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External Project Evaluation of "Water efficiency and food production in Rice & Cotton" (WAPRO) project

Final Report

12 October 2022

Mandated by:

Swiss Agency for Development and Cooperation (SDC)
Section Food Systems
Ms Stéphanie Piers de Raveschoot
stephanie.piers-de-raveschoot@eda.admin.ch

Authors:

Carsten Schulz
schulz@kek.ch

Roman Troxler
troxler@kek.ch

Sophie Staheyeff
staheyeff@kek.ch

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Author: KEK – CDC, Carsten Schulz, Roman Troxler, Sophie Staheyeff

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Responsible at the client

Stéphanie Piers de Raveschoot, SDC Food Systems Section

Collaborators of the evaluation team:

KEK – CDC: Carsten Schulz, Roman Troxler, Sophie Staheyeff

mesopartner: Marcus Jenal

Ecoplan: Felix Walter

Case study Pakistan: Suwaibah Mansoor

Cas study Tajikistan: Anvar Kamolidinov

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List of Abbreviations

AAER	Adopt-adapt-expand-respond
AWS	Alliance for Water Stewardship
BCI	Better Cotton Initiative
CBA	Cost Benefit Analysis
CHF	Swiss Francs
CSR	Corporate social responsibility
ESG	Environmental, Social, and Governance
EQ	Evaluation question
FDFA	Swiss Federal Department of Foreign Affairs
GMO	Genetically Modified Organism
GPFS	Global Program Food Security of SDC
HQ	Headquarters
LNOB	Leave no one behind
M&E	Monitoring & Evaluation
NGO	Non-governmental organization
Norad	Norwegian Agency for Development Cooperation
ODA	Official development assistance
OECD/DAC	Organisation for Economic Cooperation and Development Assistance Committee
OH	Outcome Harvesting
PPP	Public Private Partnership
PSE	Private Sector Engagement
RRVCP	Regional Rice Value Chain Program (Islamic Development Bank)
SC	Steering Committee
SDC	Swiss Agency for Development and Cooperation
SDG	Sustainable Development Goal
SECO	State Secretariat for Economic Affairs
SRP	Sustainable Rice Platform
TISS	Transparency and Innovation of Sustainability Standards
ToR	Terms of Reference
WAPRO	Short form of the project title “Water efficiency and food production in Rice & Cotton” and commonly used project name
WUA	Water Users Association

Executive Summary

*"How can a **donor together with NGOs join forces with the private sector** to promote water efficiency in the production of water-intensive crops in such a way, that improving agricultural and water efficiency measures applied by **smallholder farmers is rewarded with improved incomes and food security**?"*

The "Water efficiency and food production in Rice & Cotton" (WAPRO) project of the Swiss Agency for Development and Cooperation (SDC) addressed this issue in its first (2014 – 2018) and second phases (2018 – 2022). WAPRO as an innovative multi-stakeholder project with a large number of private and civil society partners was implemented in six countries using the Push-Pull-Policy approach addressing water efficiency for smallholder farmers in cotton and rice production. Its overall goal is to enhance food security, farmers' income and water productivity for 65'000 farmer families in Pakistan, India, Tajikistan, Kyrgyzstan, Myanmar and Madagascar.

After eight years of implementation, an external evaluation commissioned by SDC assessed the results achievements of the second phase in particular and the overall impact of the project. The external evaluation is based on case studies conducted in two out of the six countries, an outcome harvesting inspired online survey with implementers and partners on self-assessing intended and unintended results, several expert interviews held online and offline and a Cost Benefit Analysis, which helps to discuss the efficiency and effectiveness of WAPRO's implementation.

The evaluation clearly shows that WAPRO is on a promising path towards achieving the target set, i.e. 65'000 farmer families increasing their incomes. Sustainable outcomes are visible thanks to innovative agricultural and water efficiency techniques applied in the 10 sub-projects. In addition, WAPRO successfully lobbied in standard organisations with large outreach such as the Better Cotton Initiative (BCI) and the Sustainable Rice Platform (SRP) so that water efficiency issues are better addressed in their standards. Impact has thus been rated as satisfactory by the evaluation team.

The WAPRO project and its interventions on all levels are seen as highly relevant. Especially the way the project addresses the issue of cotton and rice as water-intensive key commodities through the application of the Push-Pull-Policy approach on micro, meso and macro level and the inclusion of relevant stakeholders in the respective value chains.

As Helvetas Swiss Intercooperation and the implementing partners in all countries are well connected to relevant players as well as to Swiss Cooperation Offices in the countries where present, the internal and external coherence is satisfactory.

Confirmed by all parties involved, WAPRO is achieving good results at the level of famers. Family incomes have increased, and water efficiency measures are successfully implemented. The farmers' food security is only addressed indirectly and unfortunately not systematically measured in the M&E system. Effectiveness has therefore been rated as satisfactory.

The chosen project set-up with a small management team and its secretariate function ensuring overall coordination, M&E and knowledge management is seen as a very lean

and efficient project approach. However, sometimes more steering and better quality of reporting would have been desirable, which led to an unsatisfactory score for this sub-criterion. The Cost Benefit Analysis showed that the overall WAPRO budget of around CHF 27 million, which includes SDC contributions as well as contributions made by the private sector, was internalized well within the project timeframe. Having reached around 40'000 confirmed farmer families by 2021 with a relatively low budget by SDC, the interventions can therefore be ranked as overall cost-efficient. Private sector contributions having come from Corporate Social Responsibility (CSR) rather than accepting to pay higher prices for the commodities is highly criticisable.

Regarding sustainability of project interventions, the highest probability for continuation is with activities implemented by local stakeholders relating to the Push Factor. Regarding the Pull Factor, at the interface between farmers and the private sector, the potential for sustainable continuation of approaches introduced in course of WAPRO is mixed. The sustainability in the Policy area and issues related to water stewardship measures are the most questionable regarding its continuation. The different teams by Helvetas Swiss Intercooperation, as well as companies and partner organisations in the sub-projects in the WAPRO countries will without a doubt continue selected activities based on own interests and resources. Sustainability is therefore rated as satisfactory.

Because WAPRO showed the advantages of involving private sector already at design stage, the evaluation team recommends to SDC that planning further projects of this kind should be undertaken collaboratively with potential project implementers and partners (intermediaries such as NGOs and the private sector). This recommendation also includes that SDC should orientate its implementation modalities to lean, time flexible project arrangements and agile project set-ups.

1 Introduction

WAPRO ("Water efficiency and food production in Rice & Cotton") is a multi-stakeholder initiative to address water efficiency issues in agriculture. It was first implemented between 2015 and 2018 in four countries in Asia by a consortium of nine partners with a budget of about CHF 6.76 million and involving 23,600 farmers. By 2019, the project had grown to 5 countries in South and Central Asia and one country in Africa, aspiring to improve the lives of more than 60'000 farmers.

After 2 phases and a 1-year extension due to the Covid-19 pandemic, the project is coming to an end by the end of 2022 and an external evaluation was foreseen for the project. The Swiss Agency for Development and Cooperation (SDC)'s Global Program Food Security (GPFS) declares the purpose of this evaluation as an "external and objective assessment regarding the achieved results of the second phase in particular, and of the overall impact of the entire project in general". In addition, as mentioned in the Terms of Reference (ToR), "the evaluation will have to contribute to the Learning-Accountability-Steering "triangle" as specified in the SDC Evaluation Policy".

The evaluation should "provide an overall and comprehensive picture on the project results on the short and medium term as well as provide information on possible effects at the long-term including elements of impacts and sustainability."

2 Evaluation objective

The evaluation object is the WAPRO project implemented by Helvetas and related consortium partners in 6 countries (India, Pakistan, Kyrgyzstan, Tajikistan, Myanmar, Madagascar), the overall project management unit with their knowledge management and steering function based in Switzerland, and the respective 10 sub-projects, as shown in the Table 1 and Figure 1 below:

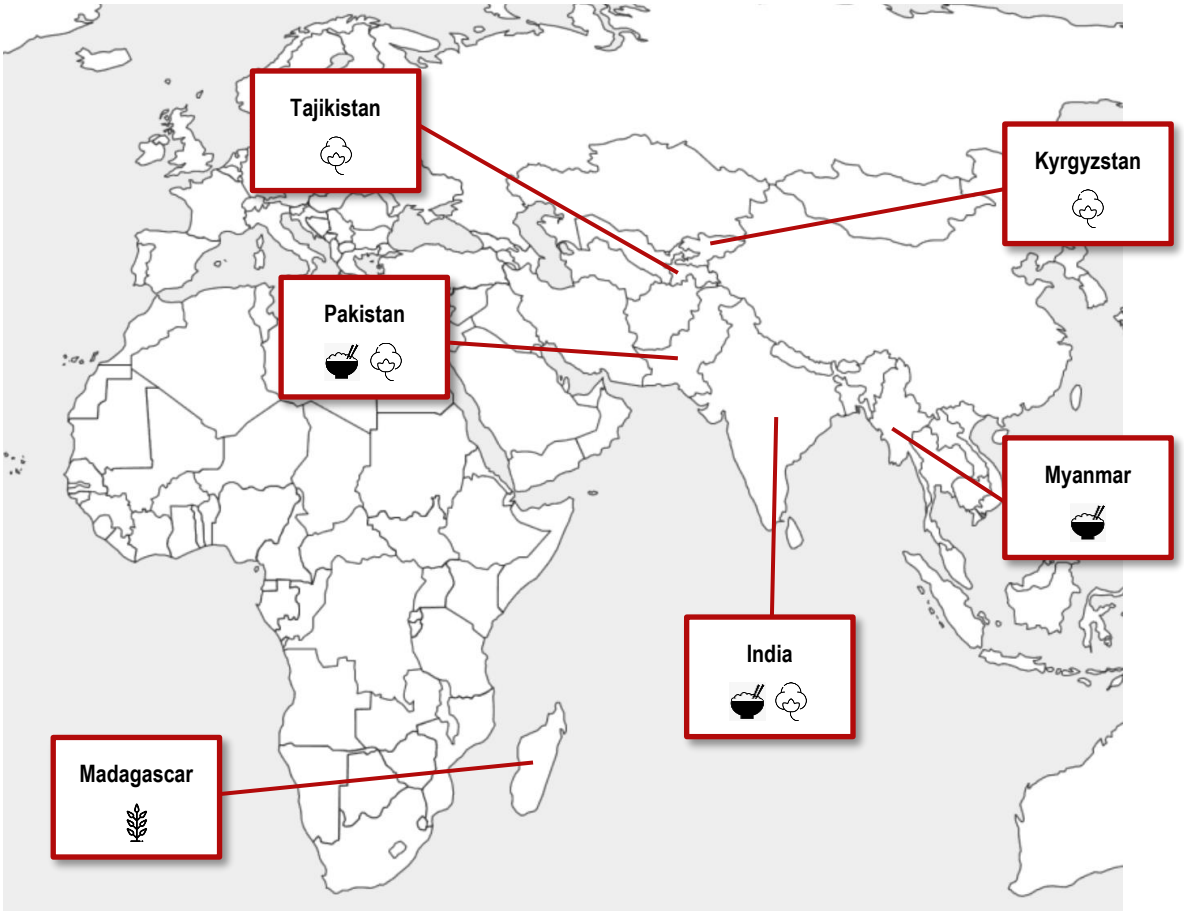
Table 1 Overview of the 10 sub-projects working in the 6 countries

Country	No	Name of Sub-project	Geographic area	Local implementing partner	Financial contributors/sponsors beside SDC	
India	1	SRP Rice India	Haryana	LT Food, PnP	Mars	
	2	Organic Rice India	Uttarakhand and Uttar Pradesh	PNP	Reismühle NUTREX, Coop Sustainability fund	
	3	BCI Cotton India	Gujarat (coastal districts)	CSPC	Tata Trust	
	4	Organic Cotton India	Madhya Pradesh	Remei India	bioRe Foundation	
Pakistan	5	BCI Cotton Pakistan	Selected districts in Punjab and Sindh	REEDs	BCI innovation fund	
	6	SRP Rice Pakistan	Selected districts in Punjab and Sindh	Galaxy, RPL	Mars, Westmill	

Kyrgyz-stan	7	Organic Cotton Kyrgyzstan	Jalalabad	IWIP	Helvetas own funds	
Tajiki-stan	8	BCI Cotton Ta-jikistan	Sughd region	Helvetas and Sarob	Helvetas own funds	
Myan-mar	9	SRP Rice Myan-mar	Shan, Mandalay, Mon	CESVI	Norad	
Mada-gascar	10	Diversified Crop Rotations Mada-gascar	Atsimo An-drefana	Helvetas	Scrimad, Bionnex, BCI	

Legend: Cotton Rice Other crops

Figure 1 Map[1] of countries in which WAPRO is active and the crops grown



The "Regional Rice Value Chain Program (RRVCP)" project mainly financed by the Islamic Development Bank and implemented in ten sub-Saharan countries (The Gambia, Senegal, Guinea, Sierra Leone, Niger, Mali, Burkina Faso, Benin, Cameroon, and Ivory Coast), is sometimes referred to as 11th sub-project. As the role of WAPRO (i.e., Helvetas and its partner Rikolto) in RRVCP is mainly related to technical assistance regarding building a solid monitoring, evaluation and learning framework based on the WAPRO lessons learned, the RRVCP program is not part of this evaluation exercise.

[1] Map retrieved from https://www.nationsonline.org/

3 Evaluation purpose and questions

3.1 Purpose of the evaluation

SDC in its ToR for this evaluation mandate defines the purpose of the external evaluation as following three overall objectives, which are:

1. To evaluate the WAPRO phase 2 according to the OECD/DAC (Organization for Economic Cooperation and Development's Development Assistance Committee) criteria (coherence, relevance, effectiveness, efficiency, sustainability, impact) against the planned and agreed objectives and outputs.
2. To assess how far systemic changes were triggered by the project and if impact results, susceptible to be sustainable as well as well as replicable, can be identified.
3. To recommend SDC on the basis of the results of this evaluation, on how to further engage with the private sector along a logic of food systems approach and supply chains.

3.2 Evaluation questions

The evaluation team developed an extensive evaluation matrix (see annex 6) during the inception phase of this evaluation with a set of 37 evaluation questions, based on the original evaluation questions from the ToR written by SDC.

In order to cluster and summarize the essence of this long list of evaluation questions, we formulated 2 core results (or contribution) hypotheses to be validated at the end of the evaluation exercise:

Results Hypotheses = core of the evaluation	**Relevance**	**Coherence**	**Effectiveness**	**Efficiency**	**Impact**	**Sustainability**
A) The improvement of food security, farmers income and water productivity for 65'000 farmer families in the 6 countries is a result of the interdependency of the different elements of the Push-Pull-Policy approach applied by the WAPRO project. → targets mainly on micro and meso level						
B) The Private Sector Engagement (PSE) modality including external facilitation enabled the stakeholders in the 6 countries to better cooperate towards sustainable (water efficiency, food security and farmers income) solutions in the key commodity value chains, also after the SDC funding comes to an end. → targets mainly on meso and macro level						

These will be discussed in the chapter 6 (the conclusion part of the report) as well in the chapter 7 (Lessons learned and recommendations) on how to deal with private sector engagement in supporting initiatives in sustainable agricultural practices and resources management activities in the future.

3.3 Evaluation team

SDC announced the evaluation mandate in March 2022, and a team by KEK - CDC evaluators in partnership with specialists from mesopartner and Ecoplan AG have been awarded this assignment by handing in an offer document. KEK - CDC have been contracted by SDC in May 2022. The evaluation team started their work immediately in May led by **Carsten Schulz**, who has overseen the whole evaluation process, coordinated the case studies and acted as a single point of contact to SDC. **Roman Troxler** conducted interviews, contributed to the Cost-Benefit Analysis (CBA) discussion, and participated in the analysis and interpretation of the evaluation results. **Sophie Staheyeff** led the online survey and supported the facilitation of the online validation workshop with the implementing partners. As specialist in systemic approaches, **Marcus Jenal** (from mesopartner) advised the evaluation team on using elements of Outcome Harvesting and participated in the analysis and interpretation of the evaluation results. With his vast experiences in Economic Financial Analysis, **Felix Walter** (from Ecoplan AG) advised the evaluation team in the CBA, and contributed to the analysis of the evaluation results.

3.4 Limitations of the evaluation

WAPRO project is working with 10 sub-projects in 6 countries. Due to the **tight schedule in evaluating this project**, the team leader visited 3 sub-projects for a short time in 2 countries (in Tajikistan for 5 days and in Pakistan for 3 days excluding travel). He had the opportunity to meet and interview most of the important stakeholders, thanks to the close collaboration with 2 national experts. They have been conducting case studies, which are elementary for the assessment process of the evaluation team.

Although a specific online survey was conducted, and interviews and a validation workshop were done with representatives of all 6 countries, there might be a **certain risk that the evaluation team assessed the implementation of WAPRO with a slight bias towards the subprojects in Tajikistan and Pakistan**, while the results of the other 7 sub-projects and findings from India, Kyrgyzstan, Myanmar and Madagascar were given less attention.

The evaluation team may **lack understanding of the Pull component**, as we only talked to farmers and ginners/rice mills (and on micro and meso level even to a very limited extent); but the evaluators were not in the position to discuss with ginners/rice mills and the large buyers (or related CSR bodies or foundations) on the meso or even macro level about their relationships.

The evaluation team had to find out by revising the provided documentation that some of the **key documents prepared by WAPRO are lacking consistency and accuracy of terminology used, (budget) figures and monitoring data**. The evaluation team used as main reference documents for monitoring and budgetary data the project document (of September 2018) and the annual report 2021 (March 2022). An updated list

of partner contributions up to August 2022 has been provided by Helvetas upon request. As this evaluation report has been prepared in September 2022, additional partner contributions due to the rice and cotton harvest 2022 in process, are still possible to be effectuated until the end of the year.

4 Evaluation methodology and process

4.1 Inspiration of Outcome Harvesting in the evaluation process

In addition to discussing the two results hypotheses as mentioned under 3.2, exploring the contributing factors was an integral part of the evaluation. To that effect, the following question was developed:

What are the most important achievements of the WAPRO project on the level of behaviour changes in project partners and how has the WAPRO project contributed to these achievements?

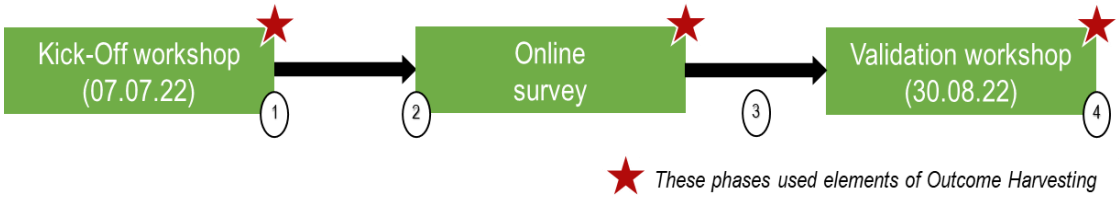
The data collection process was inspired by Outcome Harvesting (OH) and allowed the evaluation team to complement missing answers to several evaluation questions. OH is a method that enables evaluators or projects to identify, formulate, verify and make sense of qualitative outcomes of their initiatives. In OH, outcomes are defined as ***changes in the behaviour, relationships, activities, actions, or capacities of people, groups, and organizations (partners or other societal actors)***. The method thereby does not measure progress towards predetermined targets or objectives, but collects evidence of what changes have actually happened and can be observed. It then works backwards to determine whether and how the project contributed to the change. In this way, using essences of OH allowed the evaluation team to find both intended outcomes and unintended outcomes and to determine how the project contributed to them.

This evaluation did not use the full OH process, but rather oriented itself on the principles of OH, particularly the collection of outcomes and contribution statements. These statements aim to document **who** changed **what**, **when** and **where** it was changed, and **how** the project contributed to the outcome. After the collection of said statements, the significance of the changes regarding the overall WAPRO objectives was also assessed.

Main application on meso and macro level

Data collected for OH focused mainly on **the meso and macro (policy) level** of the WAPRO project. The partners who participated in this process were the WAPRO consortium and implementation partners in the countries. A list of contacted stakeholders and partners can be found in Annex 2:. Figure 2 illustrates the process and timeline.

Figure 2 Online Outcome Harvesting process and timeline



1. A 45-minutes online Kick-Off workshop on the 7th of July 2022 introduced the process, the OH approach and the online survey to be filled out by the participants.
2. The online survey was open to participants from the 8th of July 2022 to the 14th of August 2022. In addition to collecting the outcomes and the contributions of the project to these outcomes, the survey inquired about WAPRO interventions – whether participants would have implemented them without the project, whether they will continue to implement them after the end of the phase and how they would rate their overall importance – and the collaboration with the WAPRO team at Helvetas Headquarters (HQ). A total of 48 people were invited to respond, 22 filled out the whole survey and an additional 4 responded to part of it.
3. The evaluators analysed the collected data and created aggregated outcome statements representing the major patterns in the responses received.
4. The evaluators presented the aggregated outcomes at an online 2-hour validation workshop on the 30th of August 2022. The participants had the opportunity to verify the findings and indicate which patterns they also observe in their country or countries. Working in geographical groups, the participants then selected and ranked the three most significant outcomes for their country and what WAPRO interventions contributed to said outcomes.

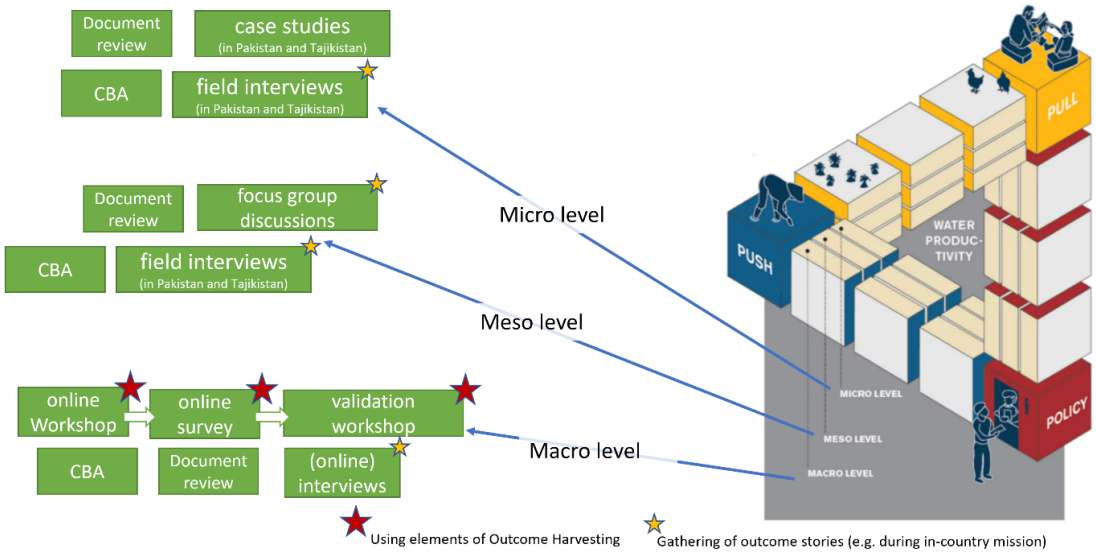
Gathering outcome stories on micro and meso level

In Tajikistan and Pakistan in July and August 2022, the 2 national consultants as well as the team leader gathered outcome stories through in-person interviews and focus group discussions to better understand the **what, when**, **where** and **how** especially on beneficiary and field implementation (micro and meso) levels in those two countries. This data collection served as a complement to the results from the macro level outcomes. It also allowed the comparison of the different meso level outcomes between the countries and the discussions among the participants with regards to the significance of the changes generated additional insights for the evaluation.

4.2 Methods

For the evaluation process of the WAPRO project on the different levels of engagement (micro, meso and macro level), the evaluation team has foreseen the application of the following evaluation methods as illustrated in Figure 3.

Figure 3 Evaluation methods on various levels



Document analysis and review

An analysis of the essential documents provided by SDC, Helvetas and other stakeholders (strategic documents, project documents, specific studies and reports by consortium partners within the sub-projects, minutes of workshops and meetings, etc.) was carried out. In addition, the evaluation team consulted and analysed additional documents they identified as relevant for the evaluation. The analysis of documents allowed the evaluation team to discuss the hypotheses and orient the evaluation process adequately.

Field interviews during case studies

Led by two national consultants in Tajikistan and Pakistan, interviews with all relevant stakeholders in 3 sub-projects were undertaken. During the visit by the team leader to Tajikistan and Pakistan, he interviewed selected implementing organizations on micro and meso level, relevant stakeholders including water stewardship initiatives, representatives of the government, non-governmental organizations (NGOs), Business Development Services, etc. These field interviews gave the team a better understanding of the relations and processes.

Focus group discussion

One focus group discussion per subproject with different stakeholders active in the value chain was conducted for the 3 sub-projects in Tajikistan and Pakistan during the field visits, amounting to a total of around 5 to 6 focus group discussions. These discussions were conducted in the local language and facilitated by the national consultants. The main questions revolved around the usefulness of the Push-Pull-Policy approach on micro level, the contribution by the different players to the approach, and the positive (and negative) results of its application, as well as the future perspective of working together in these commodity value chains after the financing by SDC has been ceased.

Online Outcome Harvesting Process

The Online Outcome Harvesting Process, including the Online (Kick-Off) Workshop, the Online Survey, and the Online Validation Workshop, is explained in 4.1.

Semi-structured interviews

Through more than 25 interviews conducted mostly online, the evaluation team gathered feedback on main aspects related to the efficiency, effectiveness, and coherence of the WAPRO project from key staff at Helvetas, the consortium partners, SDC and other stakeholders such as local and national authorities. In addition, some interviews with external experts from textile industry or certification organizations have been undertaken to get a second opinion.

CBA discussion focusing on break-even points

While the above-mentioned methods mainly focused on generating qualitative findings on how the project contributed to certain intended and non-intended outcomes, the evaluation also aimed to provide evidence regarding the achievement of quantitative targets and the cost-effectiveness of the WAPRO project.

At the end of its first phase the project already developed a rather simple yet straightforward CBA, contrasting SDC's project cost and the income effects of the final beneficiaries (farmers and their families). Using these calculations as a starting point, the evaluators developed a simplified CBA, based on reported costs and benefits per cut-of date 2021 (see Annex 3: for more details) identifying break-even points with respect to the different sources of funding.

Presentation of preliminary findings

On the 5th of September 2022, at the end of the evaluation process, a meeting with the WAPRO team and members of GPFS, was organized. The consultants presented their findings, learnings and recommendations. The participants also had the chance to comment on these findings and to validate the conclusions and recommendations presented.

5 Evaluation findings per DAC criterium

5.1 Relevance

The WAPRO overall project and its interventions are highly relevant, as they address the issue of water efficiency in key commodities, an issue of highest interest and very forward thinking when the project objective and approach were conceptualized eight years ago. The degree of WAPRO's alignment with government priorities in all 6 countries is given, as well as with the Sustainable Development Goals (SDGs), Switzerland's International Cooperation Strategy 2021-24 and the Environmental, Social, and Governance (ESG) strategy of most of private sector partners involved.

WAPRO's ability to work with stakeholders at different levels together with government authorities and the private sector (including their readiness to contribute financially), its

Push-Pull-Policy approach at the micro, meso and macro levels has provided a good opportunity to both initiate or implement targeted measures and, in addition, to use advocacy to systematically address water productivity in the value chain. The private sector appears to have great interest in WAPRO interventions at the farmer or initial value chain level, and is ready to support meaningful initiatives with the payment of organic and FairTrade premiums (mainly from CSR budgets), but has little interest in the long run of paying a higher price for the commodity.

What the evaluation team learned by visiting farmer groups and having a look at the sales statistics: WAPRO is not a project focusing necessarily on smallholder or disadvantaged farmers per se, as it was not meant to particularly address specific target groups (e.g. women farmers, youth, LNOB = leave no one behind). This could be seen as a mistake in design, or rather as a viable approach to have a fast adoption of water efficiency measures to all farmers working in these key commodity value chains. While we state this so clearly, it should not be disregarded that the majority of WAPRO beneficiaries are smallholder farmers (with more than 15 % of female farmers) who benefit substantially from increased incomes and improved water efficiency because of WAPRO interventions.

Mixed results on gender sensitivity in rice and cotton value chains[2]

Although no specific mainstreaming issues have been mentioned in the ProDoc, WAPRO addressed gender sensitivity during implementation in some of the sub-projects based on the important need given that commodity value chains in selected countries are predominantly ruled by men. Based on the reflection of phase 1 that gender sensitivity was not addressed sufficiently (and mentioned as “cornerstone 6” of what should be done differently in phase 2, as presented in the ProDoc of phase 2), the application of gender approaches in phase 2 didn’t show much success, with positive exceptions, e.g. in Tajikistan the percentage of female farmers (and female trainers) could be raised to ca. 40% percent of all reported farmers; this effect is due to labour migration of male farmers to Russia, and WAPRO’s ability to address this issue during implementation. While the organic cotton sub-project in India exclusively targeted women farmers, in other sub-projects (e.g. in SRP rice in Pakistan) gender specific activities mainly addressed social welfare of female workers (and paid by Corporate social responsibility (CSR) initiatives from the private sector), as male are owners and decision makers in agriculture. In general terms the evaluation team is of the opinion that the target of 15 % of participating women was not an ambitious goal, but with 27 % of female farmers reached (as mentioned in the annual report 2021) the project reached an overall satisfactory result.

Critical observation: Organic cotton versus BCI cotton

Helvetas has worked several years in the promotion of Organic cotton with projects in Central Asia and West Africa[3]. However, WAPRO has taken up water productivity as a core issue and has therefore prominently promoted the application of the BCI standard based on private sector demand, but continues to support Organic cotton in other re-

[2] The evaluation describes the issue of gender sensitivity in the chapter of relevance, while you find the scoring in correspondence with SDC’s evaluation grid in chapter 5.3 effectiveness.

