
MEMORANDUM

TO: Rebecca Tunstall

FROM: Randall Blair, Anu Rangarajan, and Ken Fortson **DATE:** 8/15/2011

SUBJECT: Evaluation Plan for Credit, PPM, and ISSA Components of the Water-to-Market Activity—**REVISED**

In March 2008, we submitted a memo describing our randomized design for evaluating the effectiveness of the training programs associated with the Water-to-Market (WtM) Activity of the Irrigated Agriculture Project (MCC-008). In this memo, we present our design for the evaluation of the following components of the WtM: the Access to Credit component, the Post-Harvest, Processing and Marketing Subactivity (PPM), and the Institutional Strengthening of Water Management Entities Subactivity (ISSA). We also propose a tentative plan to calculate economic rates of return (ERRs) for the WtM Activity.

Summary of the Water-to-Market Activity. The overarching goal of the Millennium Challenge Account (MCA) with Armenia is to increase household income and reduce poverty in rural Armenia through improved performance of the country's agricultural sector. In 2007, MCA began implementing two projects to achieve this goal: (1) Rehabilitation of Rural Roads and (2) Irrigated Agriculture. The Irrigated Agriculture project consists of two activities: (a) Irrigation Infrastructure Rehabilitation and (b) Water to Market. The goal of the WtM Activity is to initiate a transition toward more profitable agriculture in the rural areas that will benefit from irrigation infrastructure rehabilitation activities. Through the WtM Activity, small farmers are given access to training, material assistance, and credit to facilitate their adoption of new technologies and high-value crops. In addition, agricultural businesses and water user associations (WUAs) receive technical and material assistance to strengthen their operations and profitability.

The WtM Activity comprises several components, including the On-Farm Water Management (OFWM) and High-Value Agriculture (HVA) training, the Access to Credit component, ISSA, and PPM. Below is a brief summary of each component's beneficiaries, activities, and expected results (Figure 1 illustrates the activities and expected results):

- **On-Farm Water Management training** consists of establishing demonstration plots and conducting training sessions for farmers about new irrigation technologies. According to original plans, a total of 60,000 farmers in 350 communities were scheduled to be trained in water management practices from 2007 to 2010. (This was later revised to 45,000 farmers.) MCA contracted with ACDI/VOCA and its partners, VISTAA and Euroconsult—to implement all training activities. The goal of trainings is the adoption of new and more efficient irrigation techniques, which will lead to increased and more cost-effective agricultural production, as well as enhanced sales. **High-Value Agriculture training** consists of establishing demonstration plots and

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conducting training sessions for farmers on high-value crop substitution and cropping intensity. A total of 30,000 farmers who also received OFWM training were scheduled to be trained by ACDI/VOCA in high-value agriculture from 2007 to 2011. (This was later increased to 36,000 farmers, as program implementers learned that there were benefits and synergies from offering farmers both OFWM and HVA training, and consequently agreed with MCA and MCC to revise the targets for both sets of training to better align them.) The goal of this training is the adoption of new cropping techniques and high-value crops, which will lead to increased and more diverse agricultural production, as well as increased sales.

- Through the **Access to Credit component**, \$8.5 million in long-term credit was scheduled to be disbursed to qualified farmers who participated in WtM training and met other criteria through 10 lending institutions. MCA contracted the Rural Finance Facility to implement the WtM credit component from 2008 to 2011. The objective of the component is to strengthen the capacity of credit providers to administer credit for viable proposals in production, post-harvest, and agribusiness-related activities. Access to credit will allow beneficiary farmers to adopt new irrigation and production technologies, and thus generate higher output and sales.
- **The Institutional Strengthening of Water Management Entities Subactivity** provides general technical support to 44 WUAs operating in Armenia—and intensive technical support to 8 of them—with the aim of strengthening their managerial, technical, structural, and financial capacity and self-sufficiency. ISSA’s implementing partner, VISTAA, provides technical assistance to WUAs on irrigation water delivery services, water fee collection and accounting, irrigation infrastructure maintenance, and reporting tasks. The intent of these improvements is to create more efficient and consistent irrigation supply for WUA members. The Subactivity also includes an irrigation policy reform component, in which a policy reform strategy was developed through a participatory process with stakeholders. All ISSA activities were scheduled to take place from August 2008 to September 2011.
- Under the **Post-Harvest, Processing, and Marketing Subactivity**, 300 enterprises and producer groups were originally scheduled to be trained by ACDI/VOCA in processing technologies, food safety, and quality standards, as well as financial analysis and developing commercial linkages. (This was later revised to 225 agribusiness enterprises when it was determined that original targets exceeded the numbers of such groups in Armenia.) The project was scheduled to be implemented from 2008 to 2011. The overall objective of the PPM Subactivity is to improve post-harvest preservation procedures, strengthen processing enterprises, and provide WtM beneficiary farmers with increased opportunities to sell their products.

