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ASSESSING RESEARCHERS' AND EXTENSION AGENTS' PERCEPTIONS, AND FARMERS' WILLINGNESS TO ADOPT WLI PROVEN TECHNOLOGIES

MEAS Pilot Action Research

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Interim Report on MEAS Pilot Action Research

September 2014 to March 2015

Report prepared by Jennifer Allen

BACKGROUND

Water scarcity resulting from decreasing rainfall, climate variability, and high population growth is a major constraint to agricultural production and a condition that is worsening in dryland areas (Solowey et al., 2013). Poor water management and poor agricultural practices further exacerbate production levels, which degrade land and water quality, (Solowey et al., 2013) and leave densely populated communities even more vulnerable to food insecurity. Addressing agricultural sustainability, especially in dryland ecosystems, is paramount to livelihoods. Methods to achieve sustainability in these areas include more efficient use of limited water resources, introduction of new technologies for better water and land management, and adaption of alternative agriculture practices to respond to water shortages and fluctuations in water demand and supply.

The Water and Livelihoods Initiative (WLI), a USAID-funded regional program, is one such program that specifically targets the above goals in dryland areas. It is managed by ICARDA and operates research benchmark sites in Egypt, Iraq, Jordan, Lebanon, Palestine, Syria, Tunisia and Yemen in the three predominant agro-ecosystems (rangeland, rain-fed, and irrigated) of the region.

The WLI aims to improve rural smallholder farmers' livelihoods through new agricultural technologies and practices that integrate better water and land management strategies into production. By way of research, design, and pilot testing, research teams in the benchmark sites now collectively have a wide array of technologies and practices that combat agriculture-related problems common to the region, such as agricultural water demand, water use efficiency, land degradation, production efficiency, and yields. Despite having technologies and practices (hereinafter "technologies") with proven results at pilot sites and holding demonstrations and field days, on the whole, adoption rates for these technologies remain low.

Low adoption, however, is not a phenomenon limited to WLI technologies. The global backdrop is one with low technology adoption rates (*e.g.*, Moser & Barrett, 2003; Shiferaw et al., 2015, Bold et al., 2015)[1]; meanwhile, technology diffusion is considered an important means for poor countries to develop and grow their economies (Foster & Rosenzweig, 2010). Adoption is often incomplete and underutilized in the places and with the people who stand to benefit the most. This same backdrop is also one where food security and poor nutrition have been on the rise due to farmers' challenges with low productivity, post-harvest losses and inaccessible markets – challenges that are intensified due to climate change. *Willingness to Adopt* is therefore timely.

The motivation for the study stemmed from WLI's desire to learn why farmers were not adopting their technologies as anticipated. It was thought that out-scaling efforts were possibly weakened by factors that include the lack of sufficient plans for dissemination and low extension engagement. It was also posited that characteristics of the technologies (*e.g.*, design, cost and/or Rogers' 2003 factors: observability, relative advantage, compatibility, complexity, and trialability) might be limiting adoption

[1] Local examples include grey water and the hydraulic injector fertigation technologies, which have had lower than anticipated adoption in Jordan.

because either the technology was not suitable for farmers' needs or abilities, or perhaps farmers' were lacking the knowledge base necessary to make informed decisions concerning adoption.[2]

Through this study, we learned about the current practices and perceptions concerning WLI technologies and now better understand farmers' adoption processes. Specifically, this study looks at three stakeholder groups: researchers, extensionists, and farmers in the benchmark sites of six WLI countries. The research helped teams recognize strengths, weaknesses, and opportunities for improved delivery of technology packages to increase adoption rates. The study's overall objective was to improve dissemination strategies and approaches to promote WLI technologies by identifying stakeholder perceptions and constraints to adoption. Strategies to overcome perceived barriers are important to agricultural value chains and farmers' livelihoods, and although the study sample is admittedly small,[3] uncovering common themes in the region ultimately informed technology dissemination strategies[4] and enhanced rural, smallholder livelihoods in accord with WLI's mission.

Project: Assessing Researchers' and Extension Agents' Perceptions, and Farmers' Willingness to Adopt WLI Proven Technologies ("Willingness to Adopt").

Purpose: The purpose of this report is to provide a report to the donor for the subject study initiated in September 2014.[5]

Partners: University of Florida (UF), International Center for Agricultural Research in the Dry Areas (ICARDA), the National Center for Agricultural Research and Extension, Jordan (NCARE), and National Agricultural Research and Extension Services (NARES) teams in Egypt, Lebanon, Iraq, Palestine (West Bank), and Tunisia.

[2] The political instability in certain WLI countries and in the region as a whole also further exacerbates researchers' efforts to connect with farmers and their attempts to regularly visit certain sites such as in Syria, Lebanon, Iraq, the West Bank, and now likely Yemen.