[3] The projects in Kyrgyzstan and Tajikistan “Trade with Organic and Fair Trade Cotton” implemented by Helvetas have been financed by SECO until 2016.

gions. Farmers in Tajikistan, who have benefitted from the previous Switzerland financed and Helvetas implemented Organic cotton project with trainings and other measures, are now trained on water productivity issues (together with conventional agroecological knowledge) and have increased their yields remarkably.

The evaluation team does not want to make a judgment as the market rules the sourcing and production of cotton. On the one hand there is a risk of cannibalism or a power game between organic and "sustainable" production in a specific geographic region (as the example shows in Kyrgyzstan and Tajikistan), and the farmers will make their choice based on higher yields and selling opportunities. On the other hand, BCI cotton with their in certain aspects less rigorous standards[4] but a much bigger outreach (to millions of hectares of cotton fields) and recognition will have much more leverage than the niche product organic cotton.

It is quite interesting to observe that WAPRO's interventions (including the advocacy work done by AWS) successfully contributed to improving and amending the standards of BCI or SRP with water efficiency measures.

Overall, the relevance of the project is rated as highly satisfactory with an average score of 1.3 (1 for target group needs, 1 for indirectly affected stakeholders, 2 for design elements of the intervention[5]).

5.2 Coherence

Good internal and external coherence

The evaluation team assess internal coherence to be good as WAPRO being steered by a global division at SDC is coherent with global and country strategies by Switzerland; thanks to WAPRO management it maintained close synergies with other (SDC) interventions on countries level e.g. India, Tajikistan, where the Federal Department of Foreign Affairs (FDFA) runs a Swiss Cooperation Office.

There is also a good alignment (and external coherence) on country level, as WAPRO worked based on opportunities and had – by project design – an open and transparent communication with relevant stakeholders from government, development partners, the private sector and civil society in the countries assessed.

Noteworthy is the ability of WAPRO management to gather implementers and relevant stakeholders across all WAPRO countries in relevant training and coordination meetings, which contributed enormously to knowledge and information sharing and mutual support. This led to the quite unique effect of competitors (sourcing of cotton as well as on rice) on national as well as international level sharing ideas and working together.

The same applies with the coherence from a food systems perspective: WAPRO is coherent as water efficiency measures and improvement in the agricultural manage-

[4] The consultants learned by talking to different specialists, that standards applied at BCI are less rigorous, when it comes to e.g. GMO-seeds (GMO=genetically modified organism) and the application of pesticides; and BCI standards are sometimes more rigorous, e.g. when it comes to the use of irrigation water – compared to organic standards.

[5] On a scale from 1 (highly satisfactory) to 4 (highly unsatisfactory). For more details see Assessment Grid in Annex 7:.

ment of smallholder farms are the backbone of (food) production in the selected countries. The Push-Pull-Policy approach offers a comprehensive way to involving relevant stakeholders in complex (market) systems.

Satisfactory coherence with other Switzerland-financed projects

WAPRO's coherence on steering level with other global programs of SDC but as well with those from State Secretariat for Economic Affairs (SECO), such as "Transparency and Innovation of Sustainability Standards (TISS)"[6] is not clearly visible. However, at field level, especially in countries with SCOs, there is a good coherence and exchange with other Switzerland financed projects, both by SECO and SDC.

Overall, the coherence of the project is rated as highly satisfactory with an average score of 1.5 (1 for internal coherence, 2 for external coherence).

5.3 Effectiveness

WAPRO achieving good results at the level of famers

WAPRO is likely to achieve the set objectives regarding the adoption of water efficiency measures and increase of income by farmers (as mentioned in the Monitoring & Evaluation (M&E) system) until the end of 2022. A large number of farmer families have indeed improved their water efficiency, their productivity and their incomes.

The overall number of beneficiaries of 65'000 farmers was defined at the beginning of the second phase in 2019, and according to the annual report 2021 the number has already been exceeded in that year by more than 15'000 to 81'550 farmers. With regard to this figure, the evaluators would like to note that M&E reporting from different subprojects and countries seems to differ in terms of a clear definition of criteria and harmonization on what can be considered a beneficiary of the WAPRO project. In addition, there are differences in the quality and length of training cycles provided by WAPRO partners, and huge differences in the integration or contracting of farmers in improved value chains (e.g. SRP Pakistan[7]). There is also the legitimate question of why the number of beneficiaries was not adjusted when discussing the extension of the phase by one year (due to Covid-19), taking into account the systemic nature of the project.

Nevertheless, even with the number of 40'000 confirmed beneficiaries by end of 2021 after 8 out of 9 years (as included for the CBA presented in Annex 3:), WAPRO achieved satisfactory results, with its 10 subprojects working in different political contexts and with the involvement of various private sector entities and government institutions.

[6] More information in the project database by FDFA on the TISS project financed by SECO.

[7] Due to COVID-19, there have been different approaches to train farmers on water efficiency measures: the group of 2'050 contracted farmers around the participating rice mills have been trained by remote and onsite courses, followed by visits of extension workers for in-person advice and monitoring. Around 52'000 non-contract farmers had access to the remote training material (e.g. Robo calls, WhatsApp groups) without any tracing of results or any in-person training and follow-up by extension workers.

WAPRO indirectly addresses food security – but not measured in the M&E system

WAPRO is (co-)financed by the Global Program Food Security (GPFS) of SDC's Global Cooperation Domain[8], but the topic of food security is not in the focus of the implementation of the project. Dealing with water productivity of 2 key commodities produced as cash crops by farmer families, food security was never actively addressed by WAPRO or even measured by a specific indicator in the M&E system[9]. However, it can be assumed that water efficiency measures combined with agro-technical and agro-ecological improvements have direct and positive implications on food security of farmer families. Another explanation is the high probability that due to the increased yield and higher productivity (thanks to the measures introduced), farmer will have increased their income which contributes as well to enhancing food security. This was confirmed by an external study conducted in India by a private sector partner[10], and as well through the OH process as can be seen in outcome statement number 11 (cf. Annex 4:).

WAPRO aimed to reduce water consumption, which positively affected the efficiency of using other agricultural inputs

The activities in the Push component enhanced the knowledge of farmers in water productivity measures with the aim to reduce water in production of rice and cotton. Alongside these activities, farmers greatly benefited from higher production efficiency due to sharing improved agricultural techniques to improve the quality of the produce, by using high quality seeds, by reducing the use of (mineral) fertilizer or finding alternatives (e.g. manure). The commodity prices by participating companies buying the produce remain by and large unchanged and rely on international market prices.

WAPRO countries in Asia well chosen – added value of Madagascar questionable

The selection of WAPRO countries in Central and South Asia has proven successful, as the exchange of experience and knowledge has led to synergies and innovations. At the beginning of the second phase, 2 new countries were added to WAPRO. While the inclusion of Myanmar made sense, the inclusion of Madagascar is considered somewhat artificial due to language barriers, lack of regional linkages, and the fact that value chains other than cotton and rice were targeted.

WAPRO's Push-Pull-Policy approach is effective

In most of the sub-projects, the interaction of the three components of Push-Pull-Policy contributed to reach the objectives. In almost all sub-projects, the discussion between farmers and the private sector led to a raise in awareness and to the incentivization of water productivity measures. In some particular sub-projects, the discussion with government authorities contributed to improving the water stewardship by smallholder farmers, e.g. in Tajikistan where SDC is supporting the government in water resources

[8] In course of the reorganisation process at SDC and the new structure (by September 2022), GPFS has been transformed to the Food Systems Section and is based in the Thematic Cooperation Division.

[9] According to the information received, the baseline study conducted at the begin of phase 1 was not recommending to include a specific food security indicator in the M&E system.

[10] The positive effect on food security was confirmed by the external evaluation of the Coop Organic Rice Project in India conducted by KPMG in 2021.

management issues[11], and WAPRO is contributing with practical examples of water productivity in smallholder agriculture, and very well testing the cooperation of state structures and water user associations. However, in countries with several sub-projects and implemented by various stakeholders, the interaction with government authorities on state-level would have needed more systematization from WAPRO stakeholders. The function of the policy coordinator (India, Pakistan) was seen by some stakeholders as not effective and not always successful.

As it was assessed during the visits to Pakistan and Tajikistan and confirmed by all participants in the validation workshop, the Push component contributed more to the success of WAPRO compared to the Pull and Policy component.

Overall, the effectiveness of the project is rated as satisfactory with an average score of 2 (2 for adequacy of approaches, 2 for achievement of objectives, 2 for transversal themes)[12].

5.4 Efficiency

Highly efficient project approach

In order to assess WAPRO's efficiency, the evaluators developed a simplified CBA, based on reported cost and benefits per cut-of date 2021 (see Annex 3: for more details). The analysis shows that considering benefits for the around 40'000 confirmed beneficiaries (as discussed above in 5.3), the project's break-even point (i.e. the point where aggregate benefits exceed aggregate costs) is reached after just one year, if solely the SDC contribution for the current second phase is used as a reference. After less than two years, the SDC costs for both phases are internalized.

WAPRO was highly successful in attracting co-financing from third parties. The SDC contribution of just under CHF 5 million was quadrupled to a total project budget of over CHF 20 million for the second phase. A more detailed breakdown of the contributions to WAPRO shows the following picture:

- 36 % of the budget comes from official development assistance (ODA) SDC and Norad (Norwegian Agency for Development Cooperation)
- 5% of the budget is from NGOs (BioRe, REEDs, Helvetas own funds)
- 8% are contributions from companies' CSR budgets or their foundations (Tata Trust, Coop Sustainability Fund, LT Foods, etc.)
- 50% are Fairtrade / SRP premiums (paid by Mars, Coop and Remei).

Taking these contributions also into account and replicating the above-mentioned calculations with regard to the total project costs, the project breaks even after about 4 to 5 years (for the second phase) or 6 to 8 years (for the two project phases together). Summarizing, we can thus state that the WAPRO project has a quite good cost-benefit

[11] In Tajikistan, SDC is financing the National Water Resources Management Project (implemented by Helvetas) and working in the same region as WAPRO.

[12] See the comments on gender sensitivity under chapter 5.1 relevance and the respective footnote there.

ratio, assuming that most of the initiated changes at the level of the benefitting farmers will last.

Assuming that by the end of 2022 considerably more than the 40'000 farmers documented so far will have adopted the improved techniques and thus achieve higher incomes, the effective cost-benefit ratio is likely to be even higher. In addition, it can also be stated that the project was implemented within the planned timeframe (which was then extended by one year due to the Covid-19 pandemic). There are considerable differences between the ten sub-projects; anecdotal evidence suggests that the sub-projects managed by Helvetas itself on average achieve better results than those managed by external third parties.

Lean project management – however, sometimes more steering and better reporting would have been needed

The project management of WAPRO is considered very lean and efficient – which most partners highly appreciated. However, the evaluators have learned of / found several aspects where more effort and accuracy would have been desirable:

- Inaccuracies and conflicting information within the ProDoc, partly imprecise definitions, logframe that does not comply with international standards. (e.g., "Number of male/female farmers involved in capacity building and value chains" cannot be considered an impact indicator).
- Yearly reports are insufficiently structured and to some extent incomplete. In particular, the reports of the sub-projects differ massively in terms of level of detail and reader-friendliness.
- Lack of transparency towards SDC and the other consortium partners regarding financial contributions of partners, also communications about failures (withdrawal of key partners like IKEA and PIC) could have been more transparent and pro-active.
- Announcements of meetings were sometimes made on very short notice, meetings were not always sufficiently well prepared and equally relevant to all participants, as some interviewees from consortium partners mentioned to the evaluation team.

The (learning) exchange between the WAPRO countries was considered very fruitful by all stakeholders interviewed, while exchange and collaboration between the different actors / sub-projects *within* one country (for example between the sub-projects in India) could have been fostered further.

Also SDC could have steered more

Several stakeholders confirmed that the SDC's contribution was decisive in leveraging other contributions for this specific project. In particular for the central project management services such as the inter-country exchange formats and knowledge management, SDC funding was crucial. The other donors directly co-financed selected sub-projects, but not the steering unit's work.

In addition, SDC's role in WAPRO was seen primarily as a silent and likeminded donor, strong in conceptualizing but not interfering in project implementation on operational level, which was appreciated by all partners interviewed. Some partners also mentioned the advantage of having a public donor involved (which might give better access to decision makers).

Even though the SDC was praised by many stakeholders for its low-profile role, one may also note that the SDC was not always able to do justice to its steering role. For example, the project document for the second phase has been accepted despite the above-mentioned severe shortcomings. The evaluators are aware that the SDC repeatedly voiced concerns about the quality of the reporting, which has evidently not led to any improvements. The very limited time resources of the desk officer responsible for the project at the GPFS undoubtedly had a significant influence on the fact that the SDC was not able to play a more decisive role in the steering of the project.

Overall, the efficiency of the project is rated as satisfactory with an average score of 2.3 (2 for cost-effectiveness, 2 for timeliness, 3 for management / monitoring / steering).

5.5 Impact

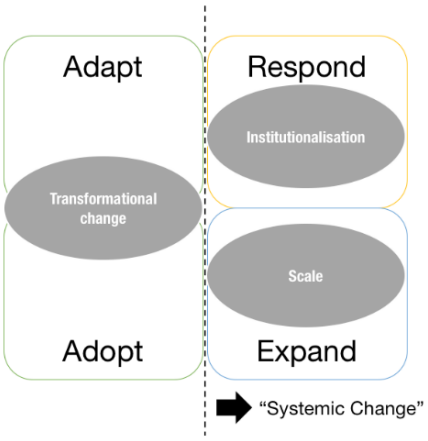
WAPRO contributed to impact on farmers' level…

With high probability the interventions initiated by WAPRO led to enhanced water productivity and increase of family income on the level of the (currently) at least 40'000 farmers and their families.

As already mentioned, the monitoring data of the several sub-projects lack harmonized criteria to distinguish different levels of adopting water efficiency techniques, which is unfortunate, as the quantification of the impact by this missing information is extremely complex to trace back on the level of the 10 sub projects.

…but could have reached more scale (and been measured better) at the level of sub-projects

From the monitoring data obtained, the evaluators are of the opinion that WAPRO project missed the momentum to strategically think about scaling-up within its sub-projects , measure farmers crowding-in and reaching scale, and contributing to the institutionalization of water efficiency measures in the Push-Pull-Policy components.



Referring to the well-known AAER framework used in market systems development[13], it seems that WAPRO in selected sub-projects (e.g. in SRP rice in Pakistan, BCI cotton in Tajikistan) sticked too long to piloting activities rather than to steer the interventions in specific sub-projects in a way, to systematically address the expansion of the transformational change to an institutionalization (see Figure 4[14]), and therefore for scaling-up the numbers of beneficiaries, by better differentiating them in the M&E system.

Figure 4 The AAER framework super-positioned with the phases of systemic change

[13] Adopt-adapt-expand-respond - A framework for managing and measuring systemic change processes 2014, Beam Exchange, by Daniel Nippard, David Elliott, Rob Hitchens https://beamexchange.org/resources/130/

[14] Graph retrieved from Marcus Jenal, 2018 https://www.jenal.org/attempt-at-a-typology-of-systemic-change/

Impact on national policies

In some countries (e.g., Tajikistan), WAPRO was able to contribute to policy/mainstreaming of water efficiency issues at the national level, while in others policy dialogue processes could only be initiated. Due to the size of the countries as well as the population (e.g. India, Pakistan), policy influencing on water management issues have only been undertaken at the state or provincial level, and had the desired impact on local level only. Influencing policy at a higher political level seems to be a very difficult field of action that requires the right partners (e.g. a platform) and more time.

Impact on partners (including standard organizations)

WAPRO approaches will be sustained in ongoing activities by partner organizations and/or replicated in several new projects co-financed by the private sector and/or with other donors. One example is the intention of SRP in partnership with Helvetas to set-up an SRP platform in Pakistan, and to channel advocacy issues of sustainable rice production issues (combined with water stewardship) to private sector partners and government authorities.

An important success to which WAPRO contributed already during phase 1 was the adaptation of standards: through the successful implementation of water stewardship approaches in course of WAPRO thanks to the Push-Pull-Policy approach in the countries, the standards by BCI and as well by SRP have been better formulated, which was achieved also through the exchange and collaboration between AWS, BCI and SRP and with Helvetas being member of the Technical Committee of AWS, the board of SRP and asked to join the board of BCI.

However, there is no evidence for WAPRO's direct impact on ESG strategies of private sector partners. Most of them cooperate with quite a number of different donors, or they have their own CSR foundation at hand which jointly implements charitable activities.

Overall, the impact of the project is rated as satisfactory with a score of 2 (no sub-criteria defined in the assessment grid).

5.6 Sustainability

In some aspects of the interventions initiated by WAPRO there is the probability that activities will continue beyond the lifetime of the project.

Highest probability for continuation is with activities by local stakeholders in the Push Factor. The adoption of water saving technologies by individual farmers will continue, as its application contributes to the reduction of the overall costs in crop production. This applies to all geographic areas where irrigation water from irrigation canals costs individual farmers money in the form of water fees, or costs for electricity or diesel where water needs to be pumped. Combined with a higher awareness on agroecological factors and applied agricultural techniques[15], the costs of production will decrease, and therefore the income of farmer families will increase. WAPRO well understood to initiate training to farmers in form of demo plots and by farmers trainers/extensionists, as this is required by the standards or certification schemes. These farmer groups were

[15] Examples are: the reduction of the use of pesticides, the use of organic fertilizers with irrigation (fertigation), etc.

established with a close relationship to a Water Users Association (WUA) or to a company that buys the harvested crop. The continued existence of these groups is therefore highly dependent on the relationship with the company under the current market situation.

Regarding the Pull Factor, at the interface between farmers and the private sector, the sustainability of approaches introduced in course of WAPRO is questionable. The usage of incentives by the private sector for farmers to produce high quality crops or to adopt water efficiency techniques (e.g. in form of subsidies for agricultural input, or through providing or paying for training and advice, etc.) very much depends on their readiness and awareness.

Although it has been successfully implemented in most WAPRO subprojects, its continuation is not necessarily guaranteed. In some sub-projects you see the private sector very much engaged and incentivizing good practices by farmers based on quality and performance criteria, which create a win-win situation. Unlike organic certification schemes, where binding and long-term contracts are essential, voluntary standards (SRP and BCI) and the financial incentives paid by the private sector depend on the interest in long-term relationships and the ability of the private sector to contribute to these costs. What appears to be an impediment is that sourcing companies do not include these incentives as cost components in the overall cost of goods calculation. According to the information received, some companies pay these incentives or premium from the CSR budget or acquire a co-financing through public funds by NGOs or donors.

Voluntary standards SRP / BCI and how they grant incentives to farmers is different:

SRP: Besides the provision of advisory services by the rice mill and other direct benefits to the farmer (e.g. harvest being collected at the field etc.), SRP foresees the possibility for the private sector to pay a premium for high quality rice directly to the farmer. The provision of benefits or payment of premiums varies from company to company, as well as from country to country, and seems not to be very systematic in SRP.

BCI: It is important to mention that in the case of BCI there are no premiums directly paid by private sector to farmers. Payment by the private sector is done to BCI or the BCI representative in the respective country in form of a yearly membership fee, a sort of license fee per ton of harvested cotton coming from a BCI certification system. In return, BCI sets up the certification system and organises trainings or advisory support to participating farmers.

The evaluators believe that the internalization of these incentives in the price of the sourced commodity is an important factor of sustaining the forthcoming activities in the Pull factor. The uncertain acquisition of external funding from private and even public sources is an impediment to these incentives, and thus to a long-term relationship with producers, as well as to sustained improvements in water efficiency.

The sustainability in the Policy factor or all issues related to water stewardship measures is the most questionable regarding its continuation. Although water efficiency issues have been discussed at almost all levels in all subprojects, continuation after WAPRO ends depends on the willingness of farmers, the private sector, and the government to engage. There have been some cases reported (e.g. Pakistan SRP rice), where private sector was involved in water stewardship issues, discussing the situation with related authorities, and supporting and backing farmers in the overall discussions. There is a high probability that in those countries/regions with payment schemes for publicly available water resources (e.g. irrigation schemes), water stewardship approaches will continue to work very well in the future, as it is a common property and WUA approaches might continue to work well. In cases where water is based on individual access e.g. by using a pump (e.g. channel water but even more

important: ground water to be pumped) water scarcity will dictate whether water stewardship approaches will function as well in the future.

WAPRO did a good job in knowledge sharing and spreading lessons learned to interested partners and other projects. The list of publications in form of short video films, articles in journals, or contributions and posters presented in conferences on national, regional and international level is seen as a good step to share the knowledge with other interested entities outside the WAPRO community. There was a missing tool by WAPRO in the form of a platform with a blog-function to exchange on the good practices applied by WAPRO with others. The objective of this platform would be to share the experiences by other stakeholders in other countries on water efficiency measures in agricultural crops. Beside the technical dimension of water efficiency measures, learnings regarding the application of Push-Pull-Policy in their geographic context should be exchanged[16]. Thanks to mentioned publications in different forums there is a good chance that the conceptional ideas and proven results might be read by interested people.

There have been articulated interventions by the implementing partners of WAPRO, which will be continued after the end of WAPRO in late 2022, as it is illustrated in the Figure 5 below. Activities in the Push and the Pull components include those in the promotion of water efficiency and income generation by scaling-up the overall number of farmers.

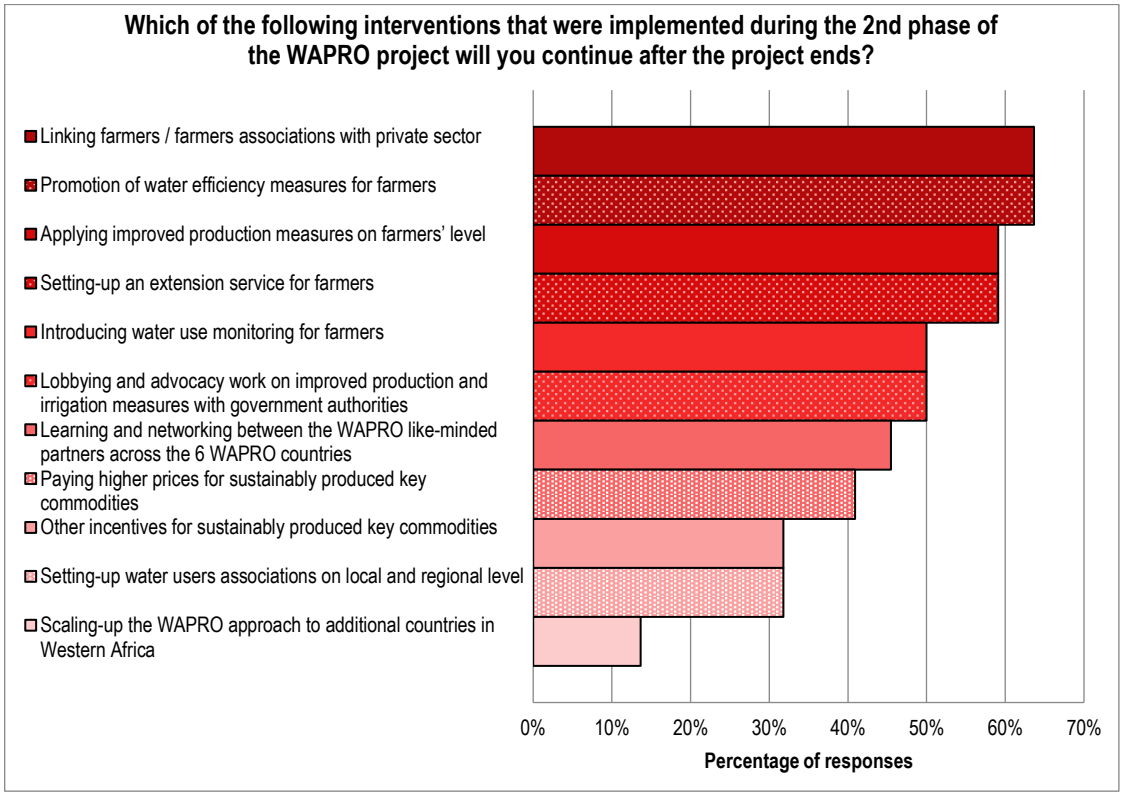


Figure 5 Interventions to be continued by Helvetas and/or partner organizations after the end of WAPRO's second phase (beyond January 2023) – source: WAPRO online survey

[16] The evaluation team learned thanks to GPFS of the CROPS4HD Project financed by SDC and implemented by SWISSAID, FIBL and AFSA in 3 African countries and India applying a quite similar approach as the Push-Pull-Policy approach. CROPS4HD call it Demand – Supply – Policy, aiming to increase food security and nutrition by smallholder farmers through agro-ecological approaches.

Based on the interest in WAPRO and the demand by external stakeholders and sponsors, there is a **high probability of follow-up projects and activities to be started soon**. The evaluation team learned about the continuation of several initiatives and projects by the stakeholders working in the framework of WAPRO, including the following:

- SDC Tajikistan will use the WAPRO learnings and include them in the 3rd phase of the National Water Resources Management Project, to be scaled up in other regions (and other agricultural crops) in the country.
- There is a desire from WAPRO stakeholders with several initiatives and donors (e.g. in Pakistan and India) to widen the Push-Pull-Policy approach in commodity growing to a more holistic Landscape Approach, considering human and ecological wellbeing.
- There are concrete plans to consolidate the set-up of the SRP platform in Pakistan by Helvetas, and to continue working on BCI cotton in Tajikistan.

Overall, the sustainability of the project is rated as satisfactory with an average score of 1.7 (1 for capacity of partners, 2 for resources of partners, 2 for contextual factors).

6 Conclusions

Responding to the overall results and contribution hypotheses presented in 3.2, the evaluators have come to the following conclusions:

Hypothesis A: The improvement of food security, farmers income and water productivity for 65'000 farmer families is a result of the interdependency of the different elements of the Push-Pull-Policy approach applied by the project.

The **targets regarding enhancing water productivity and improving farmers' incomes will be most probably reached**, although reliable monitoring data is only available for around 40'000 farmer families at the moment[17]. We can assume that many more farmers have been copying what their neighbours did and have thus also adopted some of the promoted technical measures towards water efficiency. Others may have profited from the changes in frameworks conditions (crowding-in) thanks to all interventions with the Push-Pull-Policy logic on micro, meso and macro level. Unfortunately, WAPRO project management hasn't defined clear criteria and ways to measure and aggregate these kinds of copying or crowding-in effects on various levels in order to use them in advocacy work and in dialogue with relevant stakeholders.

The essence of the **Push-Pull-Policy approach seems to be very useful** having been applied in various settings and contexts and allows to include a range of different stakeholders. Its beauty is that it has the potential to simplify some issues in complex environments, by a long lasting and viable approach aiming for continuity and further outreach. It includes different levels of engagement with micro, meso and macro, without

[17] WAPRO management is currently conducting an adoption rate survey in selected countries to obtain the latest data on how many beneficiaries have adopted water efficiency measures, to be published in November 2022.

predetermining what needs to be done on which levels, thus allowing the sub-projects to be opportunity-driven. These different levels of engagement and the triangle relationship offers entities and stakeholders to be included in a meaningful way.

Especially for (also future) **projects in the context of food systems**, the Push-Pull-Policy approach can be a very useful model to plan systematic and interlinked interventions targeting different stakeholder groups. As the AAER example (see 5.5) very clearly shows, systems approaches should be well embedded.

Hypotheses B: The Private Sector Engagement (PSE) modality including external facilitation enabled the stakeholders in the 6 countries to better cooperate towards sustainable solutions in the key commodity value chains, also after the SDC funding comes to an end.

We can conclude that the external facilitation (by Helvetas) indeed allowed private sector partners to better collaborate in the respective sub-projects, particularly when it comes to the advocacy and policy component – and that some of these activities might continue also after the SDC funding comes to an end.

The key question here however relates to the additionality of SDC funding to WAPRO, i.e., was SDC able to trigger engagements or investments that the private sector would not otherwise make? Most private sector partners acknowledged, that they would (also without SDC) support with their own money the implementation of sub-projects with local partner organization (under the supervision of Helvetas). However, as explained in 5.4, the evaluators assume that the overarching project services (innovating, piloting and sharing knowledge) could only be realized thanks to SDC funds.

For future PSE projects a straightforward working modality could thus be that SDC finances a facilitator (such as Helvetas) in form of a hub or a secretariate for innovation, idea creation, knowledge management and overall coordination, while the private sector partners (or other donors) should pay for the direct implementation of activities in the countries – maybe with some seed funding at the beginning by SDC. Such an approach would allow for a more flexible (opportunity-driven) start of sub-projects in a country.

However, the evaluators were concerned to see that although SDC has managed to leverage substantial third-party funds (SDC pays only about a quarter of the total budget of the current phase), most of the leveraged funds were already earmarked for improving the living conditions of farmers. This applies on the one hand to the leveraged funds from Norad (ODA funds) and NGOs, but on the other hand also to the premiums mobilized by the private sector, which by definition have to be paid in order to comply with the corresponding labels, e.g. Fairtrade premium. We note that the private sector investments beyond the abovementioned premiums are primarily made from corresponding CSR budgets (e.g. Coop Sustainability Fund) and are not internalized in the production process. It can therefore be assumed that the private sector investments would also have been invested in a charitable sense without WAPRO (simply as a co-financing with another donor).

7 Lessons learned and recommendations

As lessons learned from the WAPRO evaluation, **the following success factors** can be identified:

- Unlike other projects in SDC's global programs, WAPRO's focus is very much on implementing activities at country level, thus creating tangible results at the level of smallholder farmers and does not have too much bureaucracy on top management level.
- WAPRO's successfully reduced the complexity of working in 6 different countries with an integrative and comprehensive approach (Push-Pull-Policy). With necessary adaptation and contextualization, the main features of the Push-Pull-Policy approach could be used for future projects within a food systems logic.
- The ability of speaking the same language, having a similar mind-set and addressing emerging topics (e.g. sustainable sourcing; water productivity) have facilitated private companies joining WAPRO.
- A good knowledge sharing component on project coordination level is essential, so that exchange on good practices, mutual learning and knowledge sharing among participating stakeholders' functions well.