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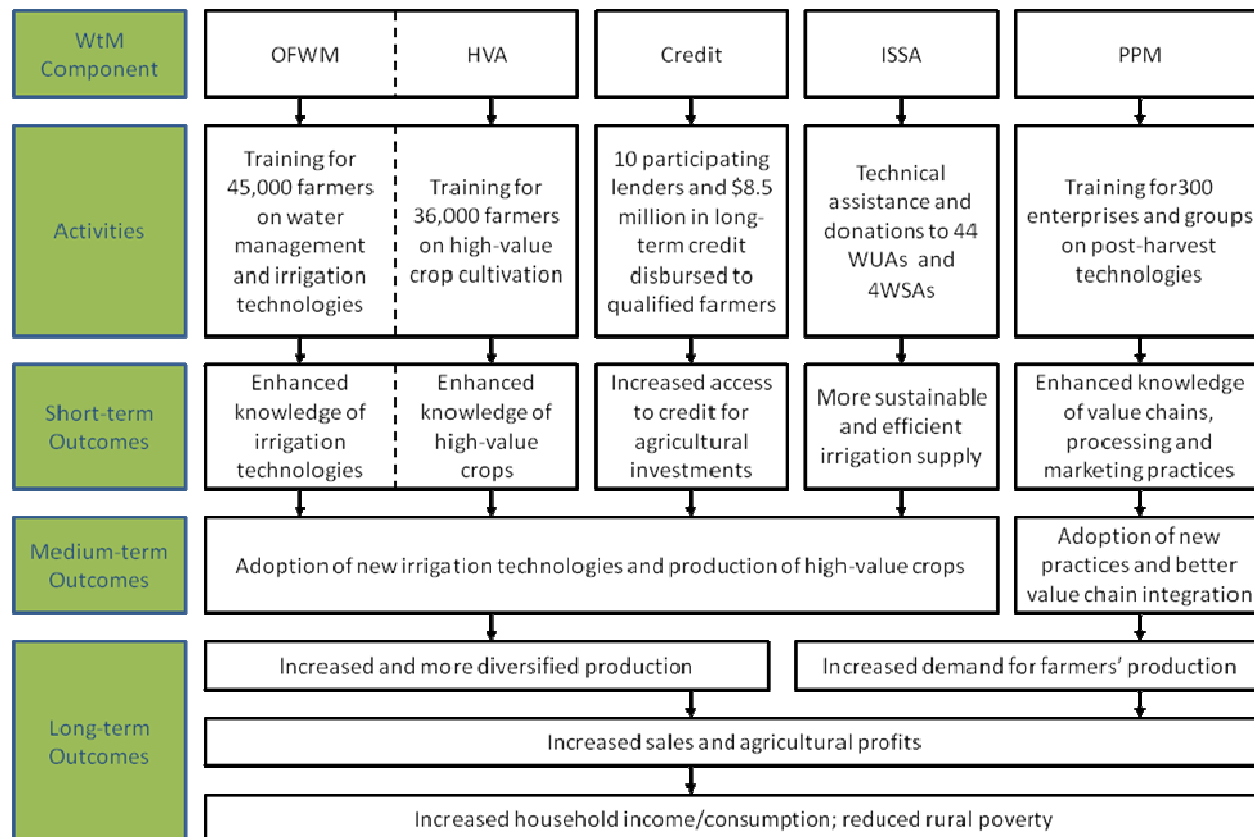
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A high degree of interaction was envisioned between the OFWM and HVA training components, as water management techniques learned in OFWM could be used to cultivate new high-value crops introduced in HVA training. Because new water management and production technologies introduced in OFWM and HVA training—such as drip irrigation systems and greenhouses—require investment capital, training beneficiaries could apply for MCA credit to finance these investments. In addition, many beneficiaries of the ISSA activity—members of the 44 assisted WUAs—also participated in WtM training and were eligible to apply for MCA credit. Thus, the short-term result of the ISSA, more sustainable and efficient irrigation water supply, could feasibly facilitate farmers' transition to new water management techniques, new crops, and new production technologies financed with MCA credit. The synergy created by these components could lead to increased and more diversified production (Figure 1).

MCA also planned substantive interaction between the PPM and other components, as processing enterprises strengthened by PPM assistance could form stronger linkages with WtM beneficiary farmers and create greater demand for farmers' production. Through these interactions among components, all WtM activities are designed to result in increased sales and agricultural profits, as well as improved household wellbeing among beneficiary farmers.

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Figure 1. Logic Model for WtM Components



Source: 2010 WtM QPA report.

Research Framework and Analysis Approach. To analyze the credit, PPM, and ISSA components of the WtM Activity, we will use the following two-question research framework:

- 1. How was the WtM component implemented?** Did the program meet its implementation targets? What types of beneficiaries were targeted, and how were they identified?
- 2. Did the component have the intended effects?** Did beneficiaries alter their behavior as a result of the program? Did they receive benefits as a result of this behavior change? Are the benefits of the program sufficiently large to justify the costs?

For each of the credit, PPM, and ISSA components, we will explore these two general research questions, as well as the relevant sub-questions listed above. To facilitate a unique and targeted analysis of each component, sub-questions will be tailored to each component's specific activities and objectives. While our emphasis will be on trying to assess the effects of each component, we will use qualitative information to describe the components and provide a brief

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description of how the components were implemented. (Each component's sub-questions are presented separately in the next three sections of this memo.)

Our analysis of these questions will use qualitative and quantitative methods. To answer questions regarding implementation and intended effects, we will use three main qualitative sources of information: (1) existing qualitative process analysis (QPA) reports completed by Socioscope; (2) in-person interviews we will conduct with MCA staff, implementers, beneficiary groups, and other informants in July and August 2011; and (3) findings from qualitative interviews conducted for MCA-Armenia's Compact Completion Report (CCR). We will synthesize and briefly summarize qualitative findings from these sources with text and summary tables organized by theme, key findings, and key program characteristics (objectives, target population, and so on).

To answer several questions regarding program targeting and intended effects, we will rely on quantitative data from several surveys of WtM beneficiaries, including the Farming Practices Survey (FPS), the Enterprise Adoption Survey (EAS), and the Water User Survey. We will present key quantitative findings from these surveys with cross-tabulations of key beneficiary characteristics and outcomes, as well as tests of statistical significance, when relevant.

When appropriate, we will use a combination of qualitative and quantitative information to answer specific research questions. For example, we can compare the characteristics of MCA credit beneficiaries available in FPS data to lending institutions' descriptions of their target beneficiaries. In addition, we can compare quantitative adoption rates from the EAS to beneficiaries' own accounts of their behavior change provided during in-person interviews. This combination of qualitative and quantitative information will offer a multi-dimensional picture of program implementation and results.

In Section I, we summarize the credit component of the WtM, outline our primary research questions for this component, discuss the main qualitative and quantitative sources of data for these questions, and propose potential qualitative and quantitative analyses. In Sections II and III, we present similar information for the ISSA and the PPM Subactivity, respectively. In Section IV, we discuss initial plans to calculate ERRs for the WtM Activity. In Section V, we provide an outline our reporting plans for the WtM evaluation.

I. ACCESS TO CREDIT COMPONENT

Background. The strategic goal of the Access to Credit component is to provide long-term credit to individual beneficiaries who were trained under the WtM component. Access to credit provides beneficiaries with the necessary resources to finance new irrigation and production technologies introduced in training. Under the credit component, \$8.5 million USD will be disbursed to beneficiaries through intermediary credit organizations. In 2008, four credit organizations were selected in a competitive process to distribute \$1.5 million in MCA-Armenia loans. In 2009, an additional six credit organizations were included in the component. These 10

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providers were charged with distributing the remaining \$7 million in loans from 2009 to 2011. The credit component is implemented and monitored by the Rural Finance Facility (RFF). The component is operating in 10 Armenian marzes (all marzes with the exception of Yerevan).

MCA loans can be used to strengthen agricultural production, modernize equipment and build greenhouses, expand orchards and vineyards, and purchase root stock, as well as for agribusiness marketing, processing, establishing consolidation centers, and developing and expanding processing factories. The loans have a maximum interest rate of 12 percent and a loan term of 2-7 years. In addition, the maximum loan amount is 10.5 million Armenian drams (AMD, about \$30,000 USD). On June 7, 2011, the 1,000th loan contract was approved and disbursed by the RFF. According to the RFF data, the average size of loans is about 4.4 million AMD (under \$12,000 USD), the average term is 55 months, and the average interest rate is 11.2 percent.

Research Questions. Based on our research framework and conversations with MCC staff, we have developed the following research questions for the credit component of the WtM Activity:

1. **How was the credit component implemented?** What were the program targets? Did the program meet its targets in terms of number/value of credits awarded? How were beneficiaries targeted across participating lending institutions? What were characteristics of recipients of MCA credit versus other credit (and versus non-recipients)? When was MCA credit awarded and for what purposes was it used? Did MCA credit have a unique niche vis-à-vis other agricultural credits? Did the number of credits vary across lending institutions? If so, why?
2. **Did the credit component have the intended effects?** Did farmers who received MCA credit have higher adoption, investment, production, and income than farmers who did not receive MCA credit? Was other financial institutions' behavior altered as a result of the program? Will the new credit lines be sustained? Are the benefits of the credit component sufficiently large to justify the costs?

Qualitative Data Sources and Analysis. To answer several questions about the program's implementation and intended effects, we will use the analysis and findings in the **WtM QPA report**, submitted in 2010 by Socioscope. The report provides an in-depth qualitative study of WtM program implementation, including the irrigation and high-value agriculture training, credit, and PPM components. The report draws from over 100 in-depth interviews and focus groups conducted in September and October 2009 with selected groups of farmers and other stakeholders, program implementers and managers, as well as more than 20 observations of WtM trainings, demonstration farms, and collection centers.

The QPA report covers the following domains for the credit component: program objectives, targeting beneficiaries, strengths and weaknesses of implementation, beneficiary expectations

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and satisfaction, and lessons learned and sustainability. We will use the WtM QPA report to document how beneficiaries were targeted across lending institutions, as well as beneficiaries' perceptions of the credit component of the MCA program.

To collect additional information on program implementation and intended results, we will conduct **in-person interviews** with MCA staff, personnel at the RFF, two lending organizations participating in the Access to Credit component (one bank and one universal credit organization), and representatives from the World Bank and the International Fund for Agricultural Development (IFAD). During interviews with MCA, RFF staff, lenders, and other stakeholders we will discuss how the loan application and approval process worked, whether the program met its targets, and what proportion of applicants were rejected. We will also collect information regarding common MCA loan characteristics, the number of loans granted across lending institutions, and why some institutions may have granted more loans than others. We will also discuss how the program's interest rate was determined, whether MCA credit altered the behavior of other lending institutions, and whether credit lines can be sustained in future years.¹ In interviews with the World Bank and IFAD, we will focus on determining the similarities and differences between MCA credit and other agricultural credit available in rural Armenia, as well as documenting lending institutions' response to MCA lending.

In addition, we expect to receive qualitative data related to the credit component from focus groups and **in-person interviews** conducted for the **MCA's Compact Completion Report (CCR)**. From July to August 2011, MCA contractors will interview at least two additional lending organizations as well as several credit applicants (both recipients and non-recipients). Topics covered in interviews with lending institutions will include beneficiary identification and outreach, the loan application process, credit conditions and repayment, and coordination with RFF and MCA. Non-beneficiary credit applicants will be asked about their reasons for soliciting MCA credit and why they did not obtain credit, whereas beneficiaries will be asked about reasons for soliciting credit, the credit approval and monitoring process, loan conditions, and their investments related to credit. MCA will provide us with these qualitative findings in September 2011, and we will supplement this information with our qualitative findings from in-person interviews with MCA, RFF, and participating lending institutions.

In August and September 2011, we will organize all qualitative information according to our research questions and sub-questions, and analyze common themes and conflicting reports from respondents. Using information from the various sources discussed above, we will summarize

¹ If time permits, we will ask participating lending organizations how they determine risks for nonpayment, what structure is in place to ensure repayment of loans, and to what extent nonpayment has occurred throughout the program's implementation.

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the essential characteristics of the WtM credit component—including objectives, budget, target population, implementation targets, and success in meeting these targets—into a table format for easy comparison with other WtM components.

Quantitative Data Source and Analysis. To answer several questions about beneficiary characteristics, loan characteristics, adoption, investment, production, and income, we will use the **Farming Practices Survey (FPS)**. The main goal of the FPS is to collect household-level data to evaluate the impact of WtM training on farmers' practices, production, and income. The survey covers the following domains: household composition, farming and irrigation practices, trainings, credit, crops produced and sold, income, and consumption. MCA-Armenia contracted with AREG to field the FPS baseline surveys in 2007-2008. The FPS was subsequently conducted in 2008-2009 and 2010-2011, covering just fewer than 5,000 farming households each year. The survey is longitudinal, with the same households targeted for interviews each year. About 80 percent of the households in the baseline round were successfully interviewed in the final follow-up survey. In the final round, 1,131 respondents reported receiving any credit, and 115 of these respondents—around 10 percent of all credit recipients—received credit through the MCA credit program. Credit recipients reported the date they received credit, the purpose of the credit, the credit amount, interest rate, maturity, and whether they were on schedule with repayments.

Table 1 illustrates a potential use of baseline and final follow-up FPS data to explore differences between WtM credit beneficiaries, other credit holders, and farmers who reported no credit history in the 2010-2011 FPS.² This table will provide insight into whether WtM credit beneficiaries were systematically different from non-beneficiaries on several demographic characteristics, whether WtM credit conditions were unique, and whether WtM credit was used for different purposes than non-WtM credit.

² We place less emphasis on using data from the 2008-2009 FPS because it does not capture the receipt of MCA credit in 2010 and early 2011. Comparing baseline and final follow-up data increases the sample of MCA credit recipients, and provides a larger time window to measure outcomes in investments, production, and income.

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Table 1. Farmer and Credit Characteristics, by Credit Receipt (Percentages Unless Otherwise Indicated)

	WtM Credit Recipients	Other Credit Recipients	Non-Credit Recipients
Baseline Farmer Characteristics^a			
Female			
Age			
Less than 40			
40-49			
50-59			
60 and older			
Education			
Less than secondary			
Secondary			
More than secondary			
Average land devoted to agriculture			
Average farming expenditures			
Average net agricultural income			
Average non-agricultural income			
Credit Characteristics			
Credit awarded in:			
2008			NA
2009			NA
2010			NA
Purpose of credit			
Greenhouse			NA
Cold storage			NA
Dry fruit			NA
Equipment			NA
Other			NA
Average credit amount			NA
Average interest rate			NA
Average maturity			NA

Sample Size

Source: 2007-2008 and 2010-2011 Farming Practices Surveys (FPSs).

^a Because variables related to land, expenses, and income could be affected by the availability of credit in follow-up years of the FPS, we report baseline values from the 2007-2008 FPS. Baseline values allow us to compare WtM credit beneficiaries and non-beneficiaries before credit receipt.

In addition, we will explore the possibility of using baseline and final follow-up FPS data to estimate the impact of MCA credit on key outcomes of investment, production, sales, and

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income. To construct these estimates, we will use regression modeling, in which MCA credit recipients are compared to other farmers in their WUAs who did not receive MCA credit.³ For this analysis, we will restrict the FPS sample to farming households in the same WUAs as credit recipients, as they are likely to have been exposed to similar agricultural and market conditions. However, there may still be observable differences between households that received credit from MCA funding and those that did not. We will control for key observable measures in the baseline FPS to reduce bias due to observable differences. We will systematically select this set of baseline characteristics that will be included in the regression from the baseline measures available, such that the regression model maximizes statistical precision and minimizes bias.⁴

Table 2 illustrates potential comparisons we can make between MCA credit recipients and this comparison group of farmers regarding their practices, investments, production, and sales in 2010, after controlling for baseline characteristics.⁵ Importantly, the comparison group includes both farming households that received no credit and those that received credit from other sources. Thus, the impact analysis is designed to assess the impact of MCA's credit program above and beyond the credit opportunities already available to Armenian farmers.

³ Additional comparisons are possible with FPS data, including the comparison of MCA credit recipients to recipients of non-MCA credit. This comparison between MCA credit recipients and recipients of non-MCA credit could provide insight into the differential impact of MCA credit versus any other type of credit on farmers' investments, production, and income. For example, if FPS data show that MCA credit was, on average, smaller and used for different purposes than non-MCA credit, this would allow us to assess if these MCA loans were indeed used for their intended purposes. A comparison of outcomes of MCA beneficiaries versus other credit holders (controlling for farmer characteristics) could yield interesting results regarding the added value of MCA credit in particular.

⁴ Alternatively, we could use statistical matching to account for observable differences between MCA credit recipients and the comparison group. However, ongoing work by Fortson (not yet released) suggests matching does not appreciably reduce bias, and correctly implementing statistical matching procedures is very time-intensive. Given the data limitations for the quantitative analysis of the credit component, we consider the regression model described here to be more cost-effective than statistical matching.

⁵ All comparisons and significance tests are contingent on sufficient sample sizes. Some MCA credit recipients may have received credit in 2010, and thus would not have time to generate tangible economic benefits through use of MCA credit. Depending on the analysis, we will consider whether to include these credit recipients in the analysis sample.

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Table 2. Agricultural Practices and Outcomes, by Credit Receipt (Percentages Unless Otherwise Indicated)

	MCA Credit Recipients	Did Not Receive MCA Credit	Difference	p-Value
Average amount spent on:				
Fertilizer and pesticides				
Irrigation payments				
Hired labor and hired equipment/tools				
Taxes and duties				
Seeds				
Producer reported the following farming practice:				
High-value crop production				
Crop change based on demand				
Establishing a greenhouse				
Producing nontraditional crops				
Producer reported the following irrigation practice:				
Drip irrigation				
Siphons				
Sprinkler irrigation				
Modified furrows				
Average tons produced:				
Grains				
Tomato				
Fruit and nuts				
Vegetables and herbs				
Potato				
Average value of agricultural production (AMD)				
Average agricultural sales (AMD)				
Average household income (AMD)				
Average household consumption (AMD)				

Sample Size

Source: 2007-2008 and 2010-2011 Farming Practices Surveys (FPSs).

II. INSTITUTIONAL STRENGTHENING SUBACTIVITY (ISSA)

Background. The primary objective of the ISSA is to improve WUAs’ managerial, technical, structural, and financial capacity. This enhanced capacity will allow WUAs to manage irrigation systems more efficiently and autonomously, and reach a level of financial sustainability in terms of revenues and operating costs. Strengthened WUAs can more effectively operate and maintain the irrigation infrastructure, thus ensuring reliable water supply and

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supporting rural agricultural development. To strengthen WUAs, the implementing organization for ISSA, VISTAA, has provided technical assistance on improved irrigation water delivery services, increased water fee collection rates and accounting capabilities, improved irrigation infrastructure maintenance, and improved reporting capacity to the Armenian government. VISTAA has also provided material assistance to WUAs in the form of office equipment and heavy machinery. In addition, some WUA staff had the opportunity to participate in study tours of irrigation systems in the U.S. and Europe. Also under ISSA, VISTAA and other implementing partners developed a national policy paper for the Armenian irrigation sector. This paper became the basis for the irrigation reform strategy developed by AVAG Solutions, modified through a participatory process with stakeholders, and approved by MCA-Armenia's governing council. The subactivity was launched in October 2008 and will be completed in October 2011.

Most ISSA activities have involved direct in-service training and technical consultations for the 44 WUAs and their water users. VISTAA and WUA representatives have met periodically to compose WUA/WSA needs assessments, form management improvement plans (MIPs), and implement goals or milestones enumerated in MIPs.⁶ As a reward for meeting key milestones, WUA staff have received material assistance in the form of furniture, computer equipment and software, water measurement equipment, and heavy machinery donations. VISTAA staff also organized meetings between two or more WUAs, so that WUA staff can share their experiences with MIPs, computer software, or any other aspect of the intervention, and learn from one another interactively.

Of the 44 WUAs receiving assistance under the ISSA, 8 were selected for intensive assistance by the project management. These 8 WUAs were originally targeted with an intention of creating a federation of WUAs and they received more consultations and technical assistance from ISSA implementing partners than the other 36 WUAs. Consultations with the targeted WUAs started in late 2008 and were conducted twice a month in 2009, as compared to one consultation every three months for non-targeted WUAs.

Research Questions. Based on our research framework and conversations with MCC staff, we have developed the following research questions for the ISSA:

1. **How was the ISSA implemented?** What types of WUAs did the program target for more intensive assistance, and how were they identified? How did farmers in targeted WUAs differ from farmers in non-target WUAs? Did the ISSA meet its

⁶ MIPs are action plans that serve as the basis for each WUA's strengthening efforts. The MIP outlines the WUA's strengths, weaknesses, and concrete objectives that must be achieved to improve the organization's administrative, technical, and financial capacity.

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targets in terms of the number of WUAs assisted? How were study tour, irrigation policy, and consultation components implemented?

2. **Did the ISSA have the intended effects?** Did the program improve WUA management, irrigation service fee collection, dispute resolution, and cost recovery? Have behaviors changed among farmers and WUA administrators that will promote the maintenance of rehabilitated infrastructure? What types of effects might the irrigation policy generate? Are the benefits of the ISSA sufficiently large to justify the costs?

Qualitative Data Sources and Analysis. To answer several questions about ISSA implementation, we will use the **ISSA QPA Report**. This report, written in 2011 by Socioscope, examines the extent to which the ISSA activities were implemented and how well they were implemented. The report covers the following main ISSA programmatic components: management support, equipment and software support, sharing experiences, policy and legal reforms, and the creation of WUA federations. The report also documents project challenges and successes, as well as the sustainability of several ISSA outputs. To inform their analysis, Socioscope conducted more than 70 in-depth interviews and focus groups with beneficiaries, program implementers, and managers.

To gather additional information on implementation and intended effects of the ISSA, we will conduct separate **in-person interviews** with MCA staff, VISTAA staff, and an AVAG representative who contributed to the irrigation policy reform strategy. During interviews with MCA and VISTAA, we will obtain staff members' perspectives and information they may have to help determine whether the program improved service fee collection, dispute resolution, and cost recovery. We will also inquire about behavior changes among WUA staff and members that could influence the sustainability of WUA infrastructure and operations. In meetings with VISTAA and AVAG representatives, we will gather information about the irrigation policy reform component, including how key elements were implemented and what its intended goals are.

In addition, we expect to use qualitative data related to the ISSA from focus groups and in-person interviews conducted for MCA's **CCR**. In July and August 2011, MCA contractors will interview several groups of water users as well as WUA directors and representatives. Focus groups with water users will cover topics including awareness of irrigation improvements, membership and water use fee collection, participation in WUA events and dispute resolution committees, farming practices, and agricultural sales. Interviews with WUA directors and representatives will cover topics including recent irrigation infrastructure improvements in their communities; VISTAA consultations; software, furniture, and equipment donations; interactions and events with water users; membership and water fee collection; and the dispute resolution committee. MCA will provide us with these qualitative findings in September or October 2011, and we will incorporate these respondents' accounts with our findings from in-person interviews with MCA, VISTAA, and AVAG representatives.

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We will organize all qualitative information according to our research questions and sub-questions, and analyze common themes and conflicting reports from respondents. We will also summarize the essential characteristics of the ISSA component—including objectives, budget, target population, implementation targets, and whether these targets were met—in a table format for easy comparison with other WtM components.

Quantitative Data Sources and Analysis. To answer questions about WUA characteristics and cost recovery, we will use the **WUA administration survey**. AVAG Solutions administered this survey to administrative staff in all 44 WUAs served by ISSA. The survey covers the following domains: WUA characteristics, infrastructure and technical capacity, human resources, office space and equipment, water intake and delivery, WUA finances, and institutional arrangements. The survey was administered in person to WUA staff during 2008, 2009, and 2010, and will be administered again in late 2011.⁷

To explore possible effects of the ISSA on cost recovery, we will use data from the three WUA administration surveys to analyze how the 44 beneficiary WUAs' reported expenditures and revenues changed from 2008 to 2009, as well as from 2009 to 2010 (Table 3). A positive change in WUAs' average net revenues from 2008 to 2010 cannot be interpreted as a direct result of the ISSA as other changes, such as government regulations or changes in WUA leadership, might have influenced observed outcomes. Nonetheless, measuring the average change across WUAs will offer insight into their potential to achieve long-term financial sustainability, a key objective of the ISSA.

⁷ Because the last WUA administration survey will be fielded in late 2011, 2011 data will be unavailable for this analysis.

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Table 3. Expenditures and Revenues of 44 WUAs Receiving ISSA Assistance (Averages, in AMD)

	2008	2009	2010	2008-2009 Change	2009-2010 Change	2008-2010 Change
Revenues						
Total Revenues						
Membership fees						
Irrigation water charges						
Other revenues						
Expenditures						
Total Expenditures						
Wages and salaries						
Water payments						
Transportation						
Energy costs						
Other expenditures						
Net Revenues (Revenues minus Expenditures)						
Sample Size						

Source: 2008, 2009 and 2010 WUA Administration Surveys.

To answer questions about farmer characteristics, irrigation service fee collection, dispute resolution, and farmers' interactions with their WUAs, we will use the Water User Survey. The main goal of the survey is to collect data on water user households at three key points during ISSA implementation to evaluate intended effects of the subactivity. The survey covers the following domains: WUA membership and contracts, dispute resolution with the WUA, irrigation service fee collection, and WUA representative elections. AVAG Solutions conducted the survey in 2009 and 2010 among households in the geographic service area of WUAs served by the ISSA, and will conduct a final follow-up survey in late 2011. The total number of surveyed households in 2009 was 1,420 (480 for targeted WUAs and 940 for non-targeted WUAs), and the 2010 and 2011 surveys featured (or will feature) a similar number of surveys for targeted versus non-targeted WUAs.⁸ Under the survey's methodology, all targeted WUAs were surveyed in both 2009 and 2010, but only a sub-sample of non-targeted WUAs was surveyed in both 2009 and 2010.

⁸ The Water User Survey did not interview the same households in each round of data collection. Rather, a unique sample of households was surveyed in each round of data collection. This contrasts with the FPS, which largely surveyed the same core sample of households at three points in time.

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As illustrated in Table 4, we can use baseline and 2010 follow-up data from the Water User Survey to analyze outcomes of farmers in the targeted and non-targeted WUAs that received ISSA assistance.⁹ The change in outcomes from 2009 to 2010 among farmers in beneficiary WUAs can provide insight into whether farmers experienced improved irrigation and WUA outcomes in 2010 as a result of ISSA technical and material support. However, this sample of farmers will be restricted to WUAs that were surveyed in both 2009 and 2010: all targeted WUAs, but only a sub-sample of non-targeted WUAs.¹⁰ Baseline and follow-up data for each WUA is necessary to control for agricultural, economic, and institutional characteristics related to WUAs and their geographic regions that could affect key outcomes.

Table 4. Reported Outcomes of Farmers in the ISSA Assistance Area (Percentages Unless Otherwise Indicated)

	2009	2010	2009-2010 Change
WUA member			
In last year, respondent:			
Fully paid for irrigation water			
Partially paid for irrigation water			
Did not pay for irrigation water			
Total value in arrears on irrigation charges (average)			
Had a dispute with the WUA			
Among those reporting a dispute, the dispute was resolved			
Paid a WUA membership fee			
Among those paying a fee, average amount of membership fee			
Had a contract with the WUA			
Had a village WUA representative			
Participated in at least one WUA meeting			
Sample Size^a			

Source: 2009 and 2010 Water User Surveys.

^a The sample includes all targeted WUAs, but only those non-targeted WUAs represented in both rounds of data collection.

⁹ The 2011 Water User Survey is probably the optimal data source to measure the changes in relevant outcomes over ISSA's entire implementation period. However, we will not have access to these data until early 2012. In future discussions with MCC, we will discuss the value of waiting until 2011 data are available to conduct this analysis.

¹⁰ Depending on how many non-targeted WUA's overlap across the two surveys, we will assess whether it is feasible to conduct separate comparisons for the targeted and non-targeted WUAs.

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III. POST-HARVEST PROCESSING AND MARKETING (PPM) SUBACTIVITY

Background. The strategic goal of the PPM Subactivity is to present and expand beneficiaries' post-harvesting technologies and opportunities, including preservation, processing, and marketing. By the end of the Compact, 225 small and medium agribusinesses will directly benefit from this activity.¹¹ Implemented by ACDI/VOCA, PPM assistance is provided at both the enterprise level and the industry level. At the enterprise level, beneficiary organizations are trained on business and financial analysis; commercial linkages; processing technologies and practices; sorting, packaging, and storing principles; food safety; quality management systems; and linkages between consolidators, processors, marketers, and farmers. PPM assistance mainly targets processing companies for assistance, but "informal" groups of farmers have also been offered training in processing and marketing techniques.

PPM assistance at the industry level includes introducing general food safety and quality assurance standards, as well as providing assistance in establishing fruit and vegetable collection points and consolidation centers, which can become an important link in the post-harvest value chain. In addition, the PPM features other activities, including a "Buy Armenian" campaign and the ARMIS information system. The campaign was held from October to December 2009 and included television commercials, press conferences, and other events to market domestic Armenian agricultural goods. The ARMIS information system provides market prices for 64 agricultural products in three large Armenian markets, as well as several wholesale and retail markets.

Research Questions. Based on our research framework and conversations with MCC staff, we have developed the following research questions for the PPM Subactivity of the WtM Activity:

1. **How was the PPM Subactivity implemented?** What types of enterprises did the program target, and how were they identified? Did the component meet its targets in terms of number of enterprises/groups assisted? What mid-course corrections were made following the feedback from the QPA report? How many consolidation centers and collection points were implemented under the Subactivity?
2. **Did the PPM Subactivity have the intended effects?** Did the program lead to the use of new practices by enterprises? Which practices were adopted with the most frequency among enterprises versus farmer groups? Did the program improve

¹¹ According to the Compact, the number of agribusinesses to be assisted was 300. After the revision in January 2009, the number decreased to 225.

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enterprise profitability? Did farmer groups that were created for the purpose of receiving technical assistance continue after they received the assistance? Are consolidation centers and collection points functioning effectively? Are the benefits of the PPM sufficiently large to justify the costs?

Qualitative Sources and Analysis. To answer questions about PPM implementation and intended effects, we will use the **WtM QPA Report**. The QPA report covers the following domains for the PPM Subactivity: program objectives, beneficiary needs and service provision, strengths and weaknesses of implementation, beneficiary expectations and satisfaction, lessons learned, and program sustainability. Related to implementation, we will use the WtM QPA report to document how beneficiary enterprises were identified, and what services were provided to each type of beneficiary (for example, commercial enterprises versus farmer groups). Related to intended effects, we will use the WtM QPA report to inform our assessment of enterprises' adoption of new practices during the first two years of PPM implementation.

To glean additional information on implementation and intended effects of the PPM, we will conduct separate **in-person interviews** with relevant MCA staff and ACDI/VOCA personnel. During these interviews, we will attempt to document the mid-course corrections that were made following the feedback from the QPA report, and whether the program met its revised implementation targets.¹² In addition, we will inquire into which training sessions and post-harvest practices could have the most potential to increase beneficiaries' profits; this will provide context for our quantitative analysis of practice adoption (discussed below). Also during these interviews, we will discuss whether beneficiary groups that formed to receive PPM training continued collective activities following assistance, and we will document ACDI/VOCA's work in establishing collection and consolidation centers.

In addition to the in-person interviews with MCA and implementer staff, we will also visit and interview two beneficiary enterprises. In these interviews, we will ask beneficiaries which training units were most helpful, which practices they adopted, and whether these practices have led to enhanced business outcomes. This information will facilitate a more nuanced analysis of the relationship between specific practices and beneficiaries' production, sales, and income.

In addition, we expect to receive qualitative data related to the PPM from in-person interviews conducted for the MCA's **CCR**. In July 2011 and August 2011, MCA contractors will interview some beneficiary farmer groups, enterprises, and collection center owners on topics

¹² Many implementation changes were made following the QPA report, which found that various aspects of the PPM were not implemented well. As a result, the PPM Subactivity requires more qualitative follow-up data collection than the other WtM components.

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including their production and marketing needs, ACDI/VOCA's assistance, and production and sales following assistance. MCA will provide us with these qualitative findings in September/October 2011, and we will integrate these findings with our findings from in-person interviews with MCA, ACDI/VOCA, and PPM beneficiaries.

We will organize all qualitative information according to our research questions and sub-questions, and analyze common themes and conflicting reports from respondents. In particular, we will attempt to compare and contrast perspectives from ACDI/VOCA personnel, MCA staff, and beneficiaries regarding the utility of PPM training sessions and practices featured in these sessions. Using information from the QPA report and interviews, we will also summarize the essential characteristics of the PPM Subactivity—including objectives, budget, target population, implementation targets, and whether these targets were met—in a table format for easy comparison with other WtM components.

Quantitative Source and Analysis. To answer questions about enterprises' characteristics, adoption of post-harvest practices, profitability, and sustainability, we will use the **Enterprise Adoption Survey (EAS)**. The purpose of the EAS is to measure the use of post-harvest practices by beneficiary enterprises, farmer groups, and individual farmers. The survey covers the following domains: WUA general information, assistance provided, use of practices and business outcomes, and future plans. AREG administered the EAS from January 2010 to March 2011. The 2010-2011 EAS covers the entire universe of 212 enterprises assisted by ACDI/VOCA by September 2010. The data for the adoption survey were collected through in-person interviews based on a standardized questionnaire. The questionnaire sections administered in each interview varied according to the type of group interviewed: enterprises, farmer groups, or individual farmers.

To explore the effects of the PPM Subactivity on enterprises' behavior, we will use 2010 EAS data to measure adoption rates of several post-harvest practices covered in WtM trainings among different types of PPM beneficiaries. Table 5 illustrates potential comparisons between adoption rates of commercial enterprises, non-governmental organizations (NGOs), and farmer groups. These tabulations will help document the unique mix of post-harvest practices adopted by each type of beneficiary organization, according to their different organizational structures and processing/marketing needs.

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Table 5. Adoption Rates of PPM Beneficiaries (Percentages)

	Commercial Organizations	Non-governmental Organizations	Farmer Groups
Used market findings			
Prepared market plans			
Prepared sales forecasts			
Improved labeling			
Branded products			
Promoted products at fairs			
Sample Size			

Source: 2010 Enterprise Adoption Survey.

We will also use 2010 EAS data to document the extent to which PPM beneficiaries reported positive outcomes of several post-harvest practices. Table 6 illustrates a potential structure for measuring a variety of post-harvest outcomes, as well as the perceived role that WtM assistance played in generating these outcomes. Perceptions of the role WtM assistance played in positive outcomes cannot be interpreted as impacts—particularly because of possible biases inherent in asking a beneficiary about the value of assistance received. However, this analysis can provide suggestive evidence regarding the role played by PPM assistance in improving beneficiaries’ outcomes.

Table 6. Positive Business Outcomes of PPM Beneficiaries (Percentages)

Reported Positive Outcome	Among Those Reporting a Positive Outcome:	
	WtM Supported Outcome	WtM Hindered or Did Not Influence Outcome
Cut production costs		
Increased productivity		
Improved product/service quality		
Increased sales		
Increased profit		
Sample Size		

Source: 2010 Enterprise Adoption Survey.

In addition, we can use the 2010 EAS to determine whether beneficiary groups that formed for the training were still in operation in 2010, and whether the group members planned to cooperate in the future. We can inform these quantitative findings with qualitative observations from ACDI/VOCA personnel provided during in-person interviews.

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IV. RECALCULATING ECONOMIC RATES OF RETURN

We will attempt to calculate ex post estimates of the ERR based on the estimated impacts of the WtM subactivities. We anticipate that this will be more straightforward for the subactivities for which we have rigorous quantitative impact estimates such as training, because tabulating the estimated benefits of the subactivity should be easier. (The training subactivity's evaluation design is not covered in this design memo, but the findings from that evaluation will be included in the same report. The costs of the credit component will be integrated in the ERR for training subactivities.)

For several of the subactivities for which the evaluation will primarily be qualitative, however, we may need to rely more heavily on modeling of the possible benefits of the program. This is particularly true for the PPM subactivity, for which we will have few tangible quantitative estimates of the economic impacts of the program to use in the ERR model. In these cases, we will update the ERR models to the extent possible or explain why the ERRs could not be updated in an informative way.

Additionally, though ISSA is classified as part of the WtM activity, its role is largely to complement the Irrigation Rehabilitation Activity, helping WUAs manage irrigation water more effectively and sustain the infrastructure that was rehabilitated. As such, it may be more appropriate to incorporate the ISSA costs (and the benefits we anticipate they may generate) into the irrigation ERRs. We will explore this option as we update the models.

V. REPORTING

Mathematica will prepare the final WtM report in three stages. In early September 2011, we will provide a detailed report outline that describes the report's structure and planned contents. After receiving MCC's comments on the outline, Mathematica will prepare a draft report (December 2011) to share with MCC and other stakeholders and discuss in detail at two stakeholder workshops: one in Washington, DC, in January 2012 (after the draft report is complete), and another in Armenia in February/March 2012 (after the results are nearly final) with former MCA staff, implementers, data collectors, and other interested stakeholders. In these workshops, Mathematica will present the evaluation designs and results. Following the stakeholder workshops, Mathematica will incorporate feedback and prepare the final report, which we plan to submit in February/March 2012 (soon after the presentation in Armenia). The report will describe the evaluation design and data sources, and present findings and interpretation of the results. It will include an executive summary of 10 or fewer pages—available in English and Armenian—intended for a broader audience. For the stakeholder workshop in Armenia, Mathematica staff will prepare a presentation in both English and Armenian.

After the WtM evaluation report is finalized, Mathematica will conduct one or more outreach session(s) in Washington, DC with MCC staff and other interested stakeholders. These

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outreach sessions will describe the evaluation design, implementation, findings, and lessons learned. Ideally, these events will coincide with MCC's annual impact evaluation conference. We expect that the WtM evaluation outreach sessions will occur in the first quarter of 2012, after the report is finalized. Mathematica will provide MCC with materials used in outreach sessions, including PowerPoint slides. Mathematica will also provide MCC with statistical program code (and documentation for the analyses) after the WtM evaluation is complete. We anticipate that this deliverable will be submitted in March 2012. We will also provide input to MCC as needed for the development of public use files based on the FPS data.

Table 7. Key Dates for the Water-to-Market Evaluation and Report

Detailed Report Outline	September 15, 2011
Draft Report	December 20, 2011
Stakeholder Workshop in DC	January 2012 (tentative)
Stakeholder Workshop in Armenia	February 2012 (tentative)
Final Report	February/March 2012
Outreach Session(s) in DC	January 2012 (tentative)
Final Programming Code	March 2012