[3] The country NARES teams are generally small. Per country team there are approximately six or fewer researchers, from one or more institutions.

[4] "Hardware" and "software" strategies pursuant to Rogers' (2003) definition, to achieve full use of an innovation.

[5] The no-cost extension allowed concluding workshops to be held when researchers were in Amman, Jordan, concurrently with WLI's annual meeting in November 2015.

The table below identifies the countries involved in this study, the specific technology,[6] benchmark site, and agro-ecological condition within each country:[7]

Country	Technology	Benchmark site	Agro-ecosystem
Egypt	Mechanized raised bed (MBR)	Shakira Governorate	Irrigated
Iraq	Subsurface drip irrigation in protected agriculture	Abu Ghraib	Irrigated
Jordan	Marabs/contour ridges	Majedidh	Rangeland
Lebanon	Conservation agriculture (CA)	El' Qaa	Rainfed
Palestine	Silage	Nassarya and Taman	Rangeland
Tunisia	Devising a policy for Regulated deficit irrigation (RDI)[8]	Beni Khled, Nabeul Governorate	Irrigated

METHODOLOGY

The data collection consisted of qualitative and quantitative methods with targeted, key informant interviews (KII) from the three stakeholder groups: farmers, researchers, and those who work in extension and advisory services (EAS) – "extensionists" – in the benchmark sites. Structured questionnaires were designed and used for each group. The research teams provided input as to questions and translation while the questionnaires were being refined (September-October 2014), and modified the farmer questionnaire for their specific technology/context.

Survey Period

Researcher and Extensionist Questionnaires

Data was collected from mid-November 2014 to March 2015. Thirty NARES researchers (10 female/20 male) and 15 extensionists (3 female/12 male) working in WLI benchmark sites in the six countries of this study were interviewed. The structured questionnaires included a variety of qualitative and quantitative questions. Sub-parts often accompanied questions to obtain a quantitative rating using a Likert-type scale, whereas quantitative questions elicited narrative responses.

The majority of the researchers who were interviewed were applied, biophysical researchers. Questions covered a broad range of topics concerning technology-development processes, challenges, interactions with farmers and extensionists and other organizations, support systems, and recommendations on the aforementioned topics. Extensionists were asked fewer questions in total, some of which paralleled the

[6] Each country's NARES team chose one technology that it thought was both proven and ready for out scaling.

[7] UF, ICARDA, and MEAS were joint funders of this study, with other USAID grants or agreements covering some countries' participation.

[8] Instead of promoting a technology, this research team is attempting to understand farmers' reluctance with scheduled irrigation and encourage the government to adopt a policy involving RDI. After obtaining results, their next step is to promote RDI.

researchers' questions, while others sought to elicit information on their daily duties/field interactions, access to information, role in technology development, barriers in their job, and their perceptions on farmers in their site.

Interviews were generally conducted on a one-on-one basis, in person. Skype was used for some interviews with the Iraq team because the security situation did not permit travel there to conduct in-person interviews. One survey was returned via email. A few times, a focus group discussion (FGD) was used when it was not possible to conduct individual interviews due to timing/scheduling. In these instances, only one data point (for quantitative data) will be accounted for. A couple of informal, unstructured key informant interviews were also conducted for background information.

Farmer Questionnaire

From January 2015 onward, the NARES teams in each benchmark site interviewed farmers with various exposures to, and therefore, various perspectives on, the specific technology. Their goal was to interview 30 farmers who have used the technology (either served as a pilot site, attended a field day, or adopted it), and 30 who were not familiar with the technology. The farmer questionnaire is comprehensive, including sections devoted to socio-economic conditions, crops/rangeland details and corresponding inputs, marketing, availability of water sources, access to credit, engagement in community based organizations, farmers' knowledge of new technologies, challenges, and 12 criteria for technology adoption.

Prior and contributing events

While the official MEAS funding for this study began in September 2014, prior to that, in June 2014, ICARDA funded Jennifer Allen to conduct five days of informational scoping at the Jenin, Palestine benchmark site, where she met with National Agricultural Research Center (NARC) researchers, the Applied Research Institute, Jerusalem (ARIJ, a NARES partner), farmers (sheep breeders), and farmer cooperatives. There, she identified factors that might affect adoption (of silage in this context) and dissemination strategies and pilot-tested possible questions with the above groups (*see* Allen, 2014). From June until September 2014, the Concept Note for this study was drafted and refined, in part from information gleaned from that mission.

Additionally, at least two members of each country team participated in an interactive, two-day WLI-funded (in collaboration with NCARE, Jordan) Cost-Benefit Analysis Workshop on June 24-25, 2014. The teams were introduced to general concepts on the economics of natural resource management and decision making. Calculating cost benefit measures provided the researchers with a new perspective – one that exposed them to some of the monetary factors that a farmer in their benchmark site might consider in his/her decision to adopt the new technology. Using the Adopt Software[9], they gained further insight into the socio-economic factors that might affect adoption of the specific technologies with their target beneficiaries.