Potential for improvement was particularly evident in the areas of steering, monitoring and reporting: While lean project management with not too complex reporting requirements is crucial in order to effectively collaborate with the private sector, Helvetas' project management in WAPRO could have been better structured in order to standardize and harmonize monitoring and reporting of the sub-projects and the overall project.

Based on the conclusions and lessons learned presented above, the evaluation team formulated some key recommendations, addressing either Helvetas or the SDC:

1. To Helvetas: It is recommended that in future projects with a similar approach more emphasis and human resources shall be allocated to project management issues, particularly for standardization and harmonization of documents used for accountability management and reporting (e.g. definition of terminology used project-wide, collection of data and assessment of costs and benefits (see annex 3), harmonization of M&E criteria).
2. To Helvetas: WAPRO's experiences and results in form of knowledge products should be captured better and presented on a meaningful online platform, apart from the WAPRO page on the Helvetas website. This platform can be used during the out phasing for external knowledge sharing and dissemination of good practices with other interested stakeholders.
3. To SDC: As the Push-Pull-Policy approach makes sense, it could be

   a) used and included as a lean component to other Water Resources Management Projects, especially for the improved link between the private sector and water stewardship issues

b) used for new (global) projects in the area of food systems, to connect different stakeholders on different levels (micro, meso and macro) and to reduce complexity and focus on main objectives.

4. To SDC: In order to attract the engagement of the private sector, find ways and plan projects together from the eyes of the future project partner:
    a. Allow for planning process with more “out of the box” ideas / co-creation processes to conceptualize innovative and foresighted projects.
    b. There is an urgent need for more flexible tender mechanisms (such as the open call used for WAPRO in 2013) to effectively partner with new partners, particularly from the private sector.
    c. There is a need for lean, time flexible project arrangements and agile project set-ups that are opportunity driven to attract investments / co-financing by private sector partners.
5. To SDC: We recommend to seek more synergies with the SECO portfolio (standard organizations / engagement with the private sector) and to have a more intensive exchange on success factors.
6. To SDC: We highly recommend conducting an ex-post impact evaluation in 2027, to see after 5 years what WAPRO project contributed to change on income increase and water productivity on the level of farmer families.

Annex 1: References

Find here a list of the main documents, publications and online tools reviewed by the evaluation team:

- End of Phase Report WAPRO I (2018)
- ProDoc by Helvetas WAPRO II (2018) and the annex of the sub-projects (2018)
- Annual reports by Helvetas 2019, 2020, 2021 and the respective annexes of the sub-projects
- Cost Benefit Analysis conducted by Helvetas (2018)
- A set of financial reports of WAPRO as provided by SDC (2019 – 2021)
- A set of minutes of steering meetings (2019 – 2021)
- Kobo Toolbox: cloud-based M&E system used by all sub-projects and supervised by WAPRO management

- Selected reports by Helvetas or main stakeholders
    - Organic Rice India 2018 - 2021 Phase End Evaluation Study (KPMG) on behalf of COOP
    - Back to office report – visit COOP organic rice and WAPRO projects in India, Peter Schmidt 2022
    - Impact Study on Rice in India 2021 – by Mars
    - Diversification strategy to improve the water productivity in state of Haryana, PNP India Dr. Samraj Sahay 2022
    - Landscape Approach in the COOP rice project 22 – 25 – by Helvetas
    - WAPRO Policy Paper in India: Policy Paper on groundwater resource of Haryana 2020

- Publications by standard organizations
    - AWS Standard 2.0
    - Better Cotton Principles Criteria V2.1
    - SRP Standard for Sustainable Rice Cultivation, Version 2.1
    - SRP Performance Indicators for Sustainable Rice Cultivation, Version 2.1
    - Better Cotton Conference 2022: Enablers of Landscape Approaches

- Articles and factsheets by WAPRO
    - Articles in Rural 21
    - Factsheets produced in course of the project

- Other documents
    - Textile Exchange - Organic Cotton Market Report 2021
    - Textile Exchange – Preferred Fiber and Materials Market Report 2021
    - Cotton: A case study in Misinformation – a report on building critical data consumption in fashion – Transformers Foundation 2021

The respective documents used by the national experts in Pakistan and Tajikistan are mentioned in each of the case study reports, as you can find in annex 7 and annex 8.

Annex 2: List of stakeholders and partners

Find here the list of stakeholders and partners of WAPRO contacted during the evaluation process by the evaluation team, by sending out the link to the online survey – or by having a personal interview or focus group discussion online.

Name	Email	Organisation name	Country(ies)	survey	interview
[redacted]	[redacted]	Helvetas	Kyrgyzstan		X
[redacted]	[redacted]	Helvetas	All, supporting M&E as well as knowledge management		X
[redacted]	[redacted]	Helvetas	Tajikistan	X	X
[redacted]	[redacted]	PIC Poéles Integrée des Croissance	Madagascar		X
[redacted]	[redacted]	SDC			X
[redacted]	[redacted]	Alliance for Water Stewardship (AWS)	All	X	X
[redacted]	[redacted]	Alliance for Water Stewardship (AWS)	All	X	
[redacted]	[redacted]	Coopérative KMR / Miharo Raiky	Madagascar		X
[redacted]	[redacted]	Better Cotton Initiative BCI	India, Pakistan, Tajikistan, Madagascar	X	X
[redacted]	[redacted]	Better Cotton Initiative BCI Pakistan	Pakistan	X	X
[redacted]	[redacted]	Better Cotton Initiative BCI Pakistan	Pakistan	X	
[redacted]	[redacted]	BioRe India	India	X	X
[redacted]	[redacted]	BioRe Foundation	India	X	X
[redacted]	[redacted]	LT Foods	India	X	X
[redacted]	[redacted]	Coop	Switzerland	X	X
[redacted]	[redacted]	Helvetas	Myanmar, India	X	X
[redacted]	[redacted]	Helvetas	Pakistan, Madagascar		X
[redacted]	[redacted]	Helvetas	Pakistan	X	X
[redacted]	[redacted]	Helvetas	Pakistan	X	X

Name	Email	Organisation name	Country(ies)	survey	interview
[redacted]	[redacted]	Helvetas	Pakistan	X	X
[redacted]	[redacted]	Galaxy Rice Mill	Pakistan	X	X
[redacted]	[redacted]	Reismühle Nutrex	India	X	X
[redacted]	[redacted]	Reismühle Nutrex	India		X
[redacted]	[redacted]	BioneXX	Madagascar	X	X
[redacted]	[redacted]	Helvetas	Myanmar	X	X
[redacted]	[redacted]	Helvetas	Kyrgyzstan	X	X
[redacted]	[redacted]	Helvetas	Tajikistan	X	X
[redacted]	[redacted]	Helvetas	Madagascar	X	
[redacted]	[redacted]	Mars	Pakistan, India	X	X
[redacted]	[redacted]	Mars	Pakistan, India	X	
[redacted]	[redacted]	Helvetas	Madagascar	X	X
[redacted]	[redacted]	BioneXX	Madagascar		X
[redacted]	[redacted]	REEDS	Pakistan	X	X
[redacted]	[redacted]	Nature Biofoods	India	X	
[redacted]	[redacted]	PnP (Partners in Prosperity) India	India	X	
[redacted]	[redacted]	PnP (Partners in Prosperity) India	India	X	
[redacted]	[redacted]	PnP (Partners in Prosperity) India	India	X	
[redacted]	[redacted]	PnP (Partners in Prosperity) India	India	X	
[redacted]	[redacted]	Rice Partners Lim-ited	Pakistan	X	X
[redacted]	[redacted]	Sarob	Tajikistan	X	X
[redacted]	[redacted]	SCRIMAD	Madagascar	X	X
[redacted]	[redacted]	SDC	GPFS		X

Name	Email	Organisation name	Country(ies)	survey	interview
[redacted]	[redacted]	Sustainable Rice Platform SRP	India, Pakistan, Thailand	X	X
[redacted]	[redacted]	Tata Trusts	India	X	
[redacted]	[redacted]	Westmill	Pakistan	X	
[redacted]	[redacted]	SDC Tajikistan	Tajikistan		X
[redacted]	[redacted]	Helvetas	Madagascar	X	
[redacted]	[redacted]	Gherzi Textile Organisation	Switzerland, external expert		X
[redacted]	[redacted]	ECOS Basel, Swiss Fair Trade	Switzerland, external expert		X
[redacted]	[redacted]	Former SDC	Panama, resource person		X

In the 2 case study reports, find the list of people visited and interviewed during the field mission by the two national consultants in Tajikistan and Pakistan.

Annex 3: CBA Discussion

At the end of its first phase the project already developed a rather simple yet straight-forward Cost-Benefit Analysis (CBA), contrasting SDC's project cost and the income effects of the final beneficiaries (farmers and their families). Based on monitoring data provided by the WAPRO management, the evaluators tried to update this analysis, reflecting costs and benefits per cut-off date end 2021.

Limitations:

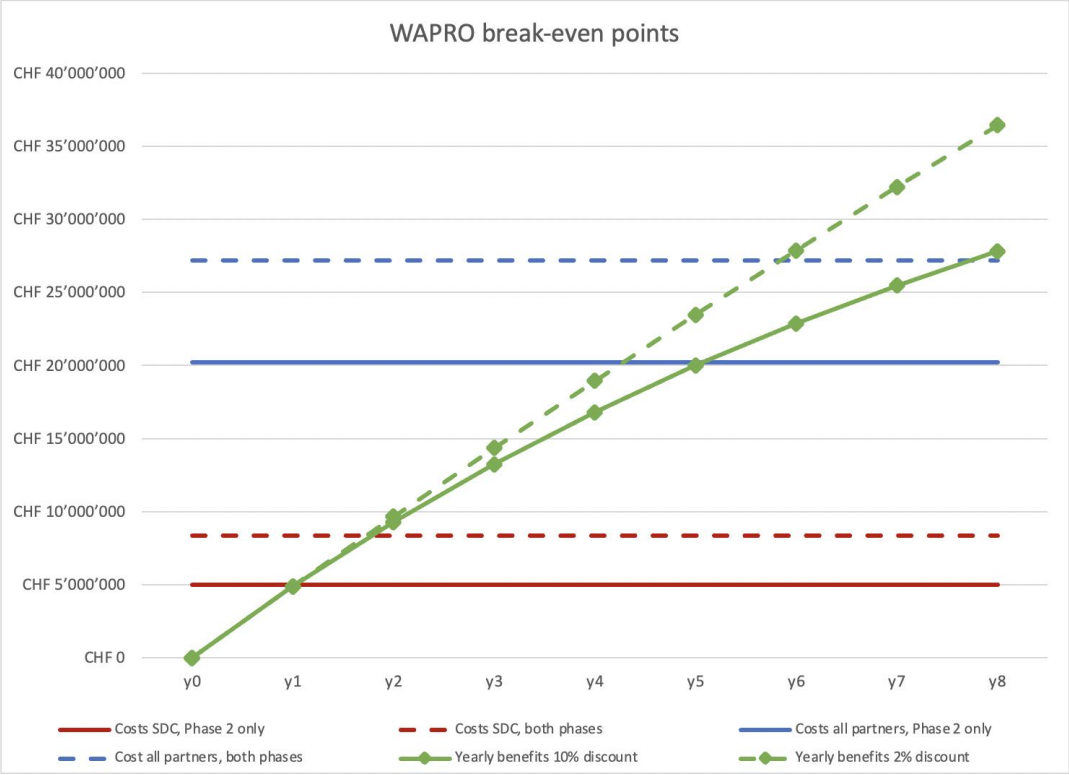
- The analysis is based on WAPRO's own monitoring data (see table below), which varies in detail and reliability depending on country and sub-project (some with control group, some without, adoption rates estimated, benefits not exhaustively documented). A comparison with productivity and income effects (data collected as part of the two country case studies) shows that the overall magnitude of the data can be considered reliable. It emerges that most WAPRO farmers cannot sell their products at higher prices, but that they significantly increase the volume produced per hectare compared to control groups, without significantly higher costs (for agricultural inputs, labour, etc.).
- The calculation of cost-benefit ratios per sub-project as such is possible and shows substantial differences in the profitability of the various sub-projects. However, since on the one hand not all sub-projects were launched at the same time, and on the other hand due to the high proportion of coordination costs of the WAPRO project that cannot be attributed to the individual sub-projects (around 1/3 of the SDC contribution), the corresponding figures are not very meaningful. Nevertheless, it can be concluded that the cost-benefit ratios of the various sub-projects vary considerably.
- On the cost side, the SDC contribution (CHF 5.0 million for phase 2, after budget top-up) is known as well as the partner contributions received by August 2022. (CHF 15.1 million for phase 2, including 10.1 million in premiums). Investment and additional costs of farmers, including opportunity costs, are not explicitly reported but should be included in the "net income increases". For simplicity, it is also assumed that all costs for SDC and the partners are incurred in a theoretical year 0, and that these are 100% one-off costs (no annually recurring costs).
- On the benefits side, only monetary benefits ("net income increases") for farmer families are taken into account. Possible benefits for intermediaries and purchasers (be they companies from the WAPRO consortium or beyond) are not included, nor are benefits for other, indirectly reached (crowding-in) farming families or non-monetary benefits such as improved access to education or health. Only numbers for 2021 are available; it can be expected that the data for 2022 will be somewhat higher.

Analysis:

Assuming that the net additional income benefits measured for the target group in 2021 (around 40'000 farmer families reached by then - excluding the BCI Pakistan sub-project) are the result of improved production processes, which will similarly materialize in the subsequent years, the question arises as to how many years it will take for the

project investment to "pay off" (break-even). For this purpose, future benefits are discounted at a rate of 10% - and 2% for comparison.

- As can be seen in the chart below, the break-even point is reached after just one year, if only the SDC contribution for the current second phase of WAPRO is used as a reference. After less than two years, the costs for the first project phase are also internalized.
- Since the WAPRO partner contributions besides quality premiums largely originate from public funds (ODA) or charity (NGOs and foundations), the evaluators consider it to be more appropriate to calculate the break-even point with regard to the total project costs, and not only taking into account the SDC contribution. This point is reached after about 5 years (for the second phase) or 8 years (for the two project phases together). Applying a lower discount rate (dashed green line) shortens the payback to slightly more than 4 years (for the total costs of the second phase) or just under 6 years (for the two project phases together).



Conclusion:

Based on the data available we can attest the WAPRO project a favourable cost-benefit ratio - also when the total project costs and not only the SDC contribution are taken into account in the assessment.

This is particularly the case since, in addition to the financial benefits calculated here for around 40'000 WAPRO farmer families reached by the end of 2021, many other actors (e.g. neighbouring farmers, distant family members or other population groups, particularly through the Policy component) could or can benefit directly or indirectly from

the learning experiences of the project. The actual benefits are therefore likely to be significantly higher than the calculated CHF 5 million per year.

A detailed investigation of the extent to which the WAPRO model is also worthwhile for companies such as Mars or Coop (through direct benefits in the respective supply chains - or indirectly through a more social/ecological brand image among consumers) would certainly be of interest. However, this would require comprehensive access to key corporate performance indicators, which the evaluators did not have - and would also have gone beyond the scope of this evaluation mandate.

Recommendations:

For future, similar projects, a more detailed assessment (separating one-off and recurring costs and benefits) and a differentiation for the various stakeholders is highly recommended. This would allow project management to gain a deeper insight into the profitability of the various sub-projects and to scale the most effective approaches accordingly. This would, e.g., allow to see under what conditions the projects can, after an initial impulse, generate revenues or other benefits exceeding recurring costs and can therefore be financially sustainable. Such an analysis could make the projects more attractive for actors from the private and also public sector.

The elaboration of an in-depth ex-post CBA (even for selected sub-projects only) might generate further interesting findings and could also be used as a set of arguments vis-à-vis potential partners for future, similar projects (provided that a differentiation is made between financial and economic analysis perspectives).

Underlying data and assumptions for the cost-benefit calculation (provided by Helvetas)

Sub-project	Unit	Tajikistan Cotton	Kyrgyzstan Cotton	India BCI Cotton	India Organic Rice	India SRP Rice	India organic cotton	Myanmar SRP Rice	Madagasscar	Pakistan SRP Rice	Pakistan BCI Cotton
Parameter		Income increase over comparison	Income increase over comparison	Income increase over comparison	Income increase over comparison	Income increase over comparison	Income increase over comparison	Income increase over comparison	Income increase over comparison	Income increase over comparison	Income increase over comparison
WAPRO technology		short furrow	short	BCI package	AWD, organic	AWD	arboreum variety, organic	Direct sowing, AWD	AWD	Levelled & AWD	BCI practices
Conventional technology		long furrow	long furrow	conventional methods	cont flood, conventional	continuous flooding	conventional production	Transplanting, flooded	continuous flooding	non-levelled, cont. flood	conventional
Project farmers in season 2020/2021	No	3'200	900	12'927	8'485	2'701	851	4'155	4'700	2'250	100'291
Surface		7'303		11'512	3'500	6'260	2'000	4'543	1'504	42'052	239'114
Productivity WAPRO	t/ha			2.56		4.31		4.15	3.47	3.55	
Productivly comparison group	t/ha			2.35		3.95		2.41	2.81	3.22	
Increase of productivity	t/ha			0.21		0.36		1.74	0.66	0.33	
calculated price	$ / t							189	150	170	
Adoption rate	%	100		100	100	60	100	30	30	34	
Comment adoption rate		Monitored were all farmers using the technology		Monitored were all BCI farmers	Monitored were all farmers in organic programme		Monitored were all farmers in organic programme	Estimation of adoption rate with sub-project team			
Income increase	$ / ha	114.04		40.00	569.25	56.32	45.75				
Benefit	$ * acreage * adoption rate	832'834		460'480	1'992'375	211'538	91'500	448'203	44'669	802'100	n.n.
Comment		Productivity increase not even included	Due to focus on POLICY component, not monitored		Driver for high figure is the high premium	Productivity increase not even included		Adoption rate is only estimated for all farmers in programme	This is only the rice; the Artemisia and Cop-beans need to be added to the calculation		As the programme was going on before, the benefit should not be calculated to WAPRO
TOTAL of all benefits 2021	$	4'883'699									

Annex 4: Aggregated Outcomes – results from online survey and validation workshop

Analysis

The following points are the evaluation team's main observations from the analysis of the aggregated outcomes:

- The vast majority of the outcomes have been observed in at least three countries or more (31 outcomes out of 33 = 94%), with the two other outcomes being very regionally specific (outcome nº 2 and nº 8).
- A total of five outcomes have been observed in all six countries. These outcomes saw a better dialogue between the farmers and the authorities/government, the increased knowledge about water issues in crop farming among farmers, a stronger learning community both among farmers and among WAPRO implementing partners and overall fairer access to water for farmers (outcomes nº 6, 12, 14, 15, 31).
- More than half of the outcomes (18 outcomes out of 33 – 55%) were submitted through the survey separately by two countries or more, meaning these outcomes were initially observed in several countries and submitted independently from each other to the evaluation team before the validation workshop. During the validation workshop, 14 of the outcomes submitted by only one country were validated in at least one other country too.
- There were five instances where an outcome story was submitted but then not validated at the workshop (outcomes nº 2, 6, 14, 25, 29). In all these instances, the outcome was validated in at least one other country. This discrepancy could be explained by the fact that not every person having submitted an outcome through the survey was present at the validation workshop.

Overview

Outcomes outcome written in survey and validated at workshop; outcome written in survey but not validated at workshop; outcome only validated at workshop		India	Pakistan	Madagascar	Tajikistan	Myanmar	Kyrgyzstan	
Collaboration between actors								
1	Stakeholders (local farmers, municipal representatives, etc.) have become aware of their own political agency.	✓	✓		✓	✓	✓	✓
2	While male farmers have advanced their knowledge and household income, women haven't had the same access so the gap between men and women may have increased even more.	✓	✓					
3	Better and more close collaboration between private sector and non-profit organizations in questions of sustainability and water efficiency was achieved	✓	✓	✓	✓	✓		✓
4	Better and more close collaboration between private sector and the farmers was achieved (e.g. dialogues between farmers and private enterprises to discuss fair water allocation)	✓	✓	✓	✓	✓		
5	Better collaboration between the private sector companies in the rice sector, even when they are competitors (e.g. rice mills and food companies)		✓			✓		✓
6	Better dialogue was fostered between the farmers and the authorities/government on water saving technologies and water stewardship issues.	✓	✓	✓	✓	✓	✓	✓
7	The project has gained recognition among water sector stakeholders and is being invited to share experiences by state agencies and development partners.	✓	✓	✓	✓		✓	
8	Producers who committed offences were sanctioned more systematically by the authorities and thus fewer offences are being committed.			✓				
9	The behaviour of farmers towards farm labour has improved thanks to better working conditions demanded by standards.	✓	✓	✓	✓			
10	Female farmers have been empowered to lead and supervise other producers	✓	✓	✓	✓			

Outcomes outcome written in survey and validated at workshop; outcome written in survey but not validated at workshop; outcome only validated at workshop		India	Pakistan	Madagascar	Tajikistan	Myanmar	Kyrgyzstan	
Farmers' income								
11	There is a visible increase in rice and cotton farmers' yield, which ultimately contributed to additional income for said farmers	✓	✓	✓	✓	✓		
Water efficiency and management (producer)								
12	Knowledge about water issues in crop farming among the farmers has increased	✓	✓	✓	✓	✓	✓	✓
13	There is a more sustainable management of water, particularly groundwater resources	✓	✓	✓			✓	
14	A strong learning community of farmers in the WAPRO regions was created or expanded	✓	✓	✓	✓	✓	✓	
15	Farmers have fairer access to water	✓	✓	✓	✓	✓	✓	
16	Awareness of water management issues was raised, and therefore farmers' family have also started using water responsibly (irrigation and drinking water)	✓	✓	✓	✓	✓		
17	Farmers are applying water saving techniques with other crops (such as cassava and cowpea)	✓	✓	✓	✓			
Production efficiency through fewer inputs								
18	The farmers consume less irrigation water as they need to irrigate fewer times during a cycle	✓	✓	✓	✓	✓		
19	The farmers use fewer fertilizers when growing their crop	✓	✓	✓	✓	✓		
20	The farmers use fewer Highly Hazardous Pesticides when growing their crop and use environment-friendly pesticides and other biopesticides	✓	✓	✓	✓	✓		
21	There was a reduction of pressure on water, fuel and electricity resources	✓	✓		✓			

Outcomes outcome written in survey and validated at workshop; outcome written in survey but not validated at workshop; outcome only validated at workshop		India	Pakistan	Madagascar	Tajikistan	Myanmar	Kyrgyzstan	
Quality of harvested products								
22	The quality of the rice yielded has significantly improved	✓	✓	✓		🖥		
23	The security of the supply of rice has increased	✓	🖥	🖥				
Sustaining water stewardship and efficiency approaches (community)								
24	The local implementing partner has begun to replicate the project's development in other regions of the country	🖥	🖥		✓		🖥	
25	Water productivity and sustainability have become important issues in private sector companies (ginneries)	✓	✓	🖥	✓	🖥		
26	Private sector companies (ginneries) have a more active role in spreading awareness about water efficiency and integrate it more into their activities	✓	✓	✓	🖥			
27	Farmers joined associations that ensure laws and rules linked to water usage are followed	✓	🖥	✓	🖥	✓		
28	Water users associations (WUAs) are better managed, leading to fewer conflicts between members	🖥	✓	✓	✓	✓		
29	Legislation concerning water efficiency were put in place or reviewed in the country on regional and/or national level	✓		🖥	🖥	✓	✓	✓
30	Government took ownership of WAPRO approaches (e.g. water saving technologies) and want to continue them after the end of the phase	🖥	✓	🖥	✓		🖥	
31	A strong Community of Practice was established within the WAPRO implementing actors	🖥	🖥	🖥	🖥	🖥	🖥	✓
32	An educational program for young students has been put in place to improve their irrigation skills and become professionally involved in the water and agricultural sectors, addressing one of the biggest bottlenecks in the sector: lack of qualified staff.	🖥	🖥		✓			
33	The local government has appointed a person in charge of post-WAPRO monitoring and supervision of activities in anticipation of the end of the phase		🖥	✓			🖥	

Significance of the outcomes and what activities contributed to them

The following results were gathered from the online validation workshop hosted on the 30th of August 2022 with the WAPRO partners.

Overview of significance

Outcome (ranked on their significance throughout the WAPRO countries)	**Number of countries**	**Ranks** (per number of countries)
There is a visible increase in rice and cotton farmers' yield, which ultimately contributed to additional income for said farmers	5/6	1st: 3; 2nd: 1; 3rd: 1
Better and more close collaboration between private sector and the farmers was achieved (e.g. dialogues between farmers and private enterprises to discuss fair water allocation)	3/6	1st: 2; 2nd: 1
There was a reduction of pressure on water, fuel and electricity resources	2/6	2nd: 2
Government took ownership of WAPRO approaches (e.g. water saving technologies) and want to continue them after the end of the phase	2/6	3rd: 2
Water users associations (WUAs) are better managed, leading to fewer conflicts between members	2/6	3rd: 2
Knowledge about water issues in crop farming among the farmers has increased	1/6	2nd: 1
Legislation concerning water efficiency were put in place or reviewed in the country on regional and/or national level	1/6	1st: 1
A strong Community of Practice was established within the WAPRO implementing actors	1/6	2nd: 1
The project has gained recognition among water sector stakeholders and is being invited to share experiences by state agencies and development partners.	1/6	3rd: 1

India

Most significant outcomes	**Why is this outcome significant?**	**Which WAPRO activities contributed to this outcome?***
Better and more close collaboration between private sector and the farmers was achieved (e.g. dialogues between farmers and private enterprises to discuss fair water allocation)	Farmers and private sector are biggest water users (directly and through virtual water trade), better technology.	[not filled out for India as a whole] * due to the diversity of sub-projects, no consensus was found for all sub-projects involved
Knowledge about water issues in crop farming among the farmers has increased	Rising water scarcity is catching farmers' attention lately and they are ready to switch to water saving technology.	
There is a visible increase in rice and cotton farmers' yield, which ultimately contributed to additional income for said farmers	Through reduction in cost of cultivation and can fetch better prices especially for organic produce.	

Pakistan

Most significant outcomes	Why is this outcome significant?	Which WAPRO activities contributed to this outcome?
There is a visible increase in rice and cotton farmers' yield, which ultimately contributed to additional income for said farmers	Improved incomes and yields are the most significant factor in bringing about a behavioural shift among farmers	• Capacity building trainings on agronomic practices • Access to technology (Laser levelling, AWD, MRT) • Awareness sessions • Access to quality inputs • Advisory services • Contract farming under SRP/BCI program
There was a reduction of pressure on water, fuel and electricity resources	Water efficiency is one of the most important objectives of the project. It is not only important from the point of view of the project but also a national priority.	• Awareness raising • Access to technology • Advisory services
Government took ownership of WAPRO approaches (e.g. water saving technologies) and want to continue them after the end of the phase	This is significant from the point of view of sustainability of the project in the long term.	• Advocacy sessions • Joint workshops/seminars • Evidence sharing • Policy dialogues

Madagascar

Most significant outcomes	Why is this outcome significant?	Which WAPRO activities contributed to this outcome?
Better and more close collaboration between private sector and the farmers was achieved (e.g. dialogues between farmers and private enterprises to discuss fair water allocation)	[not filled out]	Strengthening of capacities of local stakeholders, adoption of new techniques (proximité dans l'accompagnement)
There is a visible increase in rice and cotton farmers' yield, which ultimately contributed to additional income for said farmers	[not filled out]	Strengthening of capacities of local stakeholders, adoption of new techniques (proximité dans l'accompagnement)
Water users associations (WUAs) are better managed, leading to fewer conflicts between members	[not filled out]	Strengthening of capacities of local stakeholders, adoption of new techniques (proximité dans l'accompagnement)

Tajikistan

Most significant outcomes	Why is this outcome significant?	Which WAPRO activities contributed to this outcome?
There is a visible increase in rice and cotton farmers' yield, which ultimately contributed to additional income for said farmers	The project's mission was to increase farmers' income and food security. Financial well-being serves for the sustainability of the project approach, as well as allows the project beneficiaries to improve their livelihood.	Transfer of knowledge, trainings, promotion of agro-ecological principles, consultations and organizing demonstration plots
There was a reduction of pressure on water, fuel and electricity resources	The project farmers save up 30% of water compared to the traditional farmers, which results in a reduction in electricity demand, as 85% of pump irrigation is used. This has an impact on the overall better management of natural resources and is a climate change mitigation measure.	Implementation of simple, affordable and easy applicable water-saving technologies at farm level, development of water-use plans at WUAs level including mapping, strengthening capacity of WUAs
Government took ownership of WAPRO approaches (e.g. water saving technologies) and want to continue them after the end of the phase	WAPRO's existing approach has proven successful and extending the knowledge transfer to other areas ensures the sustainability of the project.	Advocacy conducted by the project, development of training modules, development of materials, brochures, educational videos, posters and by working at irrigation system level, participation in RTs, organization of multi-stakeholders workshops with government and private sector representatives, development of recommendations for Agency for Land Reclamation and Irrigation and creation of Syrdarya River Basin Council Working Group on Water Use Efficiency and Productivity led by WAPRO.

Myanmar

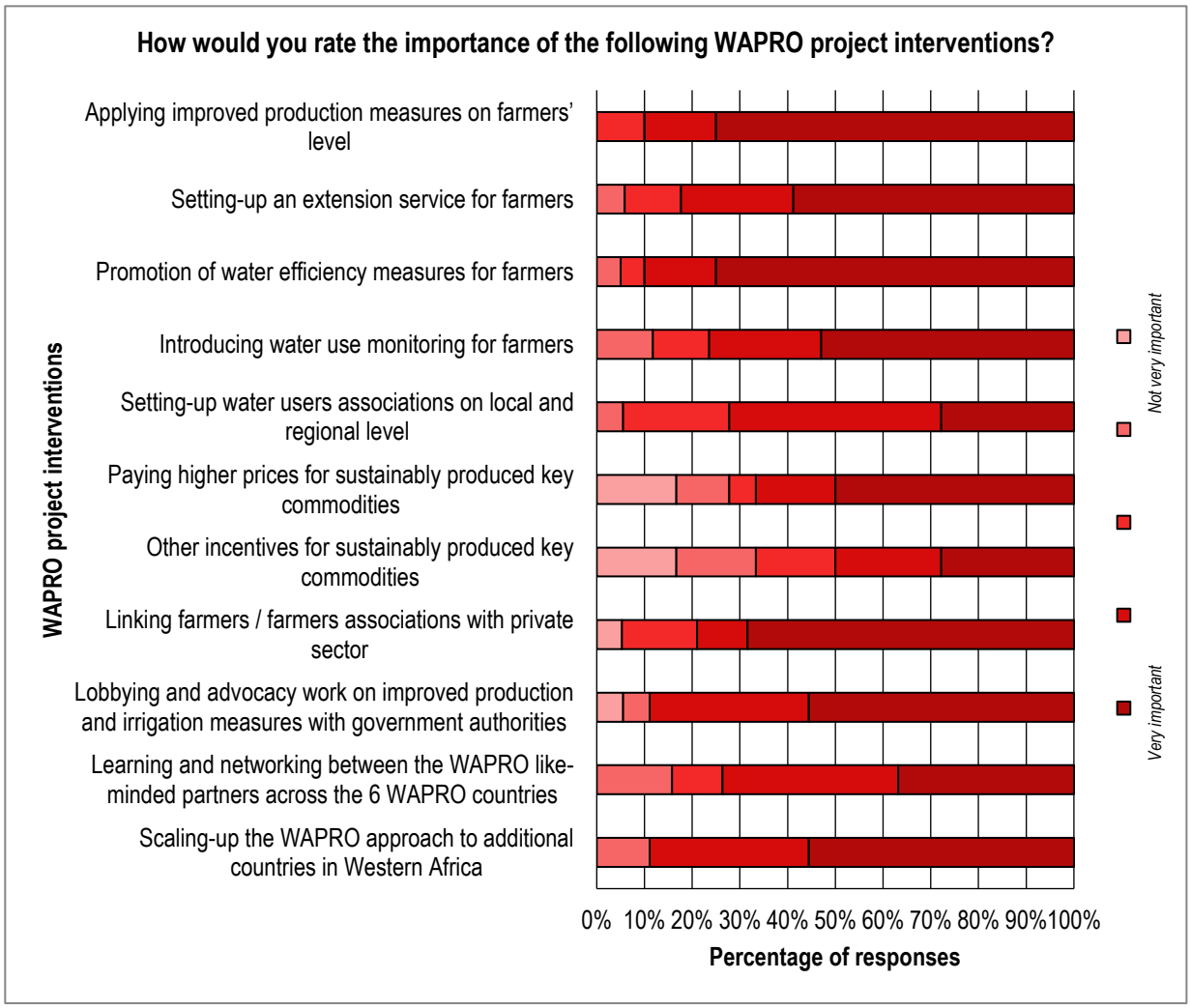
Most significant outcomes	Why is this outcome significant?	Which WAPRO activities contributed to this outcome?
There is a visible increase in rice and cotton farmers' yield, which ultimately contributed to additional income for said farmers	• It directly contributed to higher income by farmer, better food nutrition leading to food security.	• Fair water access • Adoption of resource efficient technologies (SRP, SRI, AWD) • Rice miller extension model (training and coaching to farmers)
Better and more close collaboration between private sector and the farmers was achieved (e.g. dialogues between farmers and private enterprises to discuss fair water allocation)	• Innovative approach (pull factor) relevant to Myanmar • One of the best approaches for sustainability	• Building trust • encouragement/ facilitation for contract farming (formal and informal) • investment/ co-financing based on rice miller assessment
Water users associations (WUAs) are better managed, leading to fewer conflicts between members	• It guarantees sustainability for fair water allocation and usage in the future	• Restructuring the organization structure for WUAs • SOP include water risk management plan, incident response plan, • Facilitation for MoU between private sector partners and WUAs (WS plan updating and equal sharing of water) • Capacity development program WUAs (leadership skill, accountant skill and management skill) • Support / contribution for rehabilitations which is lead by WUAs • Support WUAs to manage collective action (financial and HR, etc.)

Kyrgyzstan

Most significant outcomes	Why is this outcome significant?	Which WAPRO activities contributed to this outcome?
Legislation concerning water efficiency were put in place or reviewed in the country on regional and/or national level	• National law that was put in place and successfully approved on national level • It opens up legislative opportunities for water security	• Multi-stakeholder discussion platforms • Expert support from Helvetas • Media coverage • Collaboration with state stakeholders (bilateral meetings, round tables)
A strong Community of Practice was established within the WAPRO implementing actors	• Strong local group of interested stakeholders • Through capacity building, they were able to talk as equals with the authorities and change the laws	• Building capacity of the actors • Building/strengthening ownership of actors through strategy development; the actors were involved in developing the strategy and the project, they built it together • Mobilizing the involved and interested stakeholders • Establishment of local initiative group • Keeping up regular communication and meetings with the local initiative group (1 meeting every 2 months) • Broadening of the base of supporters (it started in a specific region, then more provinces were involved)
The project has gained recognition among water sector stakeholders and is being invited to share experiences by state agencies and development partners.	• Helvetas give support to the local actors in their water-related activities, especially policy related activities	• Expertise provided (legal, technical and practical expertise); it was based on local knowledge, not only on INGO knowledge • Persistent advocacy and long-term thinking, not stopping after the first set back

Annex 5: Selected survey result graphs

How would you rate the importance of the following WAPRO project interventions?



Annex 6: Evaluation matrix

No	Criteria	Code	Question improved / questions proposed
1	Relevance	R1	How far were project design (notably through the 4 components), scope, implementation modalities and budget adequate to reach the planned objectives and outputs? What about unplanned objectives and outputs?
2	Relevance	R2	Which of the different pillars and activities of the project were more relevant to tackle the different objectives of the phase?
3	Relevance	R3	To what extent has the intervention responded to changes in the environment over time (risks and potentials)?
4	Relevance	R4	How pertinent has the public-private partnership modality been to reach the overall goal of improved water resources management for increased farmers' income and water productivity? What was their main motivation / incentive to get involved?
5	Relevance	R5	How far has gender mainstreaming been considered in the overall design and implementation of this phase, and how could it be improved in the future?
6	Relevance	R6	How far were challenges and opportunities of the youth taken into account in the overall project design and implementation, and how could it be improved in the future?
7a	Relevance	R7a	Was the intervention aligned with the goals and policies of Swiss development cooperation (incl. GPFS cooperation strategy 2017-2020 and 2021-2024)
7b	Relevance	R7b	Was the intervention aligned with the needs and priorities of partner countries?
7c	Relevance	R7c	Was the intervention aligned to the needs and priorities of target groups (famers)?
7d	Relevance	R7d	Was the intervention aligned to the needs and priorities of the target groups (international private sector)?
8	Coherence	C1	In view of the recent developments under the momentum of the UN Food Systems Summit, how coherent is the project approach and partnership through a food systems lens?
9	Coherence	C2 new	How do you assess the coherence / synergies /subsidiarity with other SDC/SECO interventions in the countries (internal coherence)?
10	Coherence	C3 new	To what extent is the intervention compatible with interventions of other actors in the country and thematic field regarding complementarity and synergies? (external coherence)
11	Coherence	C4	How far did the WAPRO phase 2 coordinate / cooperate with other interventions by other donors / projects in the similar regions or countries?
12	Effectiveness	EFFECT1	To what extent were the project results attained, in terms of smallholders reached, policies adapted, private sector engaged, etc.?
13	Effectiveness	EFFECT2	What evidence exists regarding results of the project on people's livelihoods in terms of social or economic improvements (e.g. food security)?
14	Effectiveness	EFFECT3	At national and sub-project level, was the steering and implementation setup adequate enough to: (1) ensure effective project implementation, (2) guarantee a proper monitoring of the project results, (3) ensure transparency and accountability, (4) consolidate the results and advances for policy dialogue and general communication (notably through the national coordinators)?
15	Effectiveness	EFFECT4	Was the selection of the 4+2 countries effective to promote the WAPRO Initiative? Were the countries selected coherent in terms of partner engagement, results attainment, and to gain leverage for replication potential?
16	Effectiveness	EFFECT5	To what extent have the three components (push / pull / policy) interacted between one another to reach greater effectiveness and sustainability of the interventions? (e.g. the push developments brought into policy frameworks, the pull incentives brought into adapted ESG guidance, etc.)
17	Effectiveness	EFFECT6	What was the value of SDC engagement for the overall partnership, objectives attainment and engagement of the stakeholders (AWS / BCI / SRP & co, Mars / Coop / Westmill, etc.?
18	Effectiveness	EFFECT7	Which have been the most important incentives for the Private Sector to become engaged in the project ("Pull" factor)?
19	Effectiveness	EFFECT8	How far was the private sector involved during this phase, and how could their involvement be positioned for greater engagement and impact in the future?
20	Effectiveness	EFFECT9	Which interventions have proven the least effective?
21	Efficiency	EFF1	Were the coordination mechanisms and leadership in project implementation fit for purpose to achieve the project results?
22	Efficiency	EFF2	How efficient was the partnership between the different project actors?
23	Efficiency	EFF3	How far did the various sub-projects communicate between each other, in terms of sharing of experience, lesson learning, or building on each other (notably for the policy dialogue at national level and globally)?
24	Efficiency	EFF4	Are the results (outputs, outcomes) delivered in a timely manner (within the intended timeframe or reasonably adjusted timeframe)?
25	Efficiency	EFF5	Were project resources efficiently utilized to achieve the project results, especially considering the last two years of the COVID-19 pandemic?
26	Efficiency	EFF6	A first cost-benefit analysis was done at the end of the first phase, with a ratio of approximately 1:1 with regards to the CH funds. Based on the available information, what would be the cost-benefit assessment of the overall project?
27	Impact	I1	How far were WAPRO approaches and methods mainstreamed, nationally and globally?
28	Impact	I2	What has been the impact of the WAPRO initiative on the CSR / ESG strategies of the private sector partners, but also within the global discourse?
29a	Impact	I3a	How far did the WAPRO overall project influence policies, in the countries of direct intervention? Are there any documented examples of such policy uptakes?
29b	Impact	I3b	How far did the WAPRO overall project influence policies globally? Are there any documented examples of such policy uptakes ?
30a	Impact	I4a	Have there been any unintended effects, such as: (1) relative to the uptake by non-stakeholders of elements promoted by the project, be it from neighbouring farmers, other governments or private sector companies? (2) relative to the re-orientation of markets (such as increased focus on export vs. local food supply), or new supply chain contracting?
30b	Impact	I4b	Have there been any unintended effects on a more global level?
31	Sustainability	SUS1	To what extent will the effects, impacts & partnerships be maintained once SDC's support comes to an end ?
32	Sustainability	SUS2	To what extent are knowledge, information and experiences documented and shared during the project implementation at the national, regional and global level?
33	Sustainability	SUS3	How far have the implementation strategies been oriented keeping in mind a logic of sustainability? (e.g. in terms of anchoring the "push" practices into local institutions or entities, or in terms of increasing the "pull" effect adoption through the development of new supply chain contracting, or through concrete new governmental frameworks)
34	Sustainability	SUS 4	How far have the results and lessons learnt produced under the programs been fed into the Swiss country offices and interventions in the countries of intervention (for those countries where an SCO is / was present) ?
35	Lessons Learned and Recommendations	LL&R1	What lessons can be learned from the phase 2 in terms of relevance, coherence, effectiveness, efficiency, impact, and sustainability, and what recommendations could be drawn for the GPFS for any new support targeting private sector engagement along a supply chain?
36	Lessons Learned and Recommendations	LL&R2	Which are the good practices from this phase, which should be further promoted for replication and up-scaling, and which activities or approaches should be avoided in the future?
37	Lessons Learned and Recommendations	LL&R3	Make any other recommendation towards SDC/GPFS, which could be useful for the promotion of private sector engagement, of sustainable agricultural practices and resources management, etc. – along the priorities of the GPFS cooperation framework 2021-2024.

Annex 7: Assessment Grid

Assessment Grid for project/program evaluations of SDC / SECO interventions

Version: 11.06.2020

Note: this assessment grid is used for evaluations of SDC / SECO financed projects and programs (hereinafter jointly referred to as an 'intervention'). It is based on the OECD Development Assistance Committee evaluation criteria.[18] In mid-term evaluations, the assessment requires analyzing the likelihood of achieving sustainability and, to a lesser degree, the likelihood of effectiveness and efficiency. All applicable sub-criteria should be scored and a short explanation should be provided.

Please add the corresponding number (0-4) representing your rating of the sub-criteria in the column “score”:
0 = not assessed
1 = highly satisfactory
2 = satisfactory
3 = unsatisfactory
4 = highly unsatisfactory

[18] For information on the 2019 revisions of the evaluation framework see: Better Criteria for Better Evaluations. Revised Evaluation Criteria. Definitions and Principles for Use, OECD/DAC Network on Development Evaluation, 2019.

Key aspects based on DAC criteria	Score (put only integers: 0, 1, 2, 3 or 4)	Justification (please provide a short explanation for your score or why a criterion was not assessed)
Relevance **Note**: the assessment here captures the relevance of objectives and design *at the time of evaluation*. In the evaluation report, both relevance at the design stage as well as relevance at the time of evaluation should be discussed.		
1. The extent to which the objectives of the intervention respond to the needs and priorities of the target group.	1	Working with a Push-Pull-Policy approach on micro, meso and macro levels, WAPRO addresses the needs and priorities of the various stakeholders directly involved in the project.
2. The extent to which the objectives of the intervention respond to the needs and priorities of indirectly affected stakeholders (not included in target group, e.g. government, civil society, etc.) in the country of the intervention.	1	WAPRO aligns with government priorities in all 6 countries, the SDGs, Switzerland's International Cooperation Strategy 2021-24 and the ESG strategy of most private sector partners involved.
3. The extent to which core design elements of the intervention (such as the theory of change, structure of the project components, choice of services and intervention partners) adequately reflect the needs and priorities of the target group.	2	Though the majority of WAPRO beneficiaries are smallholder farmers, the design of the project does not specifically target them or any other specific disadvantaged target groups (e.g. women farmers, youth, LNOB), however, the chosen target group “farmer families” and the project interventions are seen to be very relevant.
Coherence		
4. Internal coherence: the extent to which the intervention is compatible with other interventions of Swiss development cooperation in the same country and thematic field (consistency, complementarity and synergies).	1	WAPRO being steered by a global division at SDC is coherent with global and country strategies by Switzerland, and WAPRO management maintained close synergies with other SDC and SECO interventions in countries where the FDFA runs a SCO.
5. External coherence: the extent to which the intervention is compatible with interventions of other actors in the country and thematic field (complementarity and synergies).	2	WAPRO worked based on opportunities and had by project design an open and transparent communication with relevant stakeholders. Furthermore, the Push-Pull-Policy approach offers a comprehensive way to involve relevant stakeholders in complex (market) systems.

Effectiveness		
6. The extent to which approaches/strategies during implementation are adequate to achieve the intended results.	2	In most of the sub-projects, the interaction of the three components of Push-Pull-Policy contributed to reaching the objectives. By addressing water efficiency, WAPRO also indirectly addressed food security, and water efficiency knowledge was also applied to other crops.
7. The extent to which the intervention achieved or is expected to achieve its intended objectives (outputs and outcomes).	2	A large number of farmer families have improved their water efficiency, their productivity and their incomes. The initial goal of 65'000 farmers was exceeded – around 81'550 farmers were reached based on the 2021 annual report. However, differences between the countries regarding M&E reporting bring a certain limitation to the true meaningfulness of this number. The confirmed number is 40'000 by 2021.
8. The extent to which the intervention achieved or is expected to achieve its intended results related to transversal themes.	2	Though the target of 15 % of participating women was not a particularly ambitious goal, given that the agronomy sector is highly male-dominated, the 27 % of female farmers WAPRO ended up reaching (as mentioned in the annual report 2021) is an overall satisfactory result.
Efficiency		
9. The extent to which the intervention delivers the results (outputs, outcomes) cost-effectively.	2	The overall budget of around CHF 27 million for both phases allowed the project to reach around 40'000 confirmed farmer families by 2021. The CBA showed that the overall WAPRO budget (SDC contributions and third-party contributions) was internalized well within the project timeframe.
10. The extent to which the intervention delivers the results (outputs, outcome) in a timely manner (within the intended timeframe or reasonably adjusted timeframe).	2	WAPRO was implemented within the planned timeframe, which was extended by one year due to the Covid-19 pandemic.
11. The extent to which management, monitoring and steering mechanisms support efficient implementation.	3	The project management style was lean, which was praised by many partners, however the lack of clear steering from SDC was seen by the evaluators as a missed opportunity. The project management lacked systematic and organized coordination and reporting and led to inaccuracy and opacity. Furthermore, though the inter-

		country exchanges were considered fruitful, intra-country exchanges – between the sub-projects and actors – could have been fostered more.
Impact		
12. The extent to which the intervention generated or is expected to generate 'higher-level effects' as defined in the design document of the intervention. **Note**: when assessing this criterion, the primary focus is the intended 'higher-level effects'. In the event that *significant* unintended negative or positive effects can be discerned, they must be specified in the justification column, especially if they influence the score.	2	WAPRO led to enhanced water productivity and increase of family income of at least 40'000 farmers and their families. However, the project could have reached more scale on the sub-project level. Furthermore, mainstreaming of water efficiency in policy was achieved on local, regional and even national level depending on the country.
Sustainability		
13. The extent to which partners are capable and motivated (technical capacity, ownership) to continue activities contributing to achieving the outcomes.	1	Activities in the Push category are the most likely to be continued (e.g. adoption of water saving technologies by individual farmers), in the Pull category it is questionable (it highly depends on the private sector's readiness and awareness) and in the Policy category it is the most questionable (it depends on the willingness of farmers, the private sector, and the government to engage).
14. The extent to which partners have the financial resources to continue activities contributing to achieving the outcomes.	2	Several examples showed that WAPRO approaches will be sustained by partner organizations and/or replicated in several new projects co-financed by the private sector and/or with other donors.
15. The extent to which contextual factors (e.g. legislation, politics, economic situation, social demands) is conducive to continuing activities leading to outcomes.	2	Though there is a will from farmers, the private sector and to an extent the governments to work on water efficiency, not many policies or mandatory incentives for private sector actors were put in place, meaning in most countries there is still a lack of a clear framework with enforceable measures to push water efficiency measures long term.

Additional information (if needed): no

Title of the intervention: WAPRO Phase 2

Assessor(s): Carsten Schulz, Roman Troxler

Date: 12.10.22

Annex 8: Case study Pakistan

Annex 9: Case study Tajikistan

Water Efficiency in Rice & Cotton Project – WAPRO

Pakistan Case Study

Suwaibah Mansoor suwaibah86@gmail.com
Lahore, September 30, 2022 – final version

Table of Contents

Executive Summary

This study was conducted as part of the overall evaluation of the Water Efficiency in Rice & Cotton Project (WAPRO) in Pakistan. The objective of the analysis was to assess the impact of WAPRO on farmers' income, water productivity and food security as well as changes in farmers' behaviours and attitudes towards improved irrigation and agronomic practices in the rice and cotton value chains. Under the project, a multitude of stakeholders worked together to enhance water productivity in the rice and cotton value chains through the innovative Push-Pull-Policy approach. The main project beneficiaries were rice and cotton farmers in Punjab, specifically, in the districts of Gujranwala and Sheikhupura for rice and district Rahim Yar Khan for cotton.

The study found significant evidence of improvement in farmers' income and water productivity in the rice value chain. The project was successfully able to convince and support farmers in adopting water efficient technologies and practices for rice crop production. The push-pull-policy approach also worked effectively in creating awareness and generating interest in the SRP standards among the key stakeholders in the rice value chain. Overarchingly, all three components worked synergistically to improve farmers' livelihoods while ensuring the profitability and sustainability of the rice value chain.

The push component in the rice project focused on creating awareness around water scarcity and water productivity among the farmer community and, sharing alternatives to their traditional cropping practices so that they can not only improve water productivity but also overall yield and quality of their crops. The outreach under the push component was significant and the field teams of the two private sector partners were able to reach 54,250 rice farmers through their trainings, farmer gatherings and on farm advisory services. The awareness among project farmers around water productivity and their interest in new technologies/practices was found to be significantly higher than the control farmers.

Under the pull component of the rice project, the two private sector partners developed an incentive package for farmers to adopt Sustainable Rice Standards (SRP) and water productive cropping practices. The incentive mechanism comprised of financial assistance in the form of subsidized access to water saving technologies and quality inputs, and premium prices and timely payments. The push component had already made the farmers aware of the potential benefits of the improved cropping practices and now the pull component was inviting them to take a step forward towards adoption through mitigating some of the financial risk that the farmers perceived in adopting new technologies. Both components worked in tandem with the result that there was 95% compliance of SRP standards among contract farmers and all the contract farmers had adopted at least one if not more of the water saving technologies that were promoted. Farmers who had adopted laser levelling reported a 10% increase in their rice yield while, farmers who had adopted laser levelling and mechanical transplanting reported an increase of up to 15%. Farmers also reported significant reduction in their water usage and cost. Laser levelling and AWD tubed together resulted in at least 30% less usage of water. A basic income and cost of production analysis showed that, with an increase of 10% in yield, project farmers were earning about USD 200/hectare more in net income than non-project farmers. Even if the yield was kept constant, the project farmers were earning USD 100/hectare more in net income compared to non-project farmers. In this case the additional income

was driven by the premium prices offered by the two companies as compared to the local market.

The policy component was also quite strong in the rice project and was successfully able to bring together key players in the rice value chain to work collectively and collaboratively. At the field level the private sector partners and government's On Farm Water Management worked together to revive and establish Water User Associations (WUA) and water use plans. There was also cross learning between the private sector extension teams and government extension services to expand the flow of information on water productive technologies and improved cropping practice to the wider farming community. At the provincial level, WAPRO's results and learnings from the rice project were incorporated in the agriculture department's on-going activities and initiatives. Under the policy component several research pieces were also developed which were used as the basis to encourage discussion and dialogue on tricky political economy issues in the water sector. WAPRO provided the agriculture community with a neutral platform where are stakeholders could come together and openly discuss issues plaguing the water sector in agriculture, to develop consensus and a holistic way forward.

The study could not find clear results in the cotton component as compared to the rice component. The cotton component started with a delay and as such has only been implemented for a year. This is too short of a time to be able to adequately assess the results of the cotton project. Currently, the project is being implemented in the district Rahim Yar Khan in south Punjab and the focus is primarily on the push component. Farmers are being trained on the better cotton standards as well as the use of water saving technologies like moisture metering, drip irrigation, sprinklers, and furrow pipes. The adoption of these technologies is yet to be seen among the project farmers. The next cotton season starts in April 2023 and that will be the time when adoption among farmers can be fully observed. The pull and policy components of the cotton project were found to be in their development stages. A clear approach was missing in terms of developing suitable incentive mechanisms for the farmers and private sector actors in the cotton value chain. Similarly, linkages with the government for collaboration and upscaling were found to be lacking. While there was some collaboration with the government agriculture departments at the district level, this was not translated at the provincial or national level.

1 Introduction and Methodology

The Swiss Agency for Development and Cooperation (SDC) has commissioned an External Project Evaluation of the SDC programme "Water efficiency in Rice & Cotton (WAPRO)", a multi-stakeholder initiative to address water efficiency issues in cotton and rice farming in 6 countries: India, Pakistan, Tajikistan, Kyrgyzstan, Madagascar, and Myanmar. WAPRO is based on a push-pull-policy approach. The push component refers to technological support for farmers to save water, and the pull component pertains to better conditions for marketing of high standard rice produced with water efficiency, while policy is about efforts to ensure upscaling and sustainability of good practices.

The purpose of the evaluation is to provide SDC with an external and objective assessment regarding the achieved results of the second phase, and of the overall impact of the entire project in general. The evaluation will provide an overall and comprehensive picture on the

project results on the short and medium term as well as provide information on possible effects at the long-term including elements of impacts and sustainability.

The case study on Pakistan is part of the overall evaluation and provides nuanced understanding of the evaluation results on the Push-Pull-Policy Approach i.e., results triggered by interlinkages between stakeholders working together, such as farmers, extension services, government institutions, private sector agents, NGOs, and associations. It also sheds light on key elements that have triggered the adoption of the farm level water efficiency measures, as initially planned by a functioning Push-Pull-Policy Approach.

1.1 Context

Agriculture and Availability of Water in Pakistan

Pakistan is among the world's 36 most water-stressed countries, with its agricultural, domestic, and industry sectors scoring high on the World Resource Institute's water stress index. Per capita annual water availability has dropped, from 5,600 cubic meters to the current level of 1,017 cubic meters and is projected to decline further under the current infrastructure and institutional conditions. (IMF, 2015)[1]

Agriculture in Pakistan is predominantly irrigated (90 percent) and consumes about 95 percent of annual available surface water. Though the bulk of farmland is irrigated through the canal system, farmers utilize water from other sources such as groundwater. Pakistan is the third-largest user of groundwater for irrigation in the world. The surface water supplies are sufficient to irrigate 27% of the area, whereas the remaining 73% is directly or indirectly irrigated using groundwater. The Punjab province uses more than 90% of the total groundwater extraction. Currently, 1.2 million private tube wells are working in the country, out of which 85% are in Punjab. (Qureshi, A.S, 2020)[2]

According to a survey conducted by Asian Development Bank, there will be a 32% shortfall in water availability in Pakistan by 2025 and it will affect food production by 70 million tons. Some important reasons for these present and projected water shortages are the escalating population, climate change impacts, poor surface water storage capacity, and poor performance of the irrigation system in terms of high conveyance and application losses. (ADB, 2012)[3]

There is a clear and urgent need to improve water efficiency and water management in Pakistan and it must start with the agriculture sector. Water productivity is crucial for a water stress country like Pakistan. Increasing water productivity in agriculture is a direct requirement for meeting for the country's food security goals. Enhancing food production under changing climatic conditions and declining water resources requires the reorientation of agriculture from current practices to more sustainable and environment friendly practices with more focus on climate smart and efficient water use production techniques.

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[1] Issues in managing water challenges and policy instruments: Regional perspectives and case studies. https://www.imf.org/external/pubs/ft/sdn/2015/sdn1511tn.pdf

[2] Qureshi, A.S. (2020). Groundwater Governance in Pakistan: From Colossal Development to Neglected Management. https://www.mdpi.com/2073-4441/12/11/3017/pdf

[3] Asian Development Bank (2012). Water Resources Strategy Study Pakistan. Asian Development Bank: Islamabad, Pakistan

Rice in Pakistan

Pakistan is ranked amongst the world's top ten producers of rice and on average grows 7 million tons annually. It contributes 3.5 percent of value added in agriculture and 0.7 percent in GDP. Rice is the second important cash crop of the country after cotton, covering 11% of total cropped area. The share of Pakistan in total world rice trade is around 9% by value and is responsible to earn more than US$ 2 billion in foreign exchange annually. (Ayub Agriculture Research Institute)[4]. The current year witnessed a record production growth of 13.6 percent to 8.419 million tons against 7.414 million tons last year. This was essentially due to rising unit prices and higher demand for the country's rice in export markets. (Pakistan Economic Survey 2021-22)[5].

Pakistan has two major rice-producing regions: Punjab and Sindh. Together, both provinces account for nearly 90% of total rice production. Punjab, due to its agro-climatic and soil conditions, produces 100% of the Basmati rice in the country, which is a premium quality and expensive rice as compared to non-basmati rice. Sindh region is enriched with cultivation of non-basmati rice, mainly IRRI-6, which is majorly exported to the African regions. (PACRA.2021)[6]

In terms of water usage, the four most water intensive crops in Pakistan are rice, sugarcane, cotton, and wheat. Among the four, rice stands out as the most water intensive using about 70 million cubic metres of water annually, with cotton, wheat and sugar all using about 50 million each. This is even though there are more hectares of wheat grown than the other three crops put together. (WWF. 2003)[7]. The traditional methods of producing irrigated rice in most of the Asian rice growing fields require large quantity of irrigation water. On average around 3,000 litres to 5,000 litres of irrigation water are needed for producing one kg of rice (IRRI, 2018)[8]. The increasing water shortage in irrigated areas due to the lack of water conservation practices and over exploitation of groundwater requires improved rice crop cultivation techniques focusing on better irrigation water efficiency.

Cotton in Pakistan

Pakistan is the 5th largest producer of cotton and 3rd largest consumer /producer of cotton yarn in the world. Farmers cultivate cotton on an area of about 2.4 million hectares, covering 15% of cultivated area in the country. Production is concentrated in two provinces with Punjab and Sindh accounting for approximately 65 and 35 percent, respectively, of planting area. Over 90 percent of cotton is produced by small farmers cultivating less than five hectares of land.

Cotton is an important cash crop and the lifeline of Pakistan's textile industry. Cotton crop has 0.8% share in GDP, contributes 5.2% in agriculture value addition and has 51% share in total foreign exchange earnings of the country. The textile sector is the largest industrial sector in Pakistan and accounts for about 40 percent of the industrial labour force and employs 10

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[4] Rice. https://aari.punjab.gov.pk/crop_varities_rice

[5] Pakistan Economic Survey. 2021-22. https://www.finance.gov.pk/survey_2022.html

[6] Rice Sector: An Overview https://www.pacra.com/sector_research/Rice%20Sector%20PACRA_1604759631.pdf

[7] WWF. 2003. Agriculture Water Use and River Basin Conservation. https://wwfint.awsassets.panda.org/downloads/agwaterusefinalreport.pdf (panda.org)

[8] IRRI. 2018. Module 3, Water Management. http:// www.knowledgebank.irri.org/ericeproduction/ III.1_Water_usage_in_rice.html

million people. This sector also generates eight percent of Pakistan's GDP and about 60 percent of foreign exchange earnings, the largest of any other product. Cotton is a less water intensive crop as compared to rice and sugar cane and is a very drought tolerant crop. Cotton's global water footprint is about 2.6% of the world's water use, lower than other crops e.g., Soybeans 4%, Maize 9%, Wheat 12%, Rice 21%. (Ayub Agriculture Research Institute)[9]

Agriculture in Punjab

Agriculture is the mainstay of Punjab's economy and makes a substantial contribution to the province's economic growth and prosperity. The sector comprising of crops, livestock, and dairy, is responsible for 20 percent of the country's overall GDP and is the largest employer in the country, absorbing 42.3 percent of the total population. 62 percent of the total area of the province is currently being utilized for agricultural activities, with 53 percent of the area sown and 9 percent fallow. The total cultivated area is around 16,000 thousand hectares. Punjab bears a large share of the total area cultivated for all major crops in Pakistan (Figure 1) and contributes more than 50 percent of the total volume produced of all major crops (Figure 2). [10]

Figure 1: Area under cultivation by crop: Pakistan & Punjab

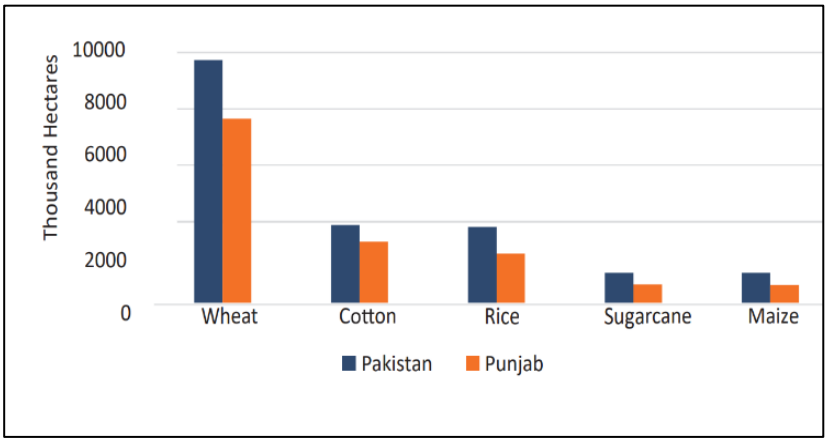
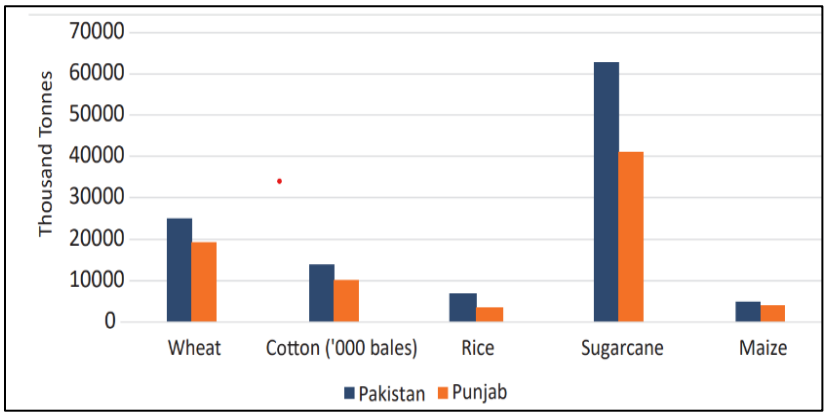


Figure 2: Production of Major Crops: Pakistan and Punjab



[9] Cotton. https://aari.punjab.gov.pk/crop_varieties_cotton

[10] *Agriculture and Rural Development. Punjab Economic Report*

https://peri.punjab.gov.pk/system/files/Chapter%203%20Agriculture%20and%20Rural%20Development_0.pdf

Figure 3: Cropped Area by Crop in Punjab

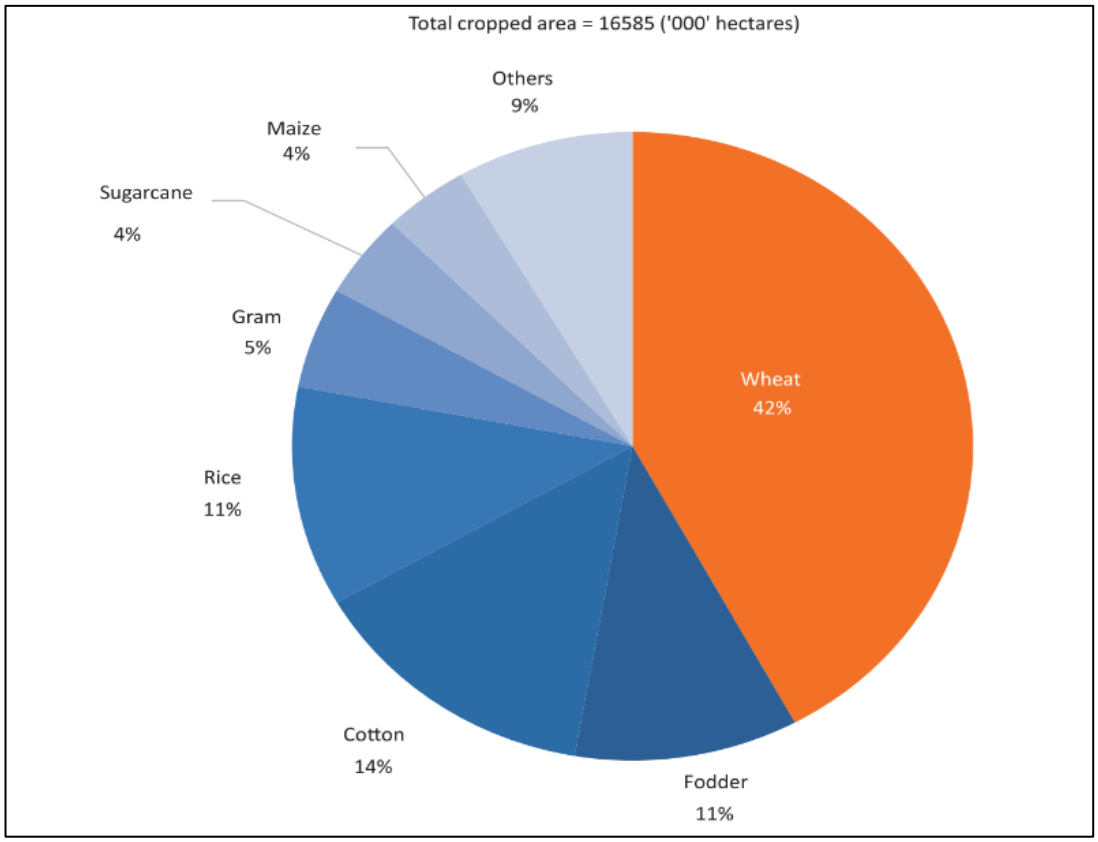
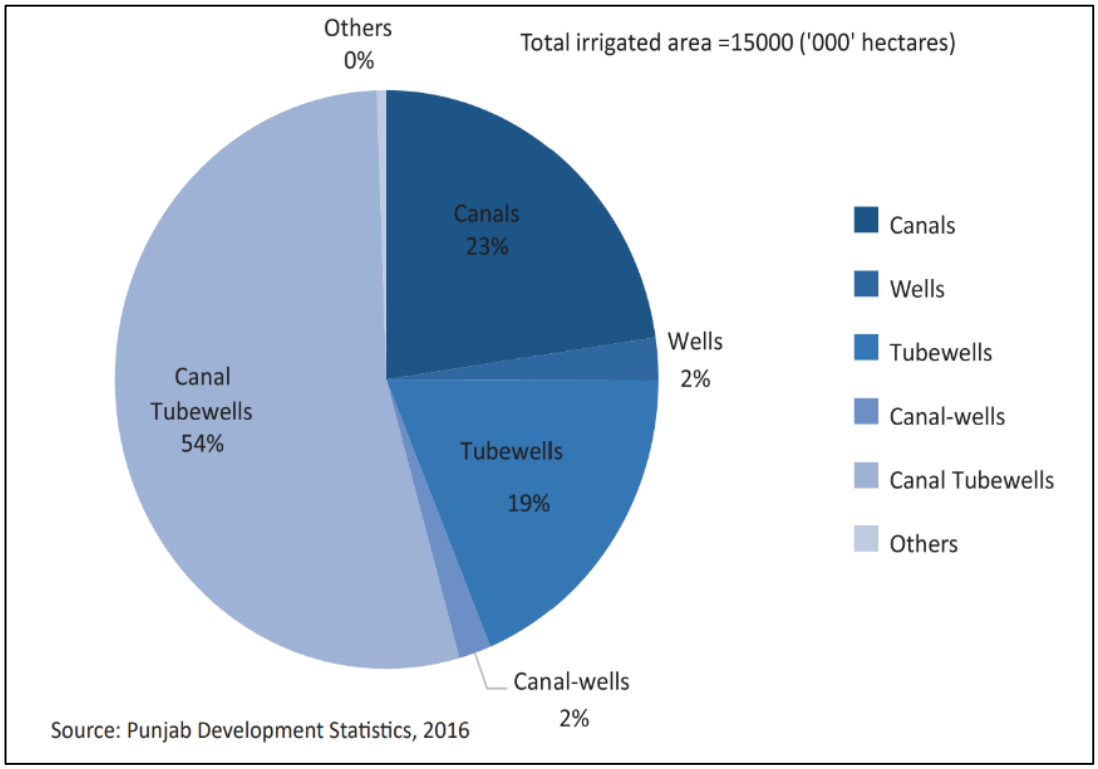


Figure 4: Mode of Irrigation in Punjab



1.2 WAPRO Project

In Pakistan, WAPRO focused on addressing inefficient irrigation practices in cotton and rice value chains through the push-pull-policy approach. The push component provided technological support for farmers to save water, the pull component supported better conditions for marketing of high standard rice and cotton produced with water efficiency, while policy component made efforts to ensure up-scaling and sustainability of good practices. A crucial ingredient of good water governance is awareness of stakeholders on rights and obligations. The policy component contributed to this end through facilitating discussions among multi-stakeholders (push and pull actors as well as up-takers) in workshops and meetings and documenting success stories. WAPRO is currently completing its second phase in Pakistan.

Rice Sub Project - Stakeholders and Partners

There are four implementing partners working in the rice value chain under the project. HELVETAS Swiss Intercooperation is the lead implementing organization for the rice project and provides oversight and coordination function. Rice Partners Limited (RPL) and Galaxy Rice Mills, are the two-lead private sector stakeholders who are working on the ground directly with the farmers through their teams based in District Sheikhupura and District Gujranwala in Punjab. RPL and Galaxy have been working to improve the capacity of the rice growers in latest crop production and water saving techniques, to help them reduce cost of production and increase paddy yields. Both companies source Basmati rice from the beneficiary farmers for export to the European market. The fourth partner is the Sustainable Rice Platform (SRP). SRP is a global multi-stakeholder partnership that promotes sustainable rice cultivation and has more than 90 institutional members including United National Environment Programme (UNEP) and the International Rice Research Institute (IRRI). SRP provides guidance to farmers and companies on sustainable production of rice. SPR standards have been adopted by the two private sector companies and they have promoted SRP standards among their rice grower networks with 95% compliance. Water stewardship/ governance elements are implemented jointly by the actors facilitated by HELVETAS Swiss Intercooperation in Pakistan.

WAPRO's efforts are supported by the government and the academia, specifically the Punjab Government's Agriculture Department and its affiliated research institutes, and the Basmati Rice Heritage Foundation, which is a non-profit association of rice millers in Punjab. A full overview of stakeholders involved in the rice sub-project is attached in the annex.

Cotton Sub Project - Stakeholders and Partners

BCI is the lead implementing organization for the cotton sub-project under WAPRO. In the second phase, BCI has brought on board Rural Education and Economic Development Society (REEDs) as the on ground implementing partner for the WAPRO cotton component. REEDs is a non-profit and non-government organization working in rural development in Pakistan. Cotton component in phase 2 started with a delay as negotiations with potential implementing partners could not mature in time. REEDs was brought on board in January 2021 and this is the first year of implementing activities under phase 2. The target areas for cotton are south Punjab and Sindh, specifically, districts Rahim Yar Khan and Vehari in Punjab and district Dadu in Sindh. Currently, activities are being implemented in Rahim Yar Khan with plans to expand to Vehari and Dadu in the coming months.

1.3 Objective of the Case Study

The main objective of the case study is to better understand the effectiveness of the "3 Ps" approach i.e., push-pull-policy in improving water use efficiency of rice and cotton farmers under the WAPRO project. The approach works by promoting adoption of best water management and agronomic practices, through a combination of effective promotion and farmer outreach **(push)** and improved market access and industry/buyer demand for water efficient and sustainably grown rice **(pull)**. Lessons learnt and best practices from these two components are then shared widely with the national and international networks to demonstrate impact and influence policy- making **(policy)**. The 3 P approach aims to improve smallholder famers' yields and income, reduce water footprint, and increase food security.

1.4 Methodology

The case study followed a qualitative approach and information was collected through interviews, focus group discussions (FGDS) and observations. To supplement this information and provide further insights relevant information was also gathered through secondary data which included project design documents and progress reports, research studies, case studies and articles.

Rice Sub-Project

For the rice sub project, the geographical scope of the case study covered two districts in Punjab, Gujranwala and Sheikhupura (see map of Punjab in annex). Both regions have a high concentration of rice growers, with Gujranwala being the second largest producer of rice in the country, with a production capacity of around 500,000 tons annually. Focus group discussions (FGDs) and individual interviews of 30 rice growers were conducted by the national consultant in selected villages of tehsil Muridke (a tehsil is an administrative sub-division of a District), in Sheikhupura and tehsil Kamonke in Gujranwala. Four FGDs were conducted with WAPRO farmers; 2 in Muridke and 2 in Kamonke, while another control FGD was conducted with non-WAPRO farmer in a village in Muridke. Each FGD had 5-6 farmer participant. WAPRO farmer FGD included contract and non-contract farmers. Contract farmers are those who sign an agreement with the company to comply with the SRP standards and sell rice to the companies after due diligence, while non-contract farmers are not contracted by the companies but participate in training programmes conducted by the companies regardless of where they sell their rice. In addition, 4 WAPRO farmer interviews were conducted in the villages surrounding the two rice mills RPL and Galaxy.

The land size of the farmers spoken too ranged from 7 hectares to 60 hectares. The farmers were predominantly growing Basmati rice. They were also growing some coarse varieties of rice, but 90% of their land was dedicated to Basmati. The main reason for growing the coarse variety was that it had a shorter production cycle compared to Basmati and can be sold early before the major chunk of Basmati rice comes in. Early harvesting also leaves the land free to grow vegetable before the wheat season. All farmers relied on ground water, pumped through tube wells, for irrigating their lands. Availability of canal water was sporadic and insufficient; therefore, all farmers had installed tube wells.

Transplanting on farms is primarily done by farm workers/labourers. This was visible during the field visits and provided the opportunity to briefly speak to the farm workers who were transplanting in the fields. The farm workers are usually located in and around the same area as the rice farms. They belong to the lowest socioeconomic strata and work on farmlands in the area doing various manual jobs (sowing, picking, sorting, harvesting, packing etc.) based on the crop that is being cultivated at the time. There are also instances where farm workers have travelled from other regions specifically during the rice transplanting season to work on rice farms. These migrating families will work on the rice fields for two months and then go back to their homes or move onto other farms to work on the next crop.

In addition to the farmers, the staff of RPL, Galaxy and Helvetas were also interviewed by the national consultant for collecting data on support being provided by WAPRO and for triangulation of information. Other stakeholders were also interviewed including the Punjab Agriculture Department's Extension Wing and the On Farm Water Management Wing (OFWM). The international consultant for the evaluation also visited Pakistan on a short trip. The international consultant visited rice farms and Galaxy Mill where he interacted with the farmers and Galaxy staff. He also met with director OFWM and technical advisor agriculture delivery unit, at the Punjab agriculture department

Transplanting is done by both men and women; however, the ratio of women is much higher than men. In total, a group of 8-10 people are transplanting rice on a piece of land at one time. Most of the time this group of people comprises of members from the same family. Working conditions are quite hard, as transplanting is done during the months of June and July when temperatures ranges from 40-45 degrees centigrade with high levels of humidity. The farm labourers will work from anywhere between 8-12 hours daily for about 45 days, in extreme temperatures, bare footed in deep mud and hot water.

Cotton Sub-Project

Reaching out and coordinating with the organizations implementing the cotton sub-project proved to be somewhat complicated. The cotton sub-project under WAPRO phase II had suffered some delays as private sector partnerships could not materialize on time. BCI had only recently brought on board REEDS as the implementing partner, and this was officially the first year of implementing project activities. To better understand the cotton sub-project and initiatives that have been started under WAPRO phase II, BCI's Regional Director and WAPRO Project Manager from REEDS were interviewed by the national and international consultant for the WAPRO evaluation at the BCI office in Lahore.

2 Findings

The WAPRO project was designed to address three key constraints that were preventing adoption of efficient water management practices in the rice and cotton agriculture value chains. The key constraints as defined in the WAPRO project design document are a) lack of awareness, know-how and guidance b) insufficient incentive mechanisms to stimulate adoption and c) lack of governance structures for coordinating and ensuring timely water distribution and corresponding maintenance of irrigation infrastructures.

2.1 Rice Sub-Project

2.1.1 Findings on PUSH Component

The PUSH component of the 3 P strategic approach targeted the first constraint by developing a dedicated team of trained agriculture field agents who provided regular assistance to the farmers throughout the crop production cycle. The promotion and extension structures developed under the rice sub-project were able to reach 54,250 rice farmers covering 340,400 hectares of land. Through these extension services farmers were advised on, on farm water management practices, the use of laser land levelling (LLL), Alternate Wetting and Drying (AWD), Mechanical transplanters (MTR), Direct Seeded Rice and timely and accurate usage of pesticide and fertilizers. The extension workers also introduced the SRP standards among the farmers. They educated the farmers on the significance of SRP to achieve ideal yield and quality and, how compliance to these standards would help them sell rice to international exporters at premium prices. In addition to advisory services, farmers were also informed and supported in enlisting for government and private sector schemes that that were providing farmers subsidized inputs and/or access to finance. The advisory services, although at the start of the rice sub-project were provided only to contract farmers engaged with the private sector partners, they were expanded to non-contract farmers in later years. To better streamline the extension services, track compliance of standards, ensure traceability and provide customized support to farmers, detailed farmer records were maintained manually as well as in the AKVO mobile application.

The table below provides rice sub-project outreach numbers. The beneficiaries have been split in two categories: contract farmers and non-contract farmers. Contract farmers are farmers who have come into an agreement with the rice companies to sell their rice to the company (subject to quality tests) and to adopt water efficient practices and SRP standards. Non-contract farmers are farmers who attend or participate in WAPRO outreach activities but are not under contract with the companies nor do they sell rice to them. The contract farmers received more regular one on one dedicated support from the rice companies i.e., weekly visits from the company's agricultural experts to explain what to do, when to do and how to do it, assessment of compliance, course corrective advice, etc. The rest of the beneficiary farmers received advice through organized training sessions of large groups on a monthly or bi-monthly basis and through other outreach mechanisms like WhatsApp group, robo calls etc.

Table 1: Project Outreach

Implementing Partner	Direct Beneficiary Farmers (Contract farmers)	Total Land Acreage-Direct Beneficiary (hectares)	Non-direct beneficiary farmers (Non-Contract Farmers)	Total Land Acreage-Non-Direct Beneficiary (hectares)
Rice Partners Limited	1,200	12,000	32,000	200,000
Galaxy Rice Mills	1,050	8,400	20,000	120,000

Source: Official project data from RPL and Galaxy

To increase adoption rates of improved agronomic practices, advisory services were supplanted with demonstration plots. 'Seeing is believing' was the underlying idea behind demonstration plots. While advisory services can present facts, alternative approaches and encourage farmers to adopt certain techniques, the ultimate decision lies with the farmer. According to the RPL and Galaxy staff, farmers are risk averse and not open to adopting new practices over the age-old farming practices that have been shared down through generations. Farmers need to see a new technology demonstrated by several people in their network before adopting the practice themselves. Under the rice sub-project, multiple demonstration plots were established on farmers' land to show the impact of adopting efficient farming practices and SRP standards. Demonstration played a significant role in easing farmer's doubts and resistance to new practices/technology through visible results. Several farmers reported trying new techniques after seeing results in demonstration farms set up by the two rice companies.

The PUSH component was able to reach a significant population of farmers. Farmer numbers reached are beyond the purchase capacities of the private sector partners, however they have continued their outreach to non-contract farmers to generate greater awareness among the wider rice community. The field of influence is even larger if social learning and word of mouth is considered. The control farmers were aware of technologies like laser levelling, DSR and AWD as they had heard about them through their friends and acquittances that were either directly or indirectly part of the WAPRO farmer beneficiary network.

Farmers within the WAPRO network were well informed about the importance of water management in rice production and could correlate improved water productivity with laser levelling, AWD tubes and DSR practices. WAPRO contract farmers were particularly articulate and knowledgeable about SRP standards and requirements as compliance to these standards was linked with their selling capacity at premium rates. They were cognizant of the fact that non-compliance will lead to rejection of their rice by the companies, and they will then have to sell the rice in the open market and lose out on premium rates.

WAPRO farmers spoke highly of the agriculture technicians and were appreciative of their support. There was a high level of trust between the farmers and the technicians and, farmers valued and strictly followed their advice. Farmers said that the technicians were available round the clock, and they felt comfortable in calling them anytime of the day. The technicians also visited the farmers frequently and supported/advised them through each stage of the crop cycle. Farmers said that they had never received this level of support from the government extension services and were grateful to the RPL and Galaxy extension workers for improving their farming practices.

A marked difference was observed between control and WAPRO farmers regarding their understanding of water scarcity issue in the country. When asked if they knew if there was a water scarcity issue in the country, control farmers responded that they have heard about it on the news, but it is not a problem in their area. They said they had plenty of water (ground water) and there are no issues if you have water bores and can run tube wells. When asked if they have observed the water table go down, they said they have bores at 37m since ages and even now if you have a new bore, you can get water at 37m.

In comparison, WAPRO farmers were acutely aware of the worsening water situation and were able to connect how their adoption of water efficient farming techniques were going to help improve the country's water problem. They had learned about this through the trainings and farmer advisory sessions. They were aware that even though the standard bore was at 37m, the water table has significantly gone down. Where a decade or two ago you could get water at 12m or 15m you now have to go down to 20m-25m to touch water.

The PUSH component was successful in raising awareness among farmers on the benefits of improved water management practices and technologies. The adoption of these technologies however varied within the group of farmers spoken to as part of the study. All the contract farmers were diligently following production advice received from the technicians had adopted at least one technology if not more (the most adopted being laser land levelling and AWD tubes). Among the non-contract and control farmers there were at least 8-9 farmers who had not adopted any of the water efficient technology. The primary reason for this was not lack of awareness or doubts regarding the benefits, but the cost of adoption and access to the technology. Non-contract and control farmers explained that they needed financial support (cost sharing) from the companies as provided to contract farmers to adopt these practices however, the companies were already at their maximum purchase capacities and were currently not looking to expand their network of contract farmers. The private sector partners were however keen to continue expanding their outreach of extension services as well as support non-contract farmers with subsidized laser levelling and other technologies but were constrained by their human and financial resources.

2.1.2 Findings on PULL Component

The PULL component of WAPRO focused on creating effective incentives for farmers to adopt water efficient production practices. Private sector buyers of rice created these incentives through demanding water efficiency and standardised cropping best practices as a pre-condition for market access, and their technical and financial support to meet this requirement. Once the farmers adopted these practices further incentives emerged in the form of reduced production costs, reduced labour, and improved yields. These incentives further encouraged farmers to continue with these practices.

To incentivise the contract farmers to adopt water efficiency and standardised cropping best practices, the rice mills introduced the following benefits package to farmers who chose to adopt the SRP standards and become part of the WAPRO farmer network:

- Laser land levelling available on 50% cost sharing basis
- Free of cost distribution and installation AWD tubes on farmer's land
- Mechanical transplanters available for rent at reduced rates
- Easy access and availability of certified and quality assured seed, fertilizers, and pesticides

- ❖ Farm machinery and inputs available at discounted rates from partner agriculture input companies
- ❖ Access to low interest and mortgage free financing
- ❖ Premium rice paddy prices at the time of selling
- ❖ Transportation cost from field to mill
- ❖ Swift and timely payments

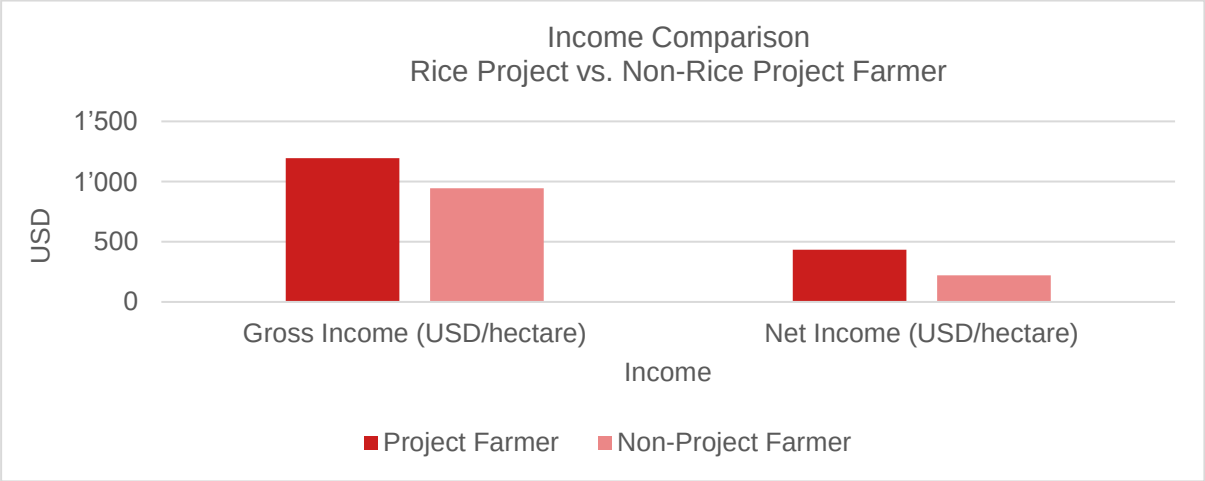
Positive yield gains were reported by all farmers who had availed laser land levelling and mechanical transplanting. They reported yield gains of up to 10% from levelled land and 10-15% on mechanically transplanted lands. Farmers attributed yield gains on levelled land to higher accuracy in terms of seed distribution, pesticide and fertilizer application, uniform seed germination and crop maturity, and precise water allocation. Yield gains from mechanical transplanting were attributed to optimal plant population. Manual labour could transplant at max 130,000 plants per hectare while mechanical transplanters transplanted up to 200,000 plants per hectare. More plant population resulted in higher yield. Additionally with mechanical transplanters there was high level of accuracy in plant distance while manual labour could not maintain that level of accuracy. Farmers also reported additional positive impact of laser levelling on their wheat and other crops than they cultivated during the year. They reaped the same benefits on other crops as they did in rice after laser levelling their land.

In terms of water saving, farmers estimated that they were using at least 20-25% less water on levelled land as compared to pre levelled land water requirements. Farmers reported that they need to accumulate water on their land before transplantation. The difference in highest and lowest portions of unlevelled land is about 10-15 cm which meant that farmers required an extra 5-8 cm of water to cover both high and low portions of their unlevelled land. With laser land levelling they reported using less water for filling the fields. Farmers also reported reduced water costs after laser land levelling. Unlevelled land required a tube well to run consecutively for 8 hrs to irrigate 1 hectare of land, while 1 hectare of levelled land could be irrigated in just 4-4.5 hrs. This significantly reduced electricity costs of running tube wells for irrigation. In the last year these cost savings have become significantly more important due to rising electricity costs. In just one year electricity costs have doubled. Farmers reported that had they not levelled their lands, they could not have afforded to run their tube wells with current electricity prices. Similar cost and water usage savings were reported by farmers using AWD tubes. Before AWD, farmers would flood their lands daily however, after installing AWD tubes they were irrigating their lands every 2-3 days. Maximum water saving was experienced by farmers who had adopted both laser land levelling and AWD tubes. According to the rice company's agriculture experts, farmers that had adopted both technologies were saving at least 30% water compared to pre-technology water use. In addition to water saving, adoption of these practices have a huge potential of reducing methane emissions. Rice grows mostly in flooded fields. The water blocks oxygen from penetrating the soil, creating ideal conditions for bacteria that emit methane. The longer the flooding lasts, the more those bacteria build up. Therefore, practices that reduces or interrupts the period of flooding can reduce methane emissions significantly.

On the revenue side framers reported an increase in net revenue despite increased cost of production due to laser land levelling and mechanical transplanting. The increase in revenue was mainly driven by increased crop yields and premium prices. RPL contract farmers benefited from additional revenue gains as the transportation cost from field to the rice mill was borne by RPL. Galaxy did not cover transportation cost however, both mills are strategically located in the rice concentrated farming area. This saves transportation cost of travelling to the

city centre to sell in the local market. A basic cost of production and income analysis showed that the project farmers experiencing additional yield of 10% after adopting better farming and water management practices were able to earn USD 214/hectare more in net income than the non-project farmers (detailed analysis and calculations are attached in annex).

Figure 5: Income Comparison with 10% additional yield of Project Farmers



Price of rice fluctuates according to the market trends each year, but farmers reported that the two private sector partners generally paid at least 10-12% more per kg compared to the local market. Some WAPRO farmers reported that a few years ago the price in the open market and that being offered by the mills was the same but even then, selling to the mill was more profitable. The main reason behind this was ethical buying practices and timely payments. The mills weighed the crop accurately and did not charge any hidden charges. If the same lot was sold in the local market, there would be commission charged at each stage and there were large inaccuracies in weighing which resulted in revenue losses to the farmers. Additionally, farmers did not have to wait for weeks to receive payments (as was the case when they sold their produce through middlemen/aarthis[11]) instead, they were paid within 2-3 days for depositing their produce at the mill. Premium price, secure and timely payments, and accurate weighing practices were also the main reasons why they were extra vigilant in adhering to advice provided by the extension technicians as it would reduce the chances of their crop being rejected by the mill. Non-contract farmers (those that had received training from RPL and Galaxy) were also eager to sell to the rice mills but were bound by their contracts with aarthis/money lenders.

[11] Aarthi are middlemen who buy produce from growers and sell to wholesalers and retailers in major fruit and vegetable markets for a cut of 6-10 per. Trading is just one part of the crucial role that these middlemen play in the supply chain. They are also the informal money lenders in the agriculture supply chain. Aarthis provide growers with funds at a mark-up that the latter use to buy seeds, fertilizers, and chemicals. In some cases, Arthis buy entire crops at the beginning of the season while in others they conduct auctions and charge a fee from both sellers and buyers.

On food security, clear conclusions could not be drawn from farmer conversations. Farmers reported that their food expenditure had grown due to the inflation in the country and that it was worrisome, but this had not yet impacted them in a way where they were facing food shortages or skipping meals. Farmers mentioned that they keep a portion of their produce for consumption throughout the year. There was no change in the quantity of food that they were keeping for their own use and the amount of produce that they set aside for household use was more than enough for the entire year. On a macro level, rice production has been consistently increasing over the last 2-3 years and in 2021 highest ever yield of 8.5 million tons was achieved. Consumption patterns have also changed where local consumption for rice has increased by 20 percent in the last five years, reducing some pressure on the staple wheat crop.

Predominantly the most popular and most adopted technique was laser land levelling followed by AWD tubes and mechanical transplanting.

Table 2: Number of farmers adopting introduced technologies

Adopted Technologies and Acreage Covered		
Type of Technology	**No. of Farmers**	**Acreage Covered (hectares)**
Laser Land Levelling	1,401	9,100
Alternate Wetting and Drying Tubes (AWD)	1,250	6,000
Mechanical Transplanting	275	240
Direct Seeding of Rice (DSR)	175	140

Source: Official project data from RPL and Galaxy

The main reason for higher adoption of laser land levelling was the cost sharing facility being provided by the private sector partners. Among the farmers interviewed, most large farmers i.e., 20 hectares and above, reported that they would continue with laser land levelling even without cost sharing, as the benefits far outweighed the costs. Smaller farm holders on the other hand were unsure if they would continue with the practice once cost sharing facility was removed. Even though they were experiencing gains in yield and lower water costs, they were worried that going forward, given the high inflationary trend in the country and rising agriculture input costs (fertilizers, pesticides, seeds, electricity, labour) they might not be able to cover the additional expense of laser levelling. The cost of production analysis showed that project farmers were incurring an overall additional cost of USD 35/hectare compared to non-project farmers. These additional drivers of cost were mainly due to the use of laser levelling and mechanical transplanting.

Table 3: Cost of production comparison (project vs. non-project farmers)

Cost of Production-Rice (USD)			
No.	**Input Cost Category**	**Project Farmers**	**Non-Project Farmers**
1	Seed Cost (USD/hectare)	9	10
2	Laser Levelling (USD/hectare)	52	-
3	Fertilizer (USD/hectare)	230	260
4	Pesticide (USD/hectare)	93	116
5	Irrigation Cost (USD/hectare)	Electricity: 140 Diesel: 232	Electricity: 162 Diesel: 255
6	Canal Water Irrigation (fixed annual charges)	2	2
7	Mechanical Transplanter (USD/hectare)	140	-
8	Labour Transplanting (USD/hectare)	-	81
9	Harvesting Cost (USD/hectare)	93	93
	Total cost/hectare (USD)	**759**	**724**

**Details on cost calculations are provided in the annex*

Another barrier to higher uptake/adoption of the water saving technologies is the availability of equipment for improved water efficiency used in the rice sub-project. Mechanical transplanters and laser land levellers are not readily available in the market. Galaxy has 4 mechanical transplanters that they rent out to their contract farmers. In one of the discussions with the galaxy farmers, it was revealed that farmers prefer mechanical transplanting but cannot always do so as the machines have a long waiting list and there is a short period of time during which the transplanting must be done so they revert to manual labour. Availability of manual labour also varies from region to region. For instance, farmers in the Sheikhupura region reported a shortage of labour due to the industrialisation of tehsil Muridke. Most of the labour who previously worked as rice transplanters have now found work in the nearby factories; therefore, rice farmers in this region were more eager to switch to mechanical transplanters if availability of the machines increased. In comparison, no such shortage of labour was reported by the farmers in the Gujranwala region and, cost and availability of the machine remained the main deciding factor for adoption.

The least adopted water saving approach was DSR. None of the farmers spoken to in the study group were using DSR. According to the agriculture experts at the rice company, DSR is well known and proven technology that reduces land preparation time and can achieve water saving of up to 15%. The issue was that DSR resulted in weed growth which in other countries is easily managed by herbicides. Unfortunately, these are not readily available in Pakistan therefore, DSR remained the least popular water saving technology among the farmers.

The rice project's overall impact on food security, water efficiency and household income depend on the uptake of efficient practices and technologies. While adoption rates were high among contract farmers the same cannot be said for non-contract farmers, mainly because the data on adoption rates among non-contract farmers was not recorded. It would be safe to

assume that the uptake among non-contract farmers is lower simply because of the cost implications. The contract farmers were financially supported to adopt these practices through cost sharing schemes or free distribution of AWD tubes etc. Non-contract farmers had to bear the entire cost themselves. While the project defines beneficiaries as all farmers who have been reached/supported through various WAPRO interventions, actual monetary benefits were accrued by those farmers who had not only learned but also adopted new practices because of WAPRO interventions.

Overall, the combination of PUSH and PULL components were successful in demonstrating to the farmers that enhanced water productivity has clear economic benefits and that going forward they will have to adopt these technologies or will be pushed out of the agrology chain due to water scarcity and climate challenges.

2.1.3 Findings on POLICY Component

The POLICY component of WAPRO focused on connecting farmers, water users, government, private sector, and the civil society to find collaborative solutions to common water use problems and incorporate them in regulatory frameworks and policy outputs. Water stewardship was the cornerstone of the WAPRO approach and over the years WAPRO was able to build sustainable partnerships between communities, government, and businesses to ensure efficient and sustainable water use.

During discussions with the stakeholders, it was apparent that the POLICY component had made significant strides in; reviving waster use associations and development and implementation of water use plans, evidence sharing and institutionalization of best practices in government plans and operations and, evidence generation and dialogue for policy influence in a sector that is mired by a rigid political economy and challenging power dynamics.

For on-farm water management, conservation, and optimum utilization of irrigation water, the 1981 Water Users' Associations Ordinance dictates that every water course will have a Water User Association (WUA) comprised of farmers who are irrigating their lands from that watercourse. The purpose of the WUAs was to build community ownership of the available water resource and its preservation and maintenance. WUAs are registered with the government, and they are jointly responsible, with the On Farm Water Management Department (OFWM), for renovation and maintenance of their respective water courses. Under WAPRO, the private sector partners played an instrumental role in reviving old WUAs and registering new ones through their social mobilization efforts. They mobilized farmers to come together to establish WUAs in their catchment areas and then supported them in registering their WUAs with the OFWM department. The WUAs that were registered through the support of WAPRO partners are active and collectively working with OFWM staff for renovation and maintenance of their respective water courses. The WUAs also support farmers in resolving conflict and jointly agreeing on reasonable ways to share the available water resource.

Further community ownership of the available water resources was created through the development of Water Use Management Plans. WAPRO supported farmers, community associations, government, and private sector actors in developing community water use plans with the objective to improve water use efficiency in the respective catchment area through coordinated efforts of all concerned stakeholders. The plans were prepared through a series of consultative sessions with concerned stakeholders at operational, service provisions and policy and

regulatory levels of the rice chain. The key stakeholders included farming communities, public sector institutions (Irrigation Department, On Farm Water Management, Rice and Cotton Research Institutes) and private sector partners. The integrity of the multi stakeholders process through which the plans were developed helped build trust among all stakeholders and enhanced shared understanding of water challenges faced by each party. The plans helped bridge the link between private sector partners and the government and now both parties wish to continue with the practice of water use plans and expand them to other regions. The farming community spoken to, also welcomed these plans as they felt that they were now active participants in the decision-making process and that their concerns and issues regarding water distribution were being taken seriously and acted upon.

The rice sub-project has been intensively engaging with the government over the course of its duration, which in turn has resulted in cross learning and awareness raising, capacity building and uptake of best practices. In discussions with the government for the study, two areas of successful collaboration that clearly stood out were capacity building of advisory services and the adoption and implementation of successful interventions of the WAPRO rice sub-project from the government's platform. Government extension workers were regularly invited to attend farmer training sessions organised by private sector partners to learn the approach and methodology being used to train farmers on water saving techniques, timely and accurate use of quality inputs and mechanized farming for boosting resource efficiency. In addition, learning materials used by the WAPRO private sector partners were shared with government extension workers to be used to train/inform non-WAPRO farmers. The Agriculture Extension services have also improved their interaction with WAPRO teams in the field and disseminate learnings among non WAPRO farmers in other areas.

According to the government officials spoken to, WAPRO was a key partner in supporting the government in transforming its advisory services program for farmers. Learning from WAPRO's approach to advisory services, the government is now seeking to privatize its own extension services. This will be done through a results-oriented extension advisory services model that will engage multiple private sector organizations to provide these services. The government will decide on KPIs and expected results out of the advisory services with the service providers and make target-based payments. They intend on incorporating WAPRO's methodology in the ToRs for the private sector advisory service providers and WAPRO has been part of the consultations initiated by the government to develop the framework under which this collaboration with the private sector will be executed.

WAPRO has also been keeping the government abreast about the results of its interventions, especially the impact that water saving technologies have had on farmers yield, income, and overall water efficiency. WAPRO efforts were highly appreciated by the public sector representatives, and they informed that some of the WAPRO interventions are now being replicated by the Punjab agriculture department, specifically targeted laser land levelling support on subsidized rates and provision of agricultural machinery on discounted rates through private sector vendors. OFWM also credited WAPRO for introducing AWD tubes to them. They have now installed AWD tubes in all the government demonstration plots in the Okara district.

Evidence generation and policy dialogue have also been a key focus area of the WAPRO rice sub-project. A series of evidence pieces were generated covering topics like role of technology in water productivity, economics/cost benefit analysis of efficient water management practices, role of private sector in improving water productivity, Warabandi (local terminology used for distribution of irrigation water rotation system) and trends in ground water management and

usage. These academic pieces were developed in collaboration with government research bodies and experts, and the findings were shared with the wider rice and cotton value chain stakeholders through a series of dialogues, workshops, and seminars.

According to the government officials spoken to, these evidence pieces went a long way in generating common understanding among all stakeholders and showing a way forward. A bigger contribution in their eyes was the neutral platform that WAPRO provided to bring to the table the multitude of stakeholders that existed within the complex political economy of water in Pakistan. Far too many government institutions are managing water with overlapping roles and responsibilities and no proper coordination mechanism. No single institution is responsible for the integrity of the Indus Basin, land and water ownership rights are convoluted and there is no regulator of water use hence unclear water payments mechanism and no recourse for water use conflicts. In this complex political economy WAPRO has provided stakeholders with a neutral platform to bring forward their concerns and raise issues. More importantly, WAPRO was able to bring into the limelight and engage stakeholders to discuss complex political water issues such as warabandi and ineffective and outdated water use payment schemes. Helvetas staff shared the example of the Khyber-Pakhtunkhwa (KP) province where they have scrapped the flat fee rate of monthly USD 2 for water users and have replaced it with user-based charges. For example, car wash services now pay USD 1,162 per month as opposed to the USD 2 per month fee for water usage. The Punjab government is also now striving to move forward with volume/usage-based fee rates and WAPRO has been instrumental in generating dialogue and building consensus around the issue.

Speaking with private sector stakeholders, they agreed that WAPRO played an instrumental role in connecting private sector with the government. Earlier there was little coordination between private and public sector and as a result private sector was excluded from policy formulation process. Now over the course of six years under WAPRO, government and private sector partners engagement has resulted in effective development and use of water plans at the farm level, better understanding of international rice standards and its correlation with accessing larger export market, an enabling environment for public and private sector to collaborate on the common agenda of efficient water management and improved water productivity in the rice and cotton value chains.

The government and private sector partners of WAPRO also mentioned that they were looking forward to the establishment of the SRP chapter in Pakistan. The proposal for the chapter has been endorsed by the Pakistan Agriculture Research Council (PARC), Provincial Agriculture Departments and the Private Sector including rice mills and exporters. All the stakeholders were of the view that once the chapter is established there will be higher adoption of the standards which is necessary for tapping a larger export market, improving farmers' livelihoods, and ensuring sustainable rice production.

WAPRO's advocacy efforts to share and disseminate its learning on multiple platforms also proved successful and resulted in synergies in areas like climate smart agriculture and collaboration with partners like UNEP and Ministry of Climate Change (MoCC). UNEP's focus areas include water saving and reduced methane emissions. Both priority areas are closely interlinked under WAPRO especially in the rice value chain. Stagnation of high quantities of water in rice fields adversely impacts methane emissions. Seeing the positive results in Pakistan under WAPRO, UNEP decided to include Pakistan in a multi country scoping study on methane emissions. UNEP wanted to build on the work done by WAPRO and push it to the next level i.e., international climate financing. The study was done in collaboration with Helvetas in

Pakistan and specifically from the WAPRO platform. It was overseen by a technical advisory committee that included experts from MoCC, Agriculture Department, Private Sector, Civil Society, and members of farmer associations. The study was so well received that Pakistan became one of the two countries that were shortlisted by UNEP for the next step i.e., country report on methane emissions. The country report was developed by Helvetas from the platform of WAPRO, in collaboration with the MoCC and the Global Change Impact Study Centre. Pakistan had signed the methane pledge at the COP 26. This study will now become the first milestone by Pakistan to be presented in the next COP under the methane pledge.

2.2 Cotton Sub-Project

2.2.1 Findings on PUSH Component

Project activities for the cotton value chain started with a delay due to non-materialization of private sector partnerships. Initially WWF and IKEA were approached to partner with BCI - the lead implementing organization of WAPRO Cotton in Pakistan but, negotiations did not mature with both IKEA and WWF. BCI then approached REEDS, a non-profit and non-government organization working in the rural development sector of Pakistan to become an implementing partner for the WAPRO sub-project in cotton. REEDS started implementation of WAPRO in January 2021 and its focus so far has been on the PUSH component. In phase 1 of the sub-project, the intervention districts were Bahawalpur and Lodhran in south Punjab and according to the project document for phase 2, activities for phase 2 were to continue in the same two districts. Currently, the cotton sub-project is being implemented in different districts of south Punjab, as opposed to Bahawalpur and Lodhran, with plans to expand to Sindh. Current intervention districts are Rahim Yar Khan and Vehari in south Punjab, with plans to start interventions in district Dadu in Sindh. All three districts are cotton dense areas and follow the wheat/cotton crop rotation cycle.

Under the PUSH component activities are primarily geared towards training of master trainers, farmer trainings and setting up demonstration plots. The technologies that are being promoted through these activities are mulching, laser land levelling, solar drip irrigation, sprinkler irrigation, moisture metering, furrow pipes and farmyard manure.

Trainings for master trainers are being conducted in collaboration with government's agriculture training institutes and Jaffer Agro Services, which is a farm inputs supply company. These master trainers then go on to conduct farmer trainings. REEDS has also leased 1 hectare of land to convert it into a demonstration plot where all the new promoted technologies are deployed to demonstrate usage and results to the farmers. REEDS has also developed and distributed IEC material on efficient water management and water saving technologies in local languages for the farmer community.

BCI and REEDs are reporting an outreach of 65,000 cotton farmer beneficiaries under WAPRO. BCI is using its existing outreach to upgrade beneficiary knowledge. The beneficiary farmers under WAPRO are existing registered BCI farmers who are now receiving trainings on water efficient crop production technologies and practices.

The discussion with BCI and REEDS made apparent that the awareness raising and capacity building initiatives of WAPRO were being implemented in an effective manner with a significant outreach however it is too early to measure impact in terms of adoption. Farmers have only

just stared learning about the new techniques and technologies, and it will take some time before they start adopting these practices. BCI and REEDS were hopeful that in the upcoming cotton season (April ’23) they will start witnessing adoption of some of these practices.

There is a risk that adoption will be slow as the farmers so far have not been shown the economic benefits of adopting these technologies or been incentivised to adopt. All the new technologies that have been introduced have a cost attached to them. This is an additional cost which the farmers will be reluctant to bear unless they are incentivised to do so do.

2.2.2 Findings on PULL Component

PULL component is not well developed as compared to the rice vale chain. The implementing partner REEDS is a not-for-profit development organization and not a market player in the cotton value chain. While it can build capacity of the farmers and create awareness it cannot provide end to end advisory services to the 65,000 farmers during the cotton season. It is also not a cotton buying organization that can offer buy back guarantees, premium rates or provide subsidised agriculture inputs in return for adopting better water use practices. The incentive that BCI provides to the farmer is that BCI provides a list of certified farmers to the ginners and then the ginners are asked to buy cotton from these certified buyers on a priority basis. This is not a formal or a binding agreement and there are no premium rates for the certified farmers. In addition, the certification is for BC standards and not for using water efficient technologies, so a farmer could be BC certified yet not using any efficient water management technology or practice. The BC standards includes water stewardship that encourages collective action towards sustainable use of water at a local level but does not address inefficient irrigation practices directly at the farm level.

Private sector involvement is crucial for creating market incentives for adoption of newer technologies in the agriculture sector. Compared to rice, private sector involvement is minimal if not non-existent in the cotton sector under WAPRO and the push-pull components are not working in harmony. The pull component is severely lacking which means that the push efforts will only be effective in so far as compelling the risk takers/first entrants and more affluent farmers to adopt while most of the farmers may opt out. The beneficiary number of 65,000 will likely remain at the push component level while the actual adoption rates may be far less due to the weak pull component.

2.2.3 Findings on POLICY Component

In cotton, the project so far has focused on local level stakeholder engagement, and it has been primarily geared towards collaborative capacity building efforts. REEDS has designed the farmer capacity building programme in collaboration with the government agriculture extension department and OFWM department. Going forward, REEDS plans on reviving the farmer WUA and form WUA in its intervention areas with support from OFWM department. Once these are active, they will move towards water stewardship via the development and implementation of water use plans.

At the national and provincial levels there has been little engagement with the government counterparts or relevant private sector stakeholders. Officials from the Punjab Agriculture Department mentioned that there has not been any recent engagement with BCI. While they were aware that WAPRO is operational in rice and cotton, they have been mainly interacting with

the Helvetas team. All policy dialogues and learning workshops at the provincial and national levels have been arranged and led by Helvetas, while BCI and REEDS have been attending as participants. Policy component like the pull component remains weak in cotton. BCI and REEDs did not have a clear approach for implementation of the policy component, and it is very much in its nascent stages.

2.3 Gender and Social Inclusion

Women are heavily involved in agriculture in Pakistan. According to the World Bank estimates 64% of all female employment in rural areas in Pakistan is in agriculture. Despite the high percentage of involvement in agriculture, women are usually restricted to low paying and physically demanding manual labour roles such as i.e., sowing, picking, weeding, sorting, harvesting, and are rarely involved in operating farm machinery, off-farm transport, marketing and selling. Women also rarely own farmlands and even if they do, farms are managed and run by male members of the family and women are not involved in the decision-making process.

In the rice value chain women are involved as rice transplanters (labourers) and in a typical rice season will work for 45 days as transplanters on rice fields. In the cotton value chain, women are predominantly working as cotton pickers. It is estimated that during the cotton season anywhere between 400,000 to half a million women would be working on the cotton fields in the 3–4-month cotton crop cycle.

The PUSH and PULL components did not distinguish between male and female farmers i.e., all field interventions/activities were available for both parties. It so happens that there are rarely any rice and cotton female farmers in the targeted areas, therefore all interventions were availed by male farmers. Females are usually working as labourers in both value chains, so they were not involved in any of the farmer trainings or advisory services provided by the project implementing partners. This holds true for male labourers as well, since the trainings and advisory services are focused on the farmer i.e., the decision maker and not on the farm workers. While the project did not target women farmers as there are hardly any in the intervention areas, it did support female workers through building their capacities on decent work with special focus on occupational health and safety aspects.

In the rice intervention areas specifically, several health, education and childcare initiatives were implemented by the implementing partners for the benefit of the rice transplanting labour families. Community Mother Centres were set up during the two months of rice transplanting season, where the children of the families working in the rice fields could spend the day while their parents worked in the fields. The children were provided with clothes, shoes, books, and meals and were being taken care of by trained government schoolteachers and local young women volunteers i.e., local college going students on break during summer vacations. Similarly, free health centres (medical camps) were set up in the target areas for the two-month period to provide basic health care for rice labourers and their families. While the camps were specifically set up for rice transplanters to give them medical assistance as they worked in harsh conditions and had to be treated for heat strokes, insect bites, diarrhoea; anyone in the area can visit the camps and get free medical advice and medicines. In addition to these social initiatives, other activities included conducting teacher trainings on child rights, classroom management and climate resilience, supporting labour families in registering their children on the National Database and Registration Authority (NADRA) and enrolment of local adolescent

children in skills training programs/institutes. These activities were funded under the WAPRO rice sub-project and the funds for these activities came through the private sector partner's contribution to WAPRO rice sub-project.

One of the concerns regarding gender inclusion in the rice sub-project was job displacement of female labourers with the increase in use of mechanical transplanters. While this is an emerging concern it is not an immediate one. According to the government and rice companies, currently only 3-5% of all rice transplantation in Punjab is being done through mechanical transplanters. The labourers spoken to also mentioned that they have not faced any difficulty in finding work during the rice season. They were also asked if this was a cause for concern to them to which they responded that there is plenty of work and if such a situation did arise, they can go work in the nearby factories or find non-rice farms to work on. They also mentioned that they work for a maximum 45 days on rice fields in a year and need to find other work for rest of the year. If they cannot work on rice farms then they will look for other work, like they do for the remaining year. According to the mill staff, there is long time to go before mechanical transplanting becomes so widespread that its starts displacing labour. Secondly, they mentioned that even with mechanical transplanting, labour will be required to prepare nursery trays for the transplanters which is something that the women can do. It is also better for them as it is less strenuous work than rice transplanting. Other alternative that the rice mills can promote is stitching of rice bags. Galaxy has been supporting women in the area by providing them with stitching units and materials to make rice bags.

3 Conclusion

WAPRO subproject in rice has been highly successful in applying the push-pull-policy approach in bringing transformative change to the lives of the rice farmers in the target areas. Farmers were highly appreciative of the WAPRO project for making them aware and, engaging them in optimizing water use in rice cultivation through new technologies and practices. The farmers who have adopted efficient irrigation techniques and advisory services promoted by WAPRO have experienced significant gains in terms of yield and income The project successfully brought together all stakeholders; farmers, government, and private sector to work together in bringing about improvements in the rice value chain. The project was successfully able to demonstrate the economics of improved water efficiency at all levels in the rice value chain, which became the core reason of attaining impact that was achieved by the project.

The rice project had unintendedly incorporated elements of an MSD programme and as such was able to bring improvements in the agriculture market system (rice value chain specifically), so that it functioned more effectively, sustainably, and beneficially for the farmers. The project had a very good insight into how the market system (rice value chain) operated: who were the market actors and how did they relate with each other. The project correctly identified the elements in the value chain, which if improved would hold the greatest potential for the farmers and unlocked the right incentives for the private sector to cater for the needs of the farmers.

The rice sub project is at a crucial stage where it has built enough momentum to be regarded by all stakeholders as the way forward for a profitable and environmentally friendly rice value chain. However, the concern is that the project is ending at a juncture where it has not reached a level of organic and sustainable expansion. Systemic change requires time before the

interventions/innovations introduced in the system can take hold and expand. While there are examples of adaptation i.e., existing private sector partners looking to continue the project interventions with their contract farmers without external support and new private sector partners seeking to follow suit and join/adopt, system wide scale-up or expansion requires more support and handholding. The project was able to facilitate change by creating and demonstrating incentives in the system for all stakeholders. What is now required for expansion is facilitation and capacity building through dialogue with stakeholders and actors, pointing out and discussing new opportunities including supporting new linkages between actors from private, public, and civil society sectors, who may not have collaborated before and facilitating learning processes among all actors to evaluate the experience of WAPRO and develop strategies for expanding the use of new practices in support of a wider system change.

As WAPRO is now coming to an end, this can be accomplished through the establishment of the SRP chapter in Pakistan. It will ensure continuity and expansion by filling the void that will be left behind by WAPRO. In order not to lose out on the good work that has been done under WAPRO and to see results taper off in the next few years, it is pertinent that some mechanism of continuity is put in place. The financial implications of this will be quite low as the continuity support that is required is not at the push and pull level but at the policy level. The policy component will ensure that WAPRO's results and learnings do not lose relevance and are utilized as key instruments in expanding adoption and adaptation of WAPRO.

WAPRO sub project in cotton is at a nascent stage and as such its impact cannot be gauged. While the push component is active and is being steadily implemented, the pull and policy components at the local and national level require more think through on the approach and strategy for greater effectiveness. Currently, both components lack direction due which the project may not be able to reach the desired impact. The technologies and practices that are being promoted have the potential to generate a large demand among the farmers however to encourage them to adopt a stronger pull component is required. The encouraging aspect in cotton is that BC standards are well known among all the stakeholders in the value chain and already have a high adoption rate. According to BCI officials Pakistan is among the top 3 suppliers of sustainable cotton globally and 30% of all cotton grown in Pakistan is on BC standards. This means that the project does not have to start from scratch as in the case of rice where no one in the value chain was aware of SRP. It can leverage the existing networks, linkages, and incentive structure to improve them further for greater benefit of the cotton farmers and profitability of the entire value chain.

4 Annex

4.1 Income and Cost of Production Analysis of Rice Farmers

Assumptions

- The analysis below provides a rough comparison of WAPRO and Non-WAPRO farmers' cost of production and income.
- The numbers are a crude estimate based on information provided by the farmers during the interviews and not from representative quantitative data sets.

- The cost price of each input cost category is an average figure of different estimates provided by the farmers e.g., the fertilizer for non-WAPRO farmer ranged between USD 230-USD 290.
- Ground water extraction is done using either electricity or diesel. Both costs are shown below. However, to keep the analysis simple, total cost of production is calculated using electricity cost only.
- The input cost category list in not exhaustive and may include other costs which have not been considered e.g., land lease rent, bank loans, Aarthi loans, transportation, etc.
- The analysis assumes non-WAPRO farmers are not using laser levelling or mechanical transplanters.
- The selling price figures are from 2021.
- The data was provided in PKR, acres and maund and has been converted to USD, hectares and kgs using the following conversions:
    - USD 1 = PKR 215
    - 1 hectare = 2.5 acres
    - 1 maund = 40 kg
- All WAPRO farmers reported an increase in yield since being attached to the project. The minimum yield gain reported was 10%. For the analysis below, a 10% yield gain has been attached to the WAPRO farmer on top of the local average yield in the area. The non-WAPRO farmer yield is the local average yield in the area.
- A second analysis is provided where the yield for both categories have been kept at the local average yield levels to assess the impact of WAPRO on cost of production and income for both farmers.

Results

- Cost of production of project farmers is 4.8% more than non-project farmers. The additional cost is driven by laser levelling and mechanical transplanting.
- Cost of irrigation is 14% lower for project farmers compared to non-project farmers.
- Project farmers are paying less for seed, fertilizers, and pesticides because they are buying from authorised dealers recommended by the rice mills and availing discounts as part of the collaboration with rice mills.
- Project farmers have experienced on average a 10% increase in yield through the WAPRO project.
- Considering the 10% increase in yield, the cost of production of USD 759/hectare and the selling price of USD 0.31/kg, the project farmers were able earn USD 214/hectare more in net income than the non-project farmers.
- Keeping the yield of both farmers constant at 3,500 kg/hectare, the project farmers were still able to earn USD 105/hectare more in net income than the non-project farmers. In this case the difference in net income comes from the premium prices being paid by the rice mills.
- The income analysis has only been done on the rice crop. Given that there are positive externalities to using water productive practices and technologies, that spill over to other crops that the farmers cultivate on their lands, it is highly likely that they are experiencing yield and thus income gains on other crops as well. The overall benefit would therefore be higher than calculated.

Cost of Production (USD)			
No.	**Input Cost Category**	**Project Farmers**	**Non-Project Farmers**
1	Seed Cost (USD/hectare)	9	10
2	Laser Levelling (USD/hectare)	52	-
3	Fertilizer (USD/hectare)	230	260
4	Pesticide (USD/hectare)	93	116
5	Irrigation Cost (USD/hectare)	Electricity: 140 Diesel: 232	Electricity: 162 Diesel: 255
6	Canal Water Irrigation (fixed annual charges)	2	2
7	Mechanical Transplanter (USD/hectare)	140	-
8	Labour Transplanting (USD/hectare)	-	81
9	Harvesting Cost (USD/hectare)	93	93
	Total cost/hectare (USD)	**759**	**724**

Yield	**Project Farmer**	**Non-Project Farmer**
Yield (kg/hectare)	3,850	3,500
Price	**Market Price**	**Rice Mill Price**
Rice Paddy Price (USD/kg)	0.27	0.31
Income (10% higher yield of Project Farmer)	**Project Farmer**	**Non-Project Farmer**
Gross Income (USD/hectare)	1,194	945
Net Income (USD/hectare)	435	221
Income (same yield)	**Project Farmer**	**Non-Project Farmer**
Gross Income (USD/hectare)	1085	945
Net Income (USD/hectare)	326	221

Figure 1: Income Comparison with 10% additional yield of Project Farmers

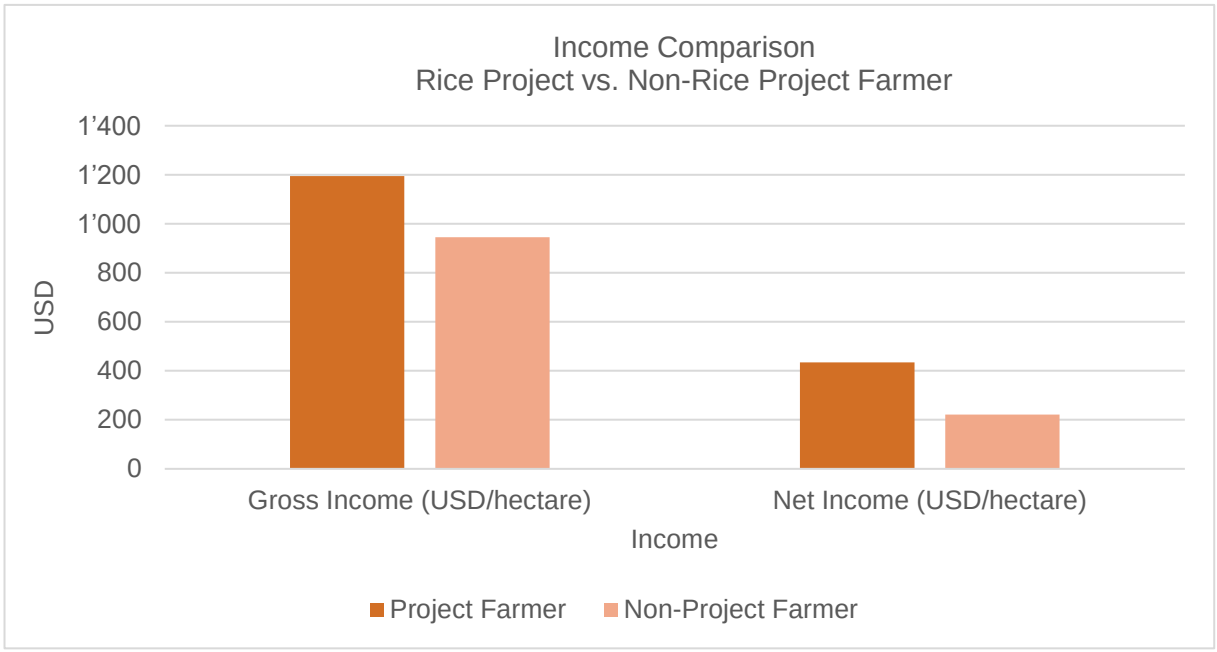
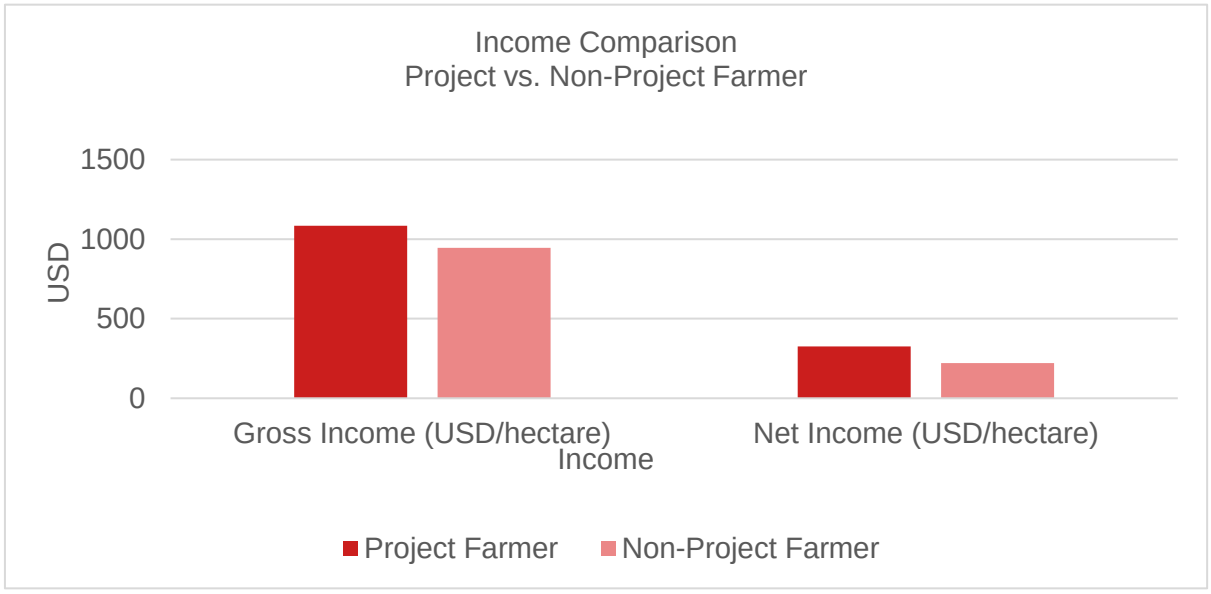


Figure 2: Income comparison with no difference in yield between project & non-project farmers



4.2 Outcome stories from rice farmers in Punjab

Outcome Story 1

Rizwan Ahmad is a farmer from Punjab who owns 25 hectares of land and grows rice and wheat on it during the year. In 2019, he was visited by a representative of Rice Partners Limited (RPL) who asked him to give the company 4 hectares of his land as a special project and grow rice on these 4 hectares as per the exact advice of RPL representatives. The company would provide all the inputs for these 4 hectares and the harvest would belong to the farmer. On the remaining land he could grow rice however he deemed fit. RPL wanted to show him and the farmers in the neighbourhood how much more yield they could obtain from their lands if they were to follow better agronomy practices as advised by RPL agronomists. For the first time in his life his land yielded 4500 kg of rice/hectare on the 4 hectares of land on which he grew rice as advised by RPL experts. His average yield had always been between 3250-3750 kg/hectare. He had followed the exact instructions which included using certified seed, laser levelling, installation of AWD tubes, mechanical transplanting and timely and accurate usage of quality fertilizers and pesticides. He was astounded by the results and since then has been following the same process and is enjoying higher yields.

Outcome Story 2

Younus, a farmer from Sheikhupura district in Punjab owns 10 hectares of land and leases another 8 hectares to grow wheat, rice, maize, and some vegetables throughout the year. His biggest expense in farming is water. His land is on the tail end of the canal and rarely receives canal water. For irrigation he relies on tube wells and has installed 3 tube wells to cover his land. A tube well needs to run for at least 8 hrs to irrigate 1 hectare of land. In 2021 he had his land laser levelled on a cost sharing basis from Galaxy Rice mills. Since then, he has experienced a significant reduction in the amount of time required to irrigate his land. He can now irrigate 1 hectare in just 4-4.5 hours. This has significantly reduced his electricity bill and brought down his overall cost of production.

Outcome Story 3

Muhammad Rana has 60 hectares of land that he leases to grow rice in Punjab. All his life he has used labour on his land for rice transplanting. The labour usually comes from nearby villages during the rice transplanting season. Entire families come together in groups to work on the lands during the rice cultivation season. In 2020, he was approached by Galaxy rice mills to use mechanical transplanter on his land. This was his first introduction to the mechanical transplanter. He was sceptical at first and not convinced that it would work better than the manual labour and, it also cost more. Upon further convincing from Galaxy representatives on the benefits of using a mechanical transplanter he decided to give it a try. He was amazed by the results. His yield improved by at least 1000 kg/hectare. He could also visibly see the difference on his land when the transplanter was planting rice. Manual labour could at most plant 120,000-130,000 plants per hectare however, the transplanter was planting around 200,000 plants per hectare. Since then, he has been using mechanical transplanter on his land as more plants mean higher yield. He believes his yield has increased by at least 10-15% since using mechanical transplanters. An additional benefit which he values more than his yield is his peace of mind. Earlier, rice transplanting season used to be a highly stressful time for him because of the labour woes. Ensuring that labour was available at the right time, was working properly i.e., planting the right number of plants at the right distance, not shirking/wasting time or wasting plants by not planting them properly, caused a lot of stress and took up a lot of his

time in labour supervision. Now during the rice season his mind is at ease because he knows the transplanter deployed on his land is planting the maximum possible plant population and the process will be completed in half the time, with minimal effort/supervision from his side.

Outcome Story 4

Iqbal, a farmer from the Sheikhupura region in Punjab has been selling his rice to RPL for the 4 last years. Before RPL, he used to sell his rice in the local market (mandi). Last year when he went to sell his rice to RPL, they rejected his lot because it did not have the required moisture content. He then had to go to the market to sell his rice. He had forgotten what hassle it was and how farmers got ripped off due to incorrect weighing, commission charges, labour charges for loading unloading and a host of other hidden charges. The biggest issue however had always been the incorrect weighing which left the farmer worse off. Iqbal said he suffered a loss of about USD 230 because at the market they said his lot came out at 500 kg less than what it had weighed at the mill. This is one of the main reasons why he always prefers to sell his crop to RPL. RPL usually pays a premium price than the local market; however, even at times when the price of RPL and the market is the same, it is still more profitable to sell to RPL as they do not cheat farmers when weighing their crop.

Outcome Story 5

Rehan, a farmer hailing from Gujranwala in Punjab owns 7 hectares of land and grows rice and wheat on it. He has never attended any trainings organized by RPL and has also never sold his rice to them. He did not know what efficient water management was and was equally unaware of any practices that could help him improve his water efficiency. In 2019 he had his land laser levelled for the first time and as result experienced an increase in his rice yields. His average yield used to be 2250 kg/ hectare but after laser land levelling he can get up to 2800 kg/hectare. He also experienced a reduction in his water cost as his tube wells were running less frequently compared to before laser land levelling. He had heard about laser land levelling through his wife's cousin, who lived two villages over and was a contract farmer for RPL. His wife's cousin used to frequently talk about the new techniques he had learned from RPL's agriculture technician and how that had impacted his overall yields. In 2019 he finally decided to try laser land levelling. He was quite apprehensive at first because laser levelling meant additional expense. He was worried he might not be able to recover the cost. He did not have a lot of expectations but was delighted when he got a higher yield. Not only was he able to recover the cost but gained additional benefit as levelling also positively impacted his wheat crop. He was also very happy to learn that laser levelling was not required every year and that he could reap its benefits for at least two years before he needed to get his land levelled again.

Outcome Story 6

Muhammad Ramzan a rice farmer from Punjab took out an agriculture input loan from HBL in 2020 under the Galaxy and HBL partnership for providing low-cost loans to rice farmers. This was his first time ever taking a loan from a formal financial institution. His perception was that getting loans from banks is a cumbersome and time taking process, and that they will have various charges and fees that will make the loan very expensive for him. After being persistently encouraged by Galaxy, he decided to take the loan. Galaxy provided him with all the support required for his documentation and paperwork which was surprisingly quick and within 2 days his loan application was submitted. One of his biggest reservations was that the bank will not process the application in time for the rice season and he would not receive the loan in time to buy the inputs. To his surprise and delight he was contacted within 2 weeks of his

application submission and was told that his loan has been processed. Later at the time of paying back the loan, he was expecting a long list of charges and fees and in his mind had come up with a high figure that he may have to pay. When the actual loan payment bill came through it was far less than the amount he had come up with in his mind. There were no extra charges or fees, and it was the same amount as that had been communicated to him at the time of the loan application. He was so surprised that he thought that there must be a mistake and the actual amount must be higher. Reluctantly, he called the bank to tell them to recheck everything because he thought they had made a mistake. The bank told him that there was no mistake and the amount in fact was correct. This lifted his spirits and was very happy that he had made the decision to take the loan. He now proudly relates this story to other farmers in his community, trying to dispel their negative perceptions.

4.3 SRP Standard for Sustainable Rice Cultivation

The Standard comprises 41 requirements structured under eight themes

4.4 Better Cotton Standards for Sustainable Cotton Production

1 BCI Farmers minimise the harmful impact of **crop protection** practices

BCI supports farmers in developing a better knowledge and understanding of practices that minimise the potential harmful effects of pesticides and in adopting Integrated Pest Management technologies with an emphasis on the use of pest control techniques other than pesticides

2 BCI Farmers promote **water stewardship**

BCI supports farmers in using water efficiently to consume and pollute less water; thus achieving greater yields and building their resilience to climate change while promoting fair use and allocation of water resources amongst users beyond the farm, and up to the watershed level.

3 BCI Farmers care for the **health of the soil**

BCI supports farmers in a better understanding and use of the soil. A healthy soil leads to significant increases in the quality and quantity of yields; to large cost reductions in fertilisers, pesticides and labour; and is a main asset for climate resilience.

4 BCI Farmers enhance **biodiversity** and use **land** responsibly

BCI supports farmers in conserving and enhancing biodiversity on their land; and in adopting practices which minimise the negative impact on habitats in and around their farm.

5 BCI Farmers care for and preserve **fibre quality**

BCI supports farmers in managing inherent fibre characteristics, man-made contamination and waste content; to enhance their cotton quality, thus enhancing its value, and leading to a better price for farmers.

6 BCI Farmers promote **decent work**

BCI supports farmers in promoting fundamental principles and rights at work on employment and income opportunities, social protection and social security, and social dialogue; based on international labour standards.

7 BCI Farmers operate an effective **management system**

BCI supports farmers in operating a management system that includes the framework of policies, processes and procedures ensuring they can fulfil all the tasks required to meet the Better Cotton Principles & Criteria; and to enable continuous improvement in farming practices.

4.5 Stakeholders Map

Rice Sub-Project Stakeholders Map				
Stakeholder	**Position**	**Role**	**Interest**	**Influence**
Farmers	In favour	Directly impacted; face water shortages and high-water costs; in favour of water productivity; not organised	High	Low
Farm labour	Ambiguous	Temporary work; not organised; likely to face job displacement because of increased mechanization	High	Low
Rice millers (local companies)	In favour	Prepared to support farmers on rice standards and improved cropping practices if it leads to greater linkages to the export market	Medium	Medium
Exporters' Association	Ambiguous	Loosely organized network of export companies; mainly focused on sustained supply of rice for export	Low	Medium
Agri. inputs / service providers	Ambiguous	Highly relevant for supply of new technologies and quality inputs	Low	Low
International companies (MARS, Westmill)	In favour	Financiers/trend setters; strong implementer of SRP standards	Medium	Medium
Government of Punjab	In favour	Policy maker; regulator; duty bearer; interested in improved yields; provides extension services; invests in large scale irrigation infrastructure; regulates supply of quality inputs; conducts research; monitors effectiveness and efficiency of irrigation system	Medium	High
Agriculture Research Institutions	In favour	Conducts research on the efficacy of different production technologies; crop varieties; field practices; demonstration/experiment plots	High	Medium

4.6 Map of Punjab

Source: https://en.wikipedia.org/wiki/List_of_districts_in_Punjab,_Pakistan

4.6 List of Meetings

Date	Meetings/Visits	Participants	Agenda
5th July, 2022	Helvetas	National Consultant, National Coordinator WAPRO	Introduction and Planning Meeting
18th July, 2022	Helvetas	National Consultant, National Coordinator WAPRO, National Program Officer Helvetas	Case study interview of Helvetas WAPRO Rice Project staff
27th July, 2022	Galaxy Rice Mill	Project Manager Galaxy, Agriculture Technicians Galaxy, National Consultant, National Coordinator WAPRO	Case study interviews of Private Sector Partner
27th July, 2022	Field Visit – Sheikhupura	National Consultant, National Coordinator WAPRO, Farmers	Farmer FGD and Interviews
28th July, 2022	Field Visit – Sheikhupura	National Consultant, National Coordinator WAPRO, Farmers	Farmer FGD and Interviews
29th July, 2022	Rice Partners Limited	Project Manager RPL, Agriculture Technicians RPL, National Consultant, National Coordinator WAPRO	Case study interviews of Private Sector Partner
29th July, 2022	Field Visit– Gujranwala	National Consultant, National Coordinator WAPRO, Farmers	Farmer FGD and Interviews
1st August, 2022	Field Visit– Gujranwala	National Consultant, National Coordinator WAPRO, Farmers	Farmer FGD and Interviews
4th August, 2022	Helvetas	Country Director, Deputy Country Director, National Consultant, National Coordinator WAPRO	Case study interview of Helvetas/WAPRO Senior Management
11th August, 2022	Punjab Agriculture Department	Director OFWM, Director Extension, National Consultant, National Coordinator WAPRO	Case study interview of government stakeholders
13th August, 2022	Galaxy Rice Mill	Project Manager Galaxy, Agriculture Technicians Galaxy, Evaluation Team Lead, National Consultant, National Coordinator WAPRO	Evaluation Team Lead meeting with Private Sector Partner
13th August, 2022	Field Visit – Sheikhupura	Evaluation Team Lead, National Consultant, National Coordinator WAPRO, Farmers	Field visit and farmer meetings by Evaluation Team Lead
14th August, 2022	Helvetas	Evaluation Team Lead, National Consultant, National Coordinator WAPRO, Country Director Helvetas, Deputy Country Director Helvetas	Evaluation Team Lead meeting with Helvetas/WAPRO Senior Management
15th August, 2022	BCI and REEDS	Evaluation Team Lead, National Consultant, National Coordinator WAPRO, BCI Regional Director, BCI Country	Case study interviews of BCI and private sector partner for cotton sub-project

		Director, REEDS Program Manager	
15th August, 2022	Punjab Agriculture Department	Evaluation Team Lead, National Consultant, National Coordinator WAPRO, Director OFWM, Technical Advisor Agriculture Delivery Unit	Evaluation Team Lead meeting with government counter parts

4.7 List of Documents used

Year	Title of Document	Author/Publisher
2015	WAPRO Project Document - Phase 1 (2015-2018)	HELVETAS Swiss Intercooperation
2018	WAPRO Project Document - Phase 2 (2018-2021)	HELVETAS Swiss Intercooperation
2018	Complementary document to the Project Document: Individual project proposals for the sub-projects within the WAPRO Phase 2	HELVETAS Swiss Intercooperation
2018	WAPRO Sub-Project Rice Yearly Plan of Operation	HELVETAS Swiss Intercooperation
2022	WAPRO Annual Report 2021	HELVETAS Swiss Intercooperation
2021	Annex document to the WAPRO Operational Report 2021	
2019	Step by Step Engagement with Partners on SRP Compliance and Challenges	HELVETAS Swiss Intercooperation
2022	WAPRO YPO Addendum on Exit strategies – Rice – Pakistan	HELVETAS Swiss Intercooperation
2021	Annual Progress Report SRP Rice Pakistan	HELVETAS Swiss Intercooperation
2018	Helvetas Conference Report-Water Productivity in Agriculture -Challenges and Solutions.	HELVETAS Swiss Intercooperation
2020	Rice Partners Limited- WAPRO Annual Report	Rice Partners Limited
2019	Workshop Report: Water Productivity in Agriculture; The Role of Technology and Private Sector	HELVETAS Swiss Intercooperation
2016	Reflection on Progress 2014-2016	Alliance for Water Stewardship
2016	Gender Role in Rice Value Chain, Pakistan	HELVETAS Swiss Intercooperation, Tehseen Nizami, Samira Qazi, Shazia Hina
2018	Cost-Return Analysis of Rice Crop with Improved Practices-District Sheikhupura	HELVETAS Swiss Intercooperation, Prof. Dr. Muhammad Zulfiqar
2016	Water Use Master Plan	HELVETAS Swiss Intercooperation

2020	Standard for Sustainable Rice Cultivation (Version 2.1)	Sustainable Rice Platform
2022	WAPRO Fact Sheet- Multi Stakeholders join forces to increase water productivity in Rice and Cotton (WAPRO)	HELVETAS Swiss Intercooperation

4.8 Pictures from the Field Visits

Water Efficiency in Rice & Cotton Project (WAPRO)

Tajikistan Case Study

Anvar Kamolidinov, National Expert anvarkamol@gmail.com

Dushanbe, September 5, 2022

ACKNOWLEDGEMENTS

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Executive Summary

The Water efficiency Project (WAPRO) in Tajikistan has been implemented since 2015 with the financial support of the Government of Switzerland through the Swiss Agency for Development and Cooperation (SDC) and the Swiss NGO HELVETAS Swiss Intercooperation. The overall goal of the project is to improve food security, farmers' incomes and water efficiency in rural areas by supporting the efforts of the Government Republic of Tajikistan to improve the efficiency of water use.

The purpose of the evaluation is to provide SDC with an external and objective assessment regarding the achieved results of the second phase in particular, and of the overall impact of the entire project in general. The evaluation will provide an overall and comprehensive picture on the project results on the short and medium term as well as provide information on possible effects at the long-term including elements of impacts and sustainability.

Tajikistan is the mountainous country with the least land resources in Central Asia. Increasing the productivity of each hectare irrigated here is important. Although the country is rich in water resources, they are for the most part transboundary and shared between the countries of the region and each country in the region, including Tajikistan, has a certain limit on water withdrawals from the Amu Darya and Syr Darya rivers. Therefore, the future development of the countries related to water use depends on the extent to which each country will introduce water-saving irrigation technologies and increase the productivity of irrigated land and farm incomes. Therefore, the objectives of the WAPRO project coincide with the strategic objectives of the country to develop irrigated agriculture.

The WAPRO project, efficient and affordable irrigation water saving technologies combined with soil fertigation to achieve high cotton yields on the low fertility, stony soils of northern Tajikistan. Given the simplicity and lack of need for special equipment and the clear training provided by the project, local farmers were convinced of its practicality and feasibility.

With a minimum increase in yield of each farmer by 0.5 t/ha, the total additional income of all 3’200 farmers amounted to 16 million Tajik Somoni per year (about 1.5 million USD/year) according to the monitoring data by WAPRO project. In addition, the project can list the following positive results such as: saving water and electricity per hectare of irrigated area, reducing pollution of groundwater and soil, reducing the use of mineral fertilizers and pesticides as well as soil erosion effects.

The results of the project are on a good way to become sustainable, as the farmers have turned them as part of their production process, which allows them to receive additional income. The knowledge gained by farmers helped them to independently find other ways to save agricultural costs, such as the use of irrigation pipes, the preparation of humus for use as fertilizer.

The WAPRO trainings not only gave the farmers new knowledge but also motivated them to search for additional new knowledge. They kind of identified a group of neighboring farmers who together started to look for new solutions to other existing problems. Not only the farmers but also the water user associations (WUAs) and other interested governmental bodies were interested in the process. For example, farmers consult with project facilitators about more efficient methods of growing other crops, the use of different pesticides, crop seeds, and WUAs adjust the amount of water supplied in their water use plan. In this way, the WAPRO project has contributed to developing the capacity of local stakeholders at a certain scale.

Cotton cultivation following BCI principles has a cumulative positive impact on water and energy conservation, protection of surface and ground water, soil from pesticide and fertilizer

pollution, increased soil fertility and improved environment, increased farmers' income and improved food security and improved cotton cultivation culture. Ultimately, BCI's cotton growing principles also have a positive impact on improving the health of farmers and their families.

The WAPRO project in Tajikistan, has done a great job in introducing the principles of the Better Cotton Initiative (BCI) among the farmers involved in the project. In addition to the application of water safe irrigation and soil fertigation technology, the BCI principles include resource conservation, environmental protection, fair income distribution and gender equity in increasing cotton revenues, which are closely linked to the sustainable development of Tajikistan.

The results obtained by the project on growing BCI cotton are a great contribution to improving the productivity of water and land in Tajikistan. This is the first practical result on a relatively large scale to save irrigation water in the country. The project achieved virtual energy savings equivalent to the water saved in places where pumped water is used for irrigation. Cultivation of BCI cotton increases farmers' incomes due to higher cotton yields and reduced agricultural inputs. Also, due to the high price of BCI cotton, ginneries and textile enterprises also increase their revenues

WAPRO's systematic interaction with government and non-government stakeholders has raised their awareness of the relevance of increasing the productivity of water and land use through the production of high-quality BCI raw cotton, grown in the best conditions while conserving natural and material resources and protecting the environment.

It should be emphasized that the WAPRO project, using the example of the production of raw cotton, has shown and proved in practice that by educating farmers in rational technologies and linking this knowledge to production processes, it is possible to save agricultural costs and receive high yields and high incomes. These results need to be disseminated throughout the country for the benefit of farmers and the government. It is encouraging that based on the results obtained in the six pilot districts the project has prepared "Methodological guidelines for efficient water management based on demonstration of water-saving irrigation technologies", which have been adopted by the Agency for Land Reclamation and Irrigation under the Government of Tajikistan to apply the project proposals in the respective cotton growing zones of the country. BCI cotton cultivation will also be disseminated by the project partner SAROB in the southern regions of Tajikistan.

The WAPRO project, with a small overall budget, has shown good practical results in saving irrigation water and increasing cotton yields, which is a technical and technological solution for increasing water productivity. The BCI cotton production was an additional measure to increase the profitability of cotton cultivation. All these project measures were foreseen in the project log frame and have been fully implemented. In addition to the project objectives achieved, the results have had a positive impact on improving the environment (reducing groundwater levels, soil erosion, pollution by mineral fertilizers and pesticides). All this resulted in increased income for the 3,200 farm households assisted by the WAPRO project. Also unaccounted beneficiaries of the project were those farmers who themselves started to learn from those farmers who apply the technology proposed by the project.

1 Introduction and Methods Used

The main consumer of irrigation water in Tajikistan is agriculture, which forms about 20% of the country's GDP and 45% of the population's employment. The bioclimatic conditions of Tajikistan are conducive to obtaining high yields of agricultural crops, including cotton. This allows you to grow raw cotton with high quality indicators, including fine-staple varieties of raw cotton[1].

Every year, cotton is sown in the country on an area of about 170'000.0 to 185'000.0 hectares, while in the Sughd oblast the cotton area is of about 55'000.0 to 60'000.0 hectares[2]. The BCI cotton growing area of the WAPRO project in 2021 was 8,483.0ha which is around 14-15% of the total cotton growing area of the Sugd oblast. In 2021, the production of cotton fiber in Tajikistan amounted to 100'600.0 tons with an export volume of 202.7 million USD[3].

Tajikistan, located in Central Asia, borders Afghanistan, China, Kyrgyzstan and Uzbekistan, Annex 5. Mountains cover 93 per cent of the territory. In July 2022, the population reached 10 million. The economy is agrarian-industrial and is based on agriculture, mining, energy (hydropower), light industry and non-ferrous metallurgy. Tourism is developing. The National Strategy of Tajikistan until 2030 envisages development of the economy of country to an industrial-industrial level.

At present, the share of cotton fiber processing in the country is about 30% and is increasing every year. If you receive from 2,5.0 to 3.0 tons of cotton per hectare and establish a complete processing of cotton fiber in the country, according to experts, you can get income from 12'000.0 to 15'000.0 USD, while only 1'800.0 USD can be earned from the export of raw cotton. The medium-term development program of the Republic of Tajikistan[4] for 2021-2025 provides for the creation of large agro-industrial clusters in the regions of the country for the complete processing of cotton fiber. This will make it possible to significantly increase the efficiency of cotton growing in the country and provide assistance to cotton farms.

The Water efficiency Project (WAPRO) in Tajikistan has been implemented since 2015 with the financial support of the Government of Switzerland through the Swiss Agency for Development and Cooperation (SDC) and the HELVETAS Swiss Intercooperation. In Tajikistan the WAPRO project focused on cotton as a key commodity that are responsible for and affected by water scarcity. The overall goal of the project is to increase farmers' incomes and water efficiency in rural areas by supporting the efforts of the Government Republic of Tajikistan to improve the efficiency of water use.

The SDC is commissioning an External Project Evaluation of the SDC program "Water efficiency in Rice & Cotton (WAPRO), Increased water efficiency and food production in key commodity value chains through multi-stakeholder partnerships applying a PUSH-PULL-POLICY strategy".

[1] Umarov, Khojamahmad Working Paper Agricultural policy in cotton production and diversification of the agro-industrial complex in Tajikistan Discussion Paper, No. 159 Provided in Cooperation with: Leibniz Institute of Agricultural Development in Transition Economies (IAMO), Halle (Saale)

[2] Database of the State Statistics Committee under the President of the Republic of Tajikistan, https://www.stat.tj/ru/database-real-sector

[3] Data of the Ministry of Agriculture of the Republic of Tajikistan. https://www.moa.tj/tj/news/news/guzorishi-matbuot-ba-sanai-29-07-2022

[4] The Medium-Term Development Program of the Republic of Tajikistan for 2021-2025. Approved by the Decree of the Government of the Republic of Tajikistan dated April 30, 2021, No. 168

The overall project objective is to “enhance food security, farmers’ income and water productivity for farmer families in Tajikistan. To realize this overall impact one specific outcome was defined for each component (PUSH, PULL and POLICY) that relate to the field (= micro) and national or corporate (= meso) level[5].

The scope of the evaluation shall be limited to the WAPRO phase 2. Experiences and opinions of the different project stakeholders, including donors and others involved in the WAPRO support, should be taken into account as well. The evaluation was conducted between June and September 2022, with the field work performed in July and August and covered three districts of Sugd oblast in north Tajikistan.

Method of the Evaluation. KEK-CDC has chosen to conduct the evaluation by the national evaluator as the lead person in conducting this case study, with a visit by the international consultant for better understanding the context and for quality assurance. The national evaluator has a total of 18 working days for desk review, field visits and report writing. This made it possible to divide the tasks between them - while the national expert paid attention to the collection of data and achievements of the project, and the international consultant paid more attention to the more generalized results and political achievements of the project.

The evaluation was conducted according to plan provided in ToR with adopting to Tajikistan conditions, table 1 below:

Table 1. Plan of WAPRO Tajikistan evaluation

#	Tasks	Indicative number of days	Time, 2022
1	Preparation and desk review; stakeholder mapping; approach paper how to plan the case study (Annex 1)	ca. 2 days	July
2	Data analysis, research, stakeholder mapping, interviews, gathering outcome stories, and focus group discussion incl. travel time	ca. 11 days	July / Aug
3	Report writing incl. feedback loop	ca. 4 days	Finalization of report is 22 Aug
4	Presenting case study and discussion	ca. 1 day	Aug / Sept
		18 days	June to Sept

In accordance with this plan, the expert carried out his work in the following order:

- Desk review
- Stakeholders map
- Field visits and interviews (Annex 1)
- Focus group discussions
- Joint analysis with international consultant
- Report writing.

[5] Annual project progress report 2021. Water Productivity Project (WAPRO) Tajikistan. 01/01/2021 – 31/12/2021

2 Findings

This section presents the identified results of the project in three of the six project districts of the Sughd oblast [6] of the Republic of Tajikistan. The impact of the project was studied at the level of family farms and Water Users Associations, which were project beneficiaries of farms operating without the intervention of the project and other interested governmental and non-governmental organizations that participated in certain project activities.

The findings are summarized in order of the Push-Pull-Policy components (see figure 2 below) on which the WAPRO project methodologically relies.

Push Component: 3,200 family farms cultivating BCI cotton, using improved furrow irrigation technology and efficient water management practices combined with liquid organic fertilizer application resulting in increased cotton yields and farm income. The Push component raises the level of knowledge of farmers who previously did not have knowledge about efficient irrigation methods, unlike those they used before. This component is an approach to change methods and technologies through knowledge dissemination.

In all surveyed areas in the sub-basin of the Khojabakirgan and Isfana rivers (J. Rasulov and B.Gafurov districts), partly in the sub-basin of the Isfara river (Kanibadam district), farmers complain about the lack of irrigation water associated with the lack of water at the source and the instability operation of pumping stations and insufficient water management in on-farm and off-farm irrigation systems. This has a strong impact on the standard of living and food security of the farmers living here. Water is especially important for such crops as cotton.

Sughd province is located in northern Tajikistan and includes 13 districts. The area is 25,400 km². The population is 2.7 million people (01.01.2020). It is considered to be the region with the most developed industry. The region's total industrial output in 2019 was over 47% of the country's total. The total area of irrigated land is 293'440 ha, including 263'557 ha (01.01.2020). Sughd province is famous for its dried apricots in Russia and Kazakhstan. But, cotton growing and the textile industry also occupy leading positions in the province's economy.

Over the years of the project, the situation of the family farms involved in the project has definitely improved. This is evidenced by the data of interviewed members of family farms in three of the six pilot districts: B. Gafurov, J. Rasulov and Kanibadam districts, (Annex 5). In most farms, due to the increase in cotton yields, family incomes increased by 40-60% Annex 4).

The increase in cotton yields was facilitated by the rational and integrated irrigation technology proposed by the WAPRO project using furrows that were shorter than before and the application of liquid organic fertilizer (fertigation).

Irrigation along shortened furrows 50-80m long instead of 120-160m long furrows previously used by farmers allowed: (1) to increase the uniformity of moistening of the root-inhabited soil layer along the length of the irrigated area (2) to reduce discharges from the end of irrigation furrows (3) to reduce the duration of irrigation (4) significantly reduce the erosion of the topsoil and the washout of fertilizer applied to the soil.

Increasing the uniformity of moisture along the length of the soil makes it possible to even out the growth of cotton along the length of the field and to obtain a more or less equal number of bolls in all parts of the field. Short furrows allow a much smaller irrigation stream to be delivered

[6] The WAPRO project operates in B. Gafurov, J. Rasulov, Zafarabad, Kanibadam, Matcho and Spitamen districts of the Sughd region of the Republic of Tajikistan

into the furrows, which in turn allows the stream to reach the end of the furrow faster, reduce wastage of water and reduce soil erosion and, as a result, reduce the duration of irrigation. Reducing erosion prevents fertilizer from being carried away from the field, maintaining and gradually increasing soil fertility.

The introduction of dissolved organic fertilizer (mainly cattle) into the field together with irrigation water in the last periods of irrigation (5-7 hours) made it possible to: (1) reduce at least two times the purchase and application of expensive mineral fertilizer[7], (2) enrich microelement content and mechanical structure of the soil and (3) increase the duration of moisture retention in the soil and the irrigation period by 2-3 days.

The results of the introduced technology will increase the yield of cotton from 2.3-2.5 tons/ha to 3.5-4.5 tons/ha. A record yield of 5.8 tons/ha is to be achieved in 2021 at Sharipov Khabibullo's farm in J. Rasulov district.

Compared to the farmers covered by the WAPRO trainings, the condition of the farmers using the conventional technology of irrigation and fertilization has not changed, they continue to receive the same yields of raw cotton at the level of 2.0-2.8 tons/ha. However, there are farmers who were not involved in the project training processes but who independently studied the experience of effective cotton cultivation on pilot farms and introduced short furrow irrigation and fertigation.

The position of cotton farmers regarding the provision of their families is ambiguous: on the one hand, the income from the sale of raw cotton does not fully cover food costs in all families, on the other hand, these families have areas near cotton fields where they grow wheat, potatoes and other food crops. However, surveys have shown that the cost of food for their families from income from the sale of cotton can cover about 30%, the rest can do this partially. Farmers cover the missing part of the food by harvesting other food crops, as well as fodder crops that allow them to keep livestock[8] and get milk and meat.

Farmers drew attention to the fact that if they can cover most of their food needs from food crops (wheat, vegetables, legumes, fruits, gourds) in kind, cotton income is cash and allows them to freely choose what the rest of the food they can buy in market. Thus, the food supply of family farm members is integrated with the participation of different crops: cotton and food crops. It is clear that they can extend project proposals to improve water efficiency and increasing crops' yields into other crops as well.

All heads of farms with whom there were conversations emphasized that now there are not enough experienced irrigators. Irrigation of cotton is carried out by inexperienced men or women who have not previously done this. The use of irrigation plastic soft or hard pipes with holes in front of each furrow helps to solve this problem. Some farmers in B. Gafurov and J. Rasulov districts have already begun to use such pipes. However, this requires some investments, for example, in the named areas, the amount of such investments was about 700-1'000.0 USD/ha.

WAPRO proposed water safe irrigation technology

The WAPRO project has provided great assistance to farmers in increasing their knowledge. Two demonstration plots were set up in each pilot area to demonstrate efficient short furrow irrigation. For this project, WAPRO provided weirs for measuring water, light traps for harmful insects. Within the framework of the project, it was conducted a series of trainings necessary to improve the efficiency of water use, to irrigate cotton in accordance with scientifically based

[7] The price of mineral fertilizer in 2022 comparatively to 2021 the price has risen sharply by 35-50%

[8] Also, livestock management is integrated with the production of organic fertilizer for further fertigation.

irrigation norms for a specific agro-climatic zone (soil type, temperature, humidity, wind, etc.), taking into account reclamation soil conditions (water table, groundwater mineralization).

Although there are more high-tech ways to reduce water losses during irrigation (drip irrigation, micro-sprinkling, etc.), WAPRO chose the most accessible and understandable technology for farmers to reduce water losses - short furrow irrigation. This is a very efficient way of watering, which allowed farmers to reduce 30 to 40% of water losses from the end of irrigation plots and deep seepage and also reduced the duration of irrigation by 5-10 hours.

The project observed the agricultural parameters of cotton cultivation in 3,200 farmers: those who participated in the training activities and field exercises, and control farms that continued to use traditional cotton cultivation technology.

The figure below shows how the percentage of farmers who applied short furrow irrigation changed from the beginning of the project to the first half of 2022. It is also possible to determine from the figure how the percentage of farmers who began to use fertigation and the combination of short furrows with fertigation changed.

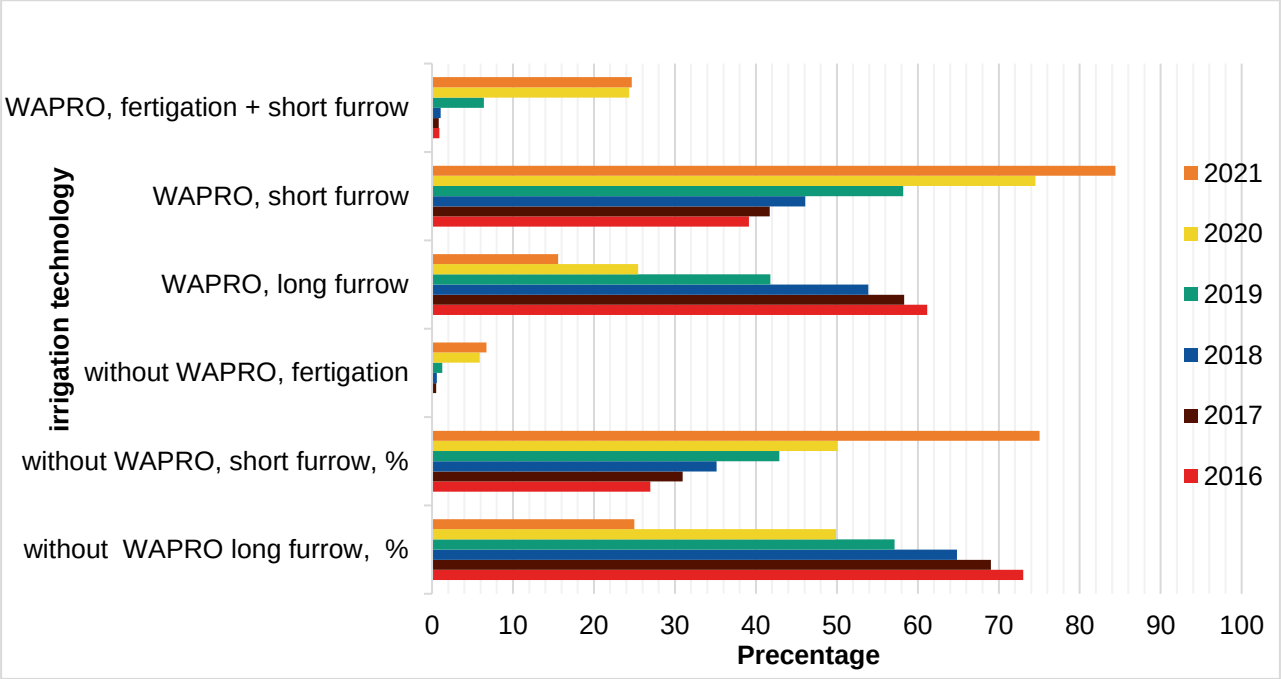


Figure 1. Dynamics of change in the number of farmers (%) who adopted the effective methods of cotton irrigation and fertigation proposed by WAPRO in 2016-2022

While before the project started in 2016 about 74% of the selected farmers used long furrows, after the WAPRO trainings and the obvious benefits of using short furrows, by 2021, the number of such farmers decreased to 25%. Conversely, the number of farmers who started using short furrows increased from 38% to 84% between 2016 and 2021.

Also, during the period of the WAPRO project, the number of farmers who started using short furrow + fertigation combination increased from a few[9] in 2016 to 26% in 2021. At the same time, the number of farmers still using long furrows decreased to 16%. This indicates the effective impact of training and extension work among local farmers in the project area. The dissemination of this knowledge and experience could be included in the system of seminars to improve the skills of agricultural specialists held by district and provincial agricultural departments.

[9] Before project same farmers had used fertigation for some vegetables.

Table. 2. Results of introduction of water safe irrigation technology in demonstration plots in pilot districts of WAPRO project

Pilot District	Irrigation technology	Irrigation number	Irrigation continuation	Received water volume	Water fee	Yield	Water productivity
		nos	hour	m^3	USD	mt	kg/m3
Mastcho	short furrow	5	58	2,412.0	4.7	4.9	2.1
Mastcho	long furrow	5	80	4,637.0	9.1	3.2	0.7
	% short furrow		27.5%	47.9%	47.9%	53.7%	200%
Spitamen	short furrow	7	46	4,428.0	8.7	4.7	1.1
Spitamen	long furrow	8	129	7,609.0	14.9	2.9	0.4
	% short furrow		64%	41.8%	41.8%	60%	174%
J. Rasulov	short furrow	8	109	5,417.0	10.6	5.1	0.9
J. Rasulov	long furrow	8	131	8,122.0	15.9	3.7	0.5
	% short furrow		16.7%	33.3%	33.3%	39.8%	111%
B. Gafurov	short furrow	10	138	7,135.0	14.0	4.6	0.7
B. Gafurov	long furrow	11	173	11,203.0	22.0	3.4	0.3
	% short furrow		20.2%	36.3%	36.3%	36.2%	116.7%
Kanibadam	short furrow	6	85	4,075.0	8.0	4.6	1.1
Kanibadam	long furrow	7	111	6,444.0	12.6	2.8	0.4
	% short furrow		23.4%	36.7%	36.7%	62.8%	160%
Zafarobod	short furrow	8	91	5457,00	10.7	4.8	0.9
Zafarobod	long furrow	8	119	7801,00	15.3	2.7	0.3
	% short furrow		23.5%	30%	30%	79.8%	158%

The data of table 2 shows in all pilot districts were obtained sustainably

The data in Table 2 show that in all pilot districts there was a sustainable benefit of short furrow irrigation compared to long furrow irrigation. A reduction of 16,7-64% in the duration of irrigations and a saving of 30-48% in the water received were obtained everywhere. Thus, farmers reduced the cost of water delivery services also by 30-48%,

Cotton yield increase depends not only on favorable water regime, but also on soil nutrition regime with necessary fertilizers. Nevertheless, in all demonstration plots, under short furrows irrigation more favorable soil moistening regimes were created: uniformity of moistening along the length of field, more uniform moistening of cotton root zone that positively influenced to increase of raw cotton yield. In all fields, irrigation with short furrows produced 36-80% higher yields. This increased irrigation water productivity by 111-200%.

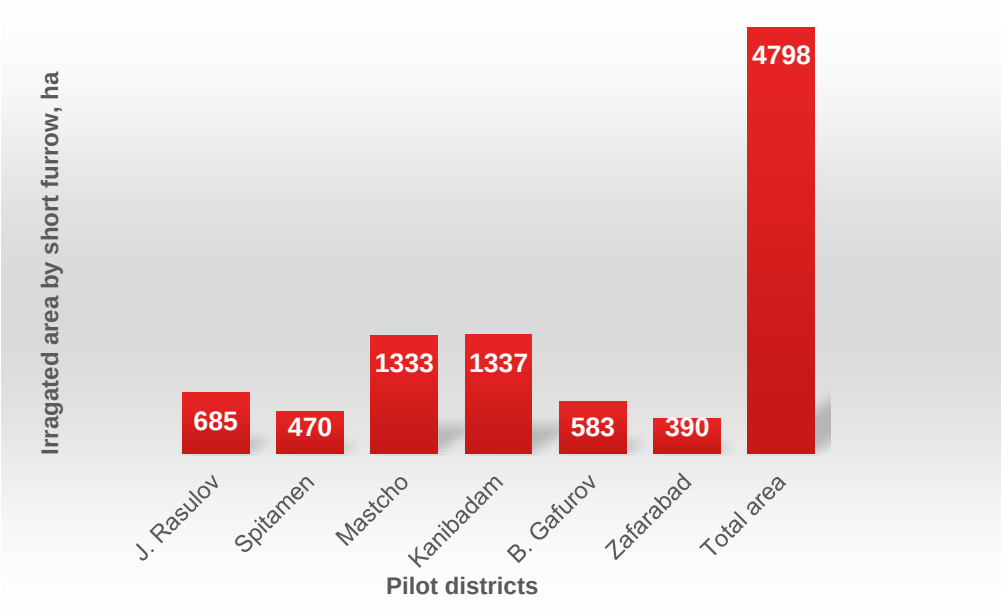


Figure 3. Total area of farms adopted short furrow irrigation in project areas
Source: WAPRO data, 2021

The number of farmers who adopted the proposed WAPRO technology in different project districts is shown in Figure 3. According to the WAPRO reports, the total number of farmers who adopted short furrow irrigation was 4,798, including those farmers who adopted the technology without participating in project activities and were convinced that it was profitable. The largest number of farmers are in Kanibadam and Mastcho districts.

A significant positive change in those who adopted the proposed technologies is due to many factors: (1) bringing information to farmers through a series of WAPRO trainings; (2) simplicity and availability of the proposed technology, which does not require material costs; (3) existing tensions with water shortages associated with the unstable operation of pumping stations, large losses of water in the irrigation infrastructure; (4) insufficient planning and water management by local WUAs and the regional state authority for melioration and irrigation. The combination of all these factors played an important role in the perception and acceptance of the WAPRO proposals.

Gender equality

Issues of gender balance and gender equality in the project farms have improved somewhat. This was facilitated by the trainings conducted within the framework of the WAPRO project. The trainings have had a particularly positive impact on those farms where BCI cotton is grown, since the issue of gender equality is one of the principles of BCI. The gender composition in the studied farms of the project varied: in B Gafurov district, about 50% of men and 50% of women; in J. Rasulov district, 36-47% of women; in the Kanibadam region, from 10 to 50% of women. In addition, seasonally, hired workers, most of whom are women, are invited to manually cultivate cotton fields in April-May and to manually pick cotton in September-November. The share of women's participation in cotton production in connection with the seasonal migration of men to Russia for work is increasing.

During the two visits to the pilot areas of the WAPRO project, the national expert did not meet working minor children in the cotton fields or in the economic centers. This applied to both pilot farms and traditional farms that were not covered by the project. All interviewed farmers emphasized that they do not use the labor of minors (below 18). Especially BCI cotton farmers control and prevent the participation of underage children in the production process. According

to the legislation of Tajikistan[10] children - students aged 14 to 16 years old have the right to work 2.5 hours a day, and from 16 to 18 years old - 3.5 hours a day.

Pilot WUAs

Water user associations in all six project districts were included in the trainings. The WAPRO project, trained six WUAs in the project areas on how to draw up an on-farm water use plan and develop maps of irrigation and drainage systems in the WUA's area of responsibility. WUA employees participated in the project's trainings, determined the volumes of water consumption for each section of the WUA's main canals, determined water losses along the length of the canals, and finally determined the water flow in the head of each canal.

The project specialists, together with WUA employees, developed GIS maps for each pilot WUA in the project areas, indicating the main hydraulic structures, canals, irrigated area and drainage system. These maps were printed in a convenient scale and distributed to each WUA.

Water user associations of the project area started distributing water in accordance with the Water Use Plans developed with the support of the WAPRO project and maps of the area of responsibility of the respective WUAs. This made it possible to improve the efficiency of water management in the on-farm system and reduce disputes between farmers due to lack of water. Availability of the WUA water use plan and maps has improved the interaction between the WUA and the regional state authorities for land reclamation and irrigation (ALRI). Now, as requested by water legislation, WUA and RDLRI have updating Water use plan of WUA and Irrigation Scheme.

It should be noted that according to legal requirements the water use plan should be updated each year before the irrigation season and submitted for approval to the State Land Reclamation and Irrigation Department and local authorities. After training by the WAPRO project, local WUAs will now be able to carry out this task in a better and more realistic manner.

However, due to the lack of water in the Isfara and Khojabakirgan rivers in April-May, WUAs cannot fully meet the needs of all farmers with irrigation water. During this period, the WUA introduces a limitation of water supply below the norms for water consumption of agricultural crops.

One of the excellent achievements of the WAPRO project and an unexpected result can be considered the formation of an atmosphere of searching for new solutions in improving the water supply of cultivated crops in areas with severe water shortage. This was facilitated by the trainings conducted by the WAPRO project and the conviction of farmers that they need to make their own decisions to increase water availability in the ways that they can: save water and try not to pollute the environment (coincides with BCI requirements). The trainings "opened the eyes" of the farmers and gave hope that the application of new approaches in the rational use of water and land will help them solve the problems of obtaining more income from cotton production, which will improve their well-being and the environment.

Another notable result of the project is the sustainable change in the behavior of farmer families regarding the more sustainable use of water and land. Most of them feel that the additional labor of 4-6 hours per watering to create an additional 2-3 furrow (instead of the previous one) is not a laborious task, since the benefits of increased yields and water savings cover these costs. They began to understand that the saved water would go to a neighboring farmer and, as a result, this would have a positive effect on the general state of water supply in the common area of the WUA. On the other hand, neighbouring farmers (those who are not participating in the WAPRO project) are interested in the results of the project interventions for efficient irrigation technology and fertigation, and have been copying successful techniques.

[10] Labor Code of the Republic of Tajikistan. Statements of the Majlisi oli of the Republic of Tajikistan, 2016, No. 7.

The WAPRO project, in order to achieve the best project results, applied the Push-Pull-Policy approach at the micro and meso levels, Figure 2. The assessment showed that in the conditions of Tajikistan, the application of this approach at the micro level has its own characteristics:

- The interdependence of the elements of the Push-Pull-Policy approach at all levels and the processes of mutual influence occur both from the bottom up and from the top down (see the arrows in Figure 2);
- Not all stakeholders (Annex 2) involved in the process are equally involved in the process of mutual influence;
- Not all stakeholders can successfully influence the target processes considered by the project, even if they want to. Since all these processes, in addition to the considered target factors, also have other external factors that have a more decisive influence.

At the micro level, the process of improving water productivity is influenced primarily by the farmers themselves, but they are also associated with WUAs, RDLRI, local Jamoat, Local authorities, the market for agricultural inputs and technical resources, Consulting companies (knowledge), Ginnery, Other stakeholders have less practical influence. From the first group, within the framework of the WAPRO project, the increase in water productivity had a significant impact - the farmers themselves, the WAPRO project, WUA, RDLRI and Local authorities:

- Farmers carried out the project;
- The WAPRO project trained farmers and raised their level of knowledge and persuaded them to introduce new technologies for water conservation and BCI cotton cultivation;
- WUAs and RDLRI provided water and were trained by the project to better plan and deliver water to farmers;
- Local authorities asked farmers to grow cotton to ensure the stability of the local industry with jobs: ginnery, spinning and textile industries, as well as to maintain the export potential of the country.

Spinning mills, textile companies, the Regional Department of Melioration and Irrigation, the Regional Department of Agriculture, the Committee for Environmental Protection and other institutions, although they are interested, due to the underdevelopment of the BCI cotton market, because of their minimal technical and economic potentials, in addition to political support for the goals WAPRO project on various platforms cannot have a practical impact.

However, for this period, the WAPRO proposals have been understood, adapted and accepted by all farmers. Due to the apparent effectiveness, farmers are convinced that even after the end of the project, they will continue to use short furrow irrigation and the supply of liquid organic fertilizer along with irrigation water. This was stated by the majority of interviewed farmers.

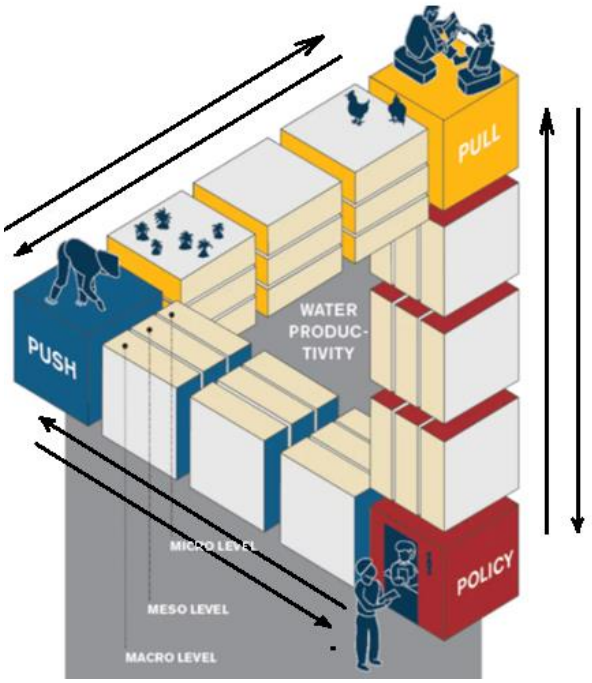


Figure 2. Applied Push-Pull-Policy approach in the WAPRO project

Pull Component: The Pull component addresses the lack of incentives for raw cotton producers on the assumption that farmers will be motivated to change their irrigation practices and other agricultural practices if a favorable market is guaranteed, i.e. if buyers support these changes either with a direct premium or the benefits of a systematic program that guarantees the acceptance of farmers' output, such as increased purchases of BCI raw cotton.

The stakeholders of the project are a long list (26 organizations, Annex 2) of state and non-governmental organizations that are involved in the production of raw cotton in Tajikistan, Appendix 1. The main ones and actively involved in project activities are small family farms, WUAs, ALRI, MEWR, ginnery, local authorities, Academia, participants in the local market for the supply of agricultural material and technical means (agriculture inputs), a consulting company represented by the cooperative SAROB, the WAPRO project itself, regional and district departments of agriculture.

WAPRO Better Cotton Initiative (BCI)

WAPRO's proposals to increase water use productivity (Push Component) are closely intertwined with the Pull Component, creating incentives for farmers to change traditional low-efficiency irrigation practices to more efficient and rational technologies proposed by WAPRO, and possibly in the future to even more efficient modern irrigation technologies agricultural commodities (BCI cotton) with stakeholder involvement, as well as increased purchases of such cotton produced under improved conditions.

Two WAPRO proposals to improve water efficiency (short furrows) and the supply of organic manure along with irrigation water (fertigation) create conditions for the following principles of BCI cotton cultivation:

Principle 2. BCI farmers care about the conservation of water resources;

Principle 3. Improved Cotton is produced by farmers who care about the health of the soil;

Principle 4. Improved Cotton is produced by farmers who protect the natural habitat;

Principle 7. BCI farmers use an effective management system.

The activities of the WAPRO project to build a bridge between farmers and BCI cotton ginnery has led ginnery to take an interest in BCI cotton and BCI cotton farmers: some ginneries have started transporting cotton from the field to the ginnery and are reducing the weed discount percentage upon receipt raw cotton BCI.

Cotton is one of the strategic crops that has a regular buyer in the international market. In Tajikistan, in 2022, cotton is grown on an area of 183'576 ha of irrigated land, including about 59'038 ha in Sughd oblast. This area increases or decreases by 10-15% in different years. Accordingly, to area, yield and climate, the annual harvest of raw cotton in the country is consist about 300'000-450'000mt, and in Sughd, 80'000140'000 mt. In 2021 Tajikistan exported 100'600mt fiber cotton with 202,6mln USD. The average yield of the raw cotton in the country is 2,0-2,2 mt/ha which is low and need to increase at list to 3,0 mt/ha

The interest of water organizations in the proposals of WAPRO to increase water productivity during irrigation of cotton has increased. The interest of the regional and district divisions of the Agency for Land Reclamation and Irrigation and the Basin Organization of Water Resources of the Syrdarya River[11] lies in the fact that in recent years the situation with the provision of irrigation water in the pumped irrigation zone has been deteriorating and becoming tense due to a number of factors: lack of water in sources (small rivers Isfara, Khojabakirgan, Isfana and Aksu) due to climate change with a gradual increase in water consumption in neighboring Kyrgyzstan located in the upper reaches of these sources, an increase in the population in the region.

Another factor influencing the water availability in the pumped irrigation zone is the stable supply of electricity and its cost. Although the Government of Tajikistan has assigned a feed-in electricity tariff for irrigation purposes during the growing season of agricultural crops (April-September), the regional state authorities for land reclamation and irrigation are not able to pay the full amount of the cost of electricity consumed.

The above factors make these organizations of the water sector very interested in saving water during irrigation, mitigating the problem of water shortage in the pumped irrigation zone, observing the established interstate limits for water withdrawal from the transboundary Syrdarya River, protecting surface and groundwater from depletion and pollution by pesticides and mineral fertilizers.

In sum, all these factors and incentives coincide with the idea of growing BCI cotton, which, in the formation of a sustainable market demand, will be supported by many stakeholders, including water management institutions.

In the meantime, farmer Ochilov Sobirjon grows BCI cotton, an active participant in all trainings and a public consultant of the WAPRO project from J. Rasulov district, Gulakandoz jamoat.

[11] The Basin Organization of Water Resources of the Ministry of Energy and Water Resources of the Republic of Tajikistan is the body for planning and managing water resources in the Tajik part of the Syrdarya river basin

On the recommendation of the project, by applying irrigation along shortened furrows 80 m long (previously used more than 100 m) and applying organic fertilizers together with irrigation water, the cotton yield increased from 3.6 t/ha to 4.6 t/ha. He reduced the application of mineral fertilizers from 600kg/ha to 100kg/ha, and reduced the irrigation rate for the season from 8200m^3/ha to 6300m^3/ha. He says that now instead of 2 hectares of cotton he can irrigate 3 hectares. Farmers in the Sughd region produced 17,350.6 tons of BCI cotton in 2021 which is 31% more than in 2018, figure 4.

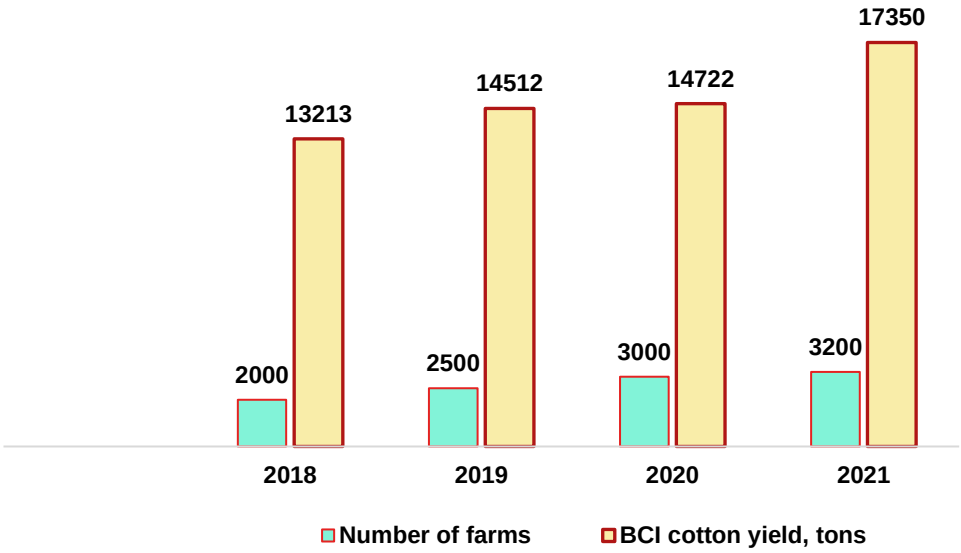


Figure 4. Dynamics of BCI cotton production by WAPRO project farm members in Sugd oblast of Tajikistan

WAPRO organized a series of joint stakeholder meetings (Ginneries, spinning mills and textile companies) to increase their interest in BCI cotton farmers. Although they do not currently promise direct purchasing preferences for such farmers, they are already beginning to consider how BCI will improve the conditions for buying cotton to create additional incentives for them. The main obstacle on this path is the still undeveloped cotton market - BCI in Tajