percent water efficiency; Maisiri et al. 2005), South-Africa (Karlberg et al. 2007), provide evidence of water use efficiency percentage rise due to low cost drip irrigation systems. In North China Plain, where soil salinity is a hindrance to agricultural production, drip irrigation has been shown to increase water use efficiency for vegetable crops like tomatoes (Wan et al. 2007).

In addition to water use efficiency, drip irrigation also leads to rise in productivity, as suggested by literature. Jha et al. (2016) shows that in comparison to furrow irrigation system, drip irrigation leads to improved productivity for fodder crops and higher economic security of smallholder farmers in Nepal. Karlberg et al. (2007) provides evidence of increase in tomato yield in South-Africa from drip irrigation, using saline water. Drip irrigation has been found to reduce labor requirements for cultivation in India; this is because the water is only supplied to the crops directly, which reduces labor cost (Narayanamoorthy 2004). These advantages of drip irrigation reduce the cost of production and increase productivity. Data from experimental plots in India show that drip irrigation, in comparison to furrow irrigation, increases the productivity of vegetable crops by 40 percent (Narayanamoorthy 2005). Higher vegetable yields have been linked to drip irrigation in Mustafakemalpasa region in western Turkey, where water is a limiting factor in agricultural production. DiGennaro (2010) reports that irrigation is linked to poverty reduction through increased crop production and thereby higher farming income.

It has been argued that advanced irrigation technology can be costly, but there is ample evidence in favor of the economic benefits of drip irrigation in general, and low-cost drip irrigation in developing nations; with increased productivity and household income as a direct outcome. Adequate water supply to crops increases the production available for household consumption and or sale. In the U.S. drip irrigation has been adopted in many regions, and has been important in the arid western states, where water is a scarce resource. Taylor et al. (2014) reports that drip irrigation adoption in California is responsible for total annual value of water saving and additional income from the yield effect ranging between $313 million and $1.13 billion, with an average of $748 million. Therefore, drip irrigation has a significant impact on farmer productivity, and farmer household income both in developing and developed countries. This can have a significant impact on other social factors like female empowerment, especially in the developing world with smallholder farms, and family farms. This effect has been observed by Upadhyay et al. (2005) in Western Nepal where drip irrigation leads to higher income and empowerment among rural female vegetable growers who adopt drip irrigation.

Research has also shown many success stories of commercialization of agriculture. Partap (1995) reports that conversion from traditional to cash crops like apples and vegetables has led to improvement in income, consumption patterns, education, and other social and welfare services (Verma and Partap 1992). A similar experience has been observed (Partap 1995) among the poor farmers in the Ningnan county located in the eastern Himalayan region of China, through government commercialization of agriculture, fruit and other cash crop farming. According to Mehta (2009), diversification towards horticultural crops and area shift in favor of fruits and vegetables has been stated as a viable option to stabilize and raise farming income, enhance agricultural growth, and increase employment opportunities in India, as also suggested by Vyas (1996) Joshi (2005) Birthal et al. (2007). Mbora et al. (2008) provides evidence of improvement in income levels among Kenyan farmers who have shifted from subsistence to profit farming in fruits and nuts production. Other low-income and medium income countries in Latin America and Asia have also experienced economic growth and greater export income from fruit and nut and horticulture production (Diop and Jaffee 2005).

There is also growing evidence on the difference in impacts on farmers' production and consumption between large- versus small-scale irrigation schemes, as determined by the area of land they cover. While schemes of any size provide access to irrigation, large-scale irrigation schemes can lead to greater improvements in farming outcomes by increasing market integration and increasing the dispersion of agricultural knowledge or technology as a larger number of farmers are brought together (Lipton et al 2003). Smaller-scale irrigation schemes, however, may require lower participation costs for farmers and provide farmers with more influence over the management of the scheme (Dillon 2010). Dillon (2010) assessed the differences in household production and consumption among those with access to small-scale (covering 50 hectares or less) and large-scale (covering more than 300 hectares, in this study specifically) irrigation infrastructure to examine whether the scale of an irrigation project increases household welfare in Mali. Using propensity score matching, he found that small-scale irrigation has a larger effect on

agricultural production and agricultural income than large-scale irrigation, but large-scale irrigation has a larger effect on consumption per capita. In Senegal, Sakurai (2015) compared the impacts of large-scale (which cover, on average, 761 hectares) versus small-scale (which cover, on average, 27 hectares) irrigation schemes in the Senegal River Valley and found that farmers in large-scale irrigation schemes achieved significantly higher yields and profits than those in small-scale irrigation schemes.

Agribusiness Development Services Activity

The sub-activities under this activity were expected to increase farmer's knowledge on high-value agriculture, the adoption of which would lead to increased productivity and income. Literature also shows evidence of impact of high-value agriculture on farmers' income. Partap (1995) reports that conversion from traditional to cash crops like apples and vegetables has led to improvements in income, consumption patterns, and other social and welfare services (Verma and Partap 1992). Mbora et al. (2008) provides evidence of improvement in income levels among Kenyan farmers who have shifted from subsistence to profit farming in fruits and nuts production. Other low-income and medium income countries in Latin America and Asia have also experienced economic growth and greater export income from fruit and nut and horticulture production (Diop and Jaffee 2005). According to Mehta (2009), diversification towards horticultural crops and area shift in favor of fruits and vegetables has been stated as a viable option to stabilize and raise farming income, enhance agricultural growth, and increase employment opportunities in India, as also suggested by Vyas (1996) Joshi (2005) Birthal et al. (2007).

Farmers training, post-harvest technical assistance, especially technical assistance to various market participants in order to strengthen the linkages between farmers and markets, and other related activities previously found to be effective in increasing market opportunities for small scale farmers. Measuring performance metrics in regard to the provision of agricultural training programs has been the main focus of the literature and previous evaluation (Waddinton et al. 2010). While to date, the number of rigorous evaluation of agricultural training programs has been limited, studies have reported mixed results (IEG 2011). For example, Kabir and Uphoff (2007) reported a positive and large spillover effect of agriculture training programs. They found that immediately after training only one- third of the farmers in a village had adopted the new techniques. The majority in the village adopted the new techniques only three years after the implementation of the training program. On the other hand, Feder et al. (2014) found no sign of concrete increase neither in crop yields, nor in farmers income levels. Nonetheless, they reported an increase in knowledge of farmers. It appears that the level of complexity of the training material also plays an important role in effectiveness of the entire program and materialization of the benefits in terms of income and crop yields. Cerdán-Infantes et al. (2008) also reported similar results in Argentina.

MCC funded evaluations to date have contributed significantly to the body of literature relating to this area. To date, there have also been five completed evaluations of agricultural training programs in Armenia, El Salvador, Ghana, Honduras, and

Nicaragua. Similar to existing findings in the literature, results have been mixed. Overall, it seems safe to assume that impacts of agricultural training programs are likely to vary substantially based on the nature and location of the specific program. In addition to agricultural training programs, research on impacts of agribusiness activities, as well as market opportunities has been limited. Therefore, the results are still not concrete and mostly generate mixed signals. For instance, in the Post-Harvest, Processing, and Marketing project in Armenia, small and medium firms and producers were trained in food processing technologies, food safety, quality standards, financial analysis, and developing commercial linkages. Fortson et al. (2013) describes that the majority of beneficiaries realized improvement in outcome indicators including productivity, sale, and profits. [13]

Access to Credit

Meyer (2011) stresses the need to better understand the demand for and use of agricultural credit to develop effective products, institutions, market infrastructure and policies. The author then discusses the use of "smart" or "market-friendly" subsidy approaches such as matching grants, credit guarantee funds, warehouse receipts, micro-insurance, etc. Hollinger (2011) describes an innovative approach that combines elements of micro-lending and conventional agricultural lending into a specialized loan package. These loans allow for disbursement and repayment schedules flexible around the seasonal nature of agriculture, such as grace periods, irregular payments or bullet repayments. They also include flexible collateral requirements in which a borrower could use land, farm equipment or even livestock. Cohen (2010) advocates more focus on financial education, among other things, as a way to ready the unbanked (people without access to conventional banking services) to enter the formal financial system.

Few rigorous impact evaluations of rural finance programs can be found in the literature. Donor institutions and aid agencies increasingly need to ascertain whether the spent funds worked well to achieve the targets, and how to encourage and facilitate the best practices in the provision of agricultural and rural finance. This calls for rigorous and strong conceptual base studies to test the feasibility of institutions, services, and the targeted population (Nagarajan, et al, 2005). However, knowledge on achieving the targets of such initiatives is limited due to lack of proper evaluations. Yaron, Benjamin and Charitonenko (1998) discuss the inherent issues with evaluating the performance of rural financial intermediaries, as it is difficult to predict behavior of borrowers in the absence of the program. It is also extremely difficult to isolate the effect of the program from external factors. Their proposed method of evaluation is based on the success of the program in areas of outreach, as measured by an index that factors market penetration, demographics of clients and quality of services, and self-sustainability measured by an index of subsidy dependence.

[13] The reported results has been based on simple descriptive statistics, as opposed to any rigorous impact or performance evaluation design.

However, recently there has been increasing demand to measure the effectiveness of rural finance projects. This is because most development organizations currently focus and report only on their outputs rather than outcomes and because there is scant evidence to show the true contribution of programs. In the last decade there has been tremendous use of quantitative impact evaluations of program interventions in development projects. Some economists argue that randomized control methodology should be central to impact evaluation practices. However, randomization is rarely possible in developing and less developed countries and sometimes it increases the difficulty of understanding the complex environment in which development projects are implemented.

ANNEX 3: ADDITIONAL NOTES ON SAMPLE SIZE

For this study, the required sample size can be calculated for different scenarios of confidence interval and margin of error using the following equation. Number of beneficiaries has been fairly small within each island. Therefore, the following formula was used for the purpose of cross validation to ensure the proposed sample size lies within an acceptable range and results from the survey can be generalized to the whole population of beneficiaries.

$$n_s = \frac{Deff*(z^2)*p(1-p)/e2}{1+\left(z^2*\frac{p(1-p)}{e^2N}\right)}, \text{ where}$$

Table 16: parameters used in calculation of the required sample size

Parameters	Remarks
n_s	sample size
z =1.96	statistic corresponding to the level of confidence (1.96 for 95% confidence interval)
Deff=1	Design effect will only be present in cluster sampling. For this survey it will be considered 1.
P=50%	Estimate for selected key outcome indicator to be measured in the survey, we assumed the conservative measure of 50%
e	margin of error (4% and 5%)
N	Total number of beneficiaries N=*229 and 49*

All the calculations were carried out using the conservative estimate of 50% for key outcome indicators of the study. This number will yield the most conservative sample size. The majority of the indicators will be in the form of proportions, which to a great extent would simplify the task of sample size calculations. As the variance of proportion is bounded (i.e. P*[p-1]). Assuming the maximum variance (0.5) would therefore ensure minimum level of precision. Also, we suggest using marginal error rates of five percent (5%), as well as a ninety-five (95%) confidence interval. The design effect would be set at 1. These parameters would ensure accuracy and representation of the final results based on acceptable statistical standards.

ANNEX 4: LIST OF STAKEHOLDERS INTERVIEWED

Table 17: List of all Persons and Entity Consulted during Design Evaluation phase

Name	Entity	Position	Island	Contacto
Joana Brito	MCC	Deputy Resident Country Director	Santiago	britoj@mcc.gov
Sónia Schofield	MCC	Program Analyst	Santiago	schofields@mcc.gov
Deolinda Dos Reis	MCA	M&E Consultant	Santiago	deolinda.reis@mca.cv
Migual Angelo Barreto da Moura	ANAS	President	Santiago	miguel.moura@anas.gov.cv
Celso Soares Ribeiro	INE	Vice President	Santiago	celso.soares@ine.gov.cv
Regina Fortado	Caixa Economica de Cabo Verde	Micro Credit Coordinator	Santiago	regina.furtado@caxia.cv
Nelita Sanches	OMCV	Micro Credit Coordinator	Santiago	nelisanches18@gmail.com
Eneida Rodrigues	MAA	Coordinator MCA-CV I WMAS projects	Santiago	Eneida.Rodrigues@maa.gov.cv/ 992 31 59
Inussa Bari	MAA	MAA Statistic Director	Santiago	Inussa.bari@maa.gov.cv/ 515 98 29
Iria Neves	MAA	MAA Statistic Direction	Santiago	Iria.Neves@maa.gov.cv/ 516 00 59
João Gonsalves	MAA	Former Delegate Fogo	Santiago	993 99 28
Lúcia Passos	MORABI-MFI	Former President	Santiago	lupassos@hotmail.com/ 992 63 15
Francisco Tavares	ASDIS-MFI	President	Santiago	Francisco.tavares@asdis.org.cv/ 991 20 22
Orlando Delegado	MAA Paúl	Delegate	S. Antão	Orlando.J.Delgado@maa.gov.cv/ 991 46 78
Orlando Freitas	MAA Paúl	Former Delegate	S. Antão	Orlando.Freitas@maa.gov.cv/ 992 66 52
Emerson	Paúl Farmer	Farmer	S. Antão	970 22 66
Nelson Andrade	MAA P. Novo	Inspector of Post-Harvest Center	S. Antão	jorgenelsonsousa@gmail.com/ 516 03 51
Jaime Pina	MAA Fogo	Delegate	Fogo	orlando.araujo@maa.gov.cv/ 515 98 84
Orlando Araújo	MAA Fogo	Mosteiros Agriculture Responsible	Fogo	orlando.araujo@maa.gov.cv/ 991 06 06
Manuel da Luz	Sol Di Fogo-MFI	President	Fogo	mdaluz952@gmail.com/ 992 39 75

ANNEX 5: LIST OF ASSOCIATIONS, PAÙL

Table 18: List of Associations, Paúl

Association name	Abbreviation	Intervention Area
Associação Esperança Eito	AEE	Eito
Associação Desenvolvimento Comunitária de Figueiral de Paúl	ADCF	Figueiral
Associação Desenvolvimento Comunitária de Pedra das Moças	ADCPM	Pedra das Moças
Associação Desenvolvimento Comunitária de Lombo Comprido	ADCLC	Lombo Comprido
Associação Desenvolvimento Comunitária de Cabo de Ribeira	AMI-VALE	Cabo de Ribeira
AMI Paúl	AMI-Pául	Cidade das Pombas

ANNEX 6: LIST OF ASSOCIATIONS, MOSTEIROS

Table 19: List of Associations, Mosteiros

Association name	Contact name ("nominho")	Position	Contact
Associação Feijoal	Amancio José Golsalves (José)	President	970 38 43
Associação Luvas *Vulvanicas*	António Mendes Antunes (Tó)	President	283 20 13/997 99 43
Associação Murro FM	António Nilton Pires	President	992 13 78
Associação Achada Grande	Mathias Vieira Andrade	President	997 64 45
Câmara Municipal dos Mosteiros	Jaime Monteiro	Vogal	995 33 85
Associação Rocha For a	José A. Barbosa Amado (Djake)	President	988 56 37
Associação Relva	José Alberto G. Andrade (Zezito)	President	283 25 90/995 83 08
Associação Ataláia	Porfírio Miranda Martins	President	283 28 87/977 14 20
Associação Corvo	Adalberto Veiga	President	983 50 45
Associação R. Ilhéu	Miguel Alves (Domingo)	President	283 18 99/977 9428
Associação Cutelo Alto	Morgado de Barros	President	995 53 03
Associação Pai António	Manuel Gomes (Tony)	President	981 48 52