[9] This program evaluates and predicts adoption levels using structured questions based on socio-economic factors that typically influence adoption of new agricultural innovations.

The month of June also saw the conclusion of the Middle East Partnership Initiative (MEPI)-funded "Peer to Peer Training to Promote Participation and Prosperity Project," led by NCARE's Dr. Samia Akroush. The twenty women (from three different cooperatives) who had completed the 11 training courses of that project were honored at a graduation ceremony. University of Florida's Jennifer Allen and Nargiza Ludgate were in attendance. This project had a MEAS-funded, University of Florida study component entitled *Extension and Advisory Service Delivery for Women's Groups in Jordan: Assessing Competencies and Building Social Capital.* The final focus group discussions for that study also took place in June 2014.

PRELIMINARY FINDINGS

Broadly speaking, the researcher and extensionist questionnaire findings to date may be classified into three categories:

a. Current practices: processes for technology development, extension's involvement, concept of research for development (R4D), and limitations to implementing research;
b. Stakeholder views: researchers' and extensionists' perceptions on farmers' knowledge, farmers' perceived barriers to adopt; perceptions on working with female farmers; researchers' perspective on their role in technology dissemination; and
c. Communication and dissemination: researchers' interaction/communication with EAS, extensionists' communication with farmers, and extensionists' perspectives on researcher-farmer interaction.

A few highlights from each category are discussed below:

Current Practices

- Researchers believed they consider farmers' needs when developing new technologies. On a scale of 1 to 5 (1 = never; 5 = always) rating how frequently farmers' needs are considered, no researcher answered lower than a 3, and the majority responded with "always." Narrative responses to this question expressed that convincing farmers with certain research objectives is not always easy, but conversely, in some sites (*e.g.*, Jordan), researchers expressed that farmers were very receptive or even sought them out, eager to serve as pilot sites because previous results rendered increased yields. Despite researchers believing they "always" considered farmers' needs, research priorities (often dictated in the national/strategic plan) and donor/funding or budget availability were the main drivers behind research interests and decisions.
- Social networks and researchers' personal relationships – where they had previously built trust – proved relevant to the current technology development. Often, it was farmers with whom researchers had an existing relationship who were used for piloting purposes.
- Most of the extensionist respondents knew about the technology, even if they were not personally involved with it. Extensionist respondents generally reported that they or their institutions had a low level of involvement with the technology development process. Instead, extension became involved "after a good result" was obtained or in the post-experimental ("second") phase.
- Extensionists said researchers were their main source of information on new technologies.
- While the utility of research for development (R4D) was recognized, as well as the ability to model experiments based on results in other countries, the need for publications still lingered for some researchers, and for some, the R4D concept seemed elusive.
- Concerning limitations they face in delivering new technologies to farmers, extensionist respondents expressed challenges relevant to their jobs, such as needing time and proper

training to 1) convince farmers of new technology; 2) be able to effectively communicate with farmers -- how to simplify and clarify the technology so farmers can easily understand it; 3) how to gain/build farmers' trust; and, 4) the impact of the lack of extension agents. Many answered similarly to researchers, citing funding, inability to reach more farmers (time, transportation), and farmers' resistance/risk aversion in their list of challenges. Gaining the farmers' trust/lack of farmers' trust in extensionists, was the most frequently cited limitation.

Stakeholder Views

- Researchers were asked (on a scale of 1 to 5, 1 = extremely poor knowledge; 5 = excellent knowledge) whether they thought farmers knew about newly developed technologies, and whether farmers knew about the specific technology in their benchmark site. Researcher respondents were reluctant to generalize, and believed that farmers' technological knowledge depended on a number of factors, such as the size of the farm (some researchers thought smaller farmers would not be very knowledge, whereas a larger cooperative would be aware of new technologies from interactions with researchers or extensionists), location of farms (those who live closer to research site or station were thought to know more because they would be better exposed through field days), education level (which was thought to influence access to information), success of the technology, and economic status of area.
- There was agreement between researcher and extensionist respondents regarding farmers' (low-average) knowledge of the specific technology.
- In most countries there was no formal system in place for farmers to ask researchers questions. Instead, researcher respondents described the system as more informal; if farmers had problems they would seek assistance. An underlying assumption here is that farmers' were familiar with the research institution or knew researchers from previous interactions. Narrative responses sometimes included extension in this process, with researchers saying they thought farmers relayed problems to extensionists, who would then consult with researchers if they were unable to provide assistance themselves.
- Researchers perceived that farmers' biggest barrier to adopting new technologies stemmed from their lack of awareness, reluctance to shift from traditional practices, and low technical capacity and education.
- There was discord with qualitative and quantitative responses concerning whether researchers tried to work with female farmers, and their views on its importance. There could be bias in response to this question as the interviewer was female.
- Regarding whether men/women have equal access to new agricultural technology information, extensionists' narrative responses raised salient points stressing that it was not just the availability of the information but *who* actually benefitted from it and *how* (*e.g.*, by being able to attend field days). This is important for devising effective dissemination strategies.

Communication and Dissemination

- Regionally, researcher interaction with extensionists was low; however, the quality of interaction was highly dependent on the location. In places where researchers had some interaction with EAS, it was viewed as an important go-between for farmers and researchers. According to researcher respondents, extension's role should include serving as front line communication with farmers, being active in the field, knowing about farmers' problems in the region, transferring results to farmers, and resolving problems with the research center (when extension is unable to resolve farmers' problems on their own). In some countries, however, researcher respondents could only speculate as to what extension might do there because they have no link with them.

- On the whole, researcher respondents did not describe or rate their interaction with extension as frequent, but they did say that interacting/communicating with extension was "extremely important" (5 on a Likert scale).
- The few number of extensionists in some countries causes researchers to play dual roles, serving as both researcher and *de facto* extension. This likely implicates researchers' efficiency and detracts attention from other research objectives.
- Key issues include how to maximize and incentivize researcher-extension relationships (especially in the face of limited extensionists and perceived challenges amongst farmer and research groups), and how to provide extension with timely, simple, and valuable information to disseminate to farmers.
- Representation of the actual number of female extension agents was not able to be determined through this study. The information could be available through other sources (*e.g.*, if published by the government). Researchers in most countries thought there were more male extensionists, said they spoke to whoever was available, and did not make special efforts to interact with female extensionists.
- Gaining farmers' trust and being properly equipped to talk to farmers were problems some extensionists expressed. Establishing a good reputation through precise messaging and using it as a springboard to build trust with farmers was described as a basis for information transfer (and farmers' consideration to adopt new practices). Without a doubt, gaining and keeping farmers' trust is essential for knowledge transfer.
- Relevant to possible dissemination strategies, extensionists were asked what they thought was the best way to communicate information on new technologies to farmers and raise their awareness. Most suggested face-to-face, hands-on learning through such things as field days/demonstrations or field schools. This is important because extensionists said, "farmers want to see to believe." Holding such events at harvest time was suggested as a way to show farmers first-hand increased yields resulting from new technologies.
- Media campaigns, cell phone messaging, pamphlets, and other materials were thought to be somewhat useful too, if farmers had the requisite literacy. Using "key farmers" for F2F dissemination was also a common practice in some of the benchmark sites.

CONCLUSION

In addition to the above, a few other themes have emerged thus far from researcher and extensionist interviews. For example, technology sustainability beyond a season was mentioned as necessary for making lasting change, and improving smallholder livelihoods. WLI initiatives – like many donor projects – provide subsidies and inputs assistance for piloted fields, including the free use of equipment initially. As researchers explained, farmers face their own barriers, including being risk averse and obtaining financial support when it comes to new technologies (or varieties), and as one said, "after the end of a project, we try to support farmers but can only support with machinery; it is not like during the time of a project with financial support." If farmers know that assistance is limited, it might influence their decisions to attempt to adopt, especially if they do not have the requisite means to continue on their own once support ends. Cost feasibility of a new innovation, therefore, must be something that researchers consider.

Funding, national planning, and the enabling environment appeared to be important factors that shaped project implementation, researcher capacity and overall agri-development success in countries in the region. Indeed, unless outside donor funding is secured, research goals generally must fit within the national/strategic plan's objectives. While WLI projects seemed to align with countries' goals (for example, to reduce agriculture inputs or reduce water for agriculture irrigation), site visits and the data

revealed that there were differing opinions on the suitability of WLI technologies in certain areas. This means that sometimes the technology did not necessarily align with stakeholders' views of farmers' desires and/or land use practices. Who is doing the farming, who controls decisions, who owns the land, and what ministries are involved in agriculture and water planning should also be answered questions, as these issues affect farmers' willingness and ability to adopt.

FINAL STEPS

In May 2015, the teams convened at ICARDA in Amman, Jordan for a WLI-hosted methodological workshop. Dr. Boubaker Dhehibi (ICARDA) Dr. Samia Akroush (NCARE) and Beza Dessalegn (ICARDA) lead the workshop during which the researchers learned more about research approaches to assess agricultural technology adoption, and, through practical sessions, took part in uniformly processing their data sets.

During the workshop, teams also had the opportunity to discuss collection efforts and findings from the interviews conducted to date. Commonalities and good practices for what might be working well were developed. Discussion with the researchers, as a FGD, further informed the data gathered from the researcher and extensionist questionnaires.

In November 2015, a final workshop was held, in collaboration with NCARE, to include the results of the adoption studies.

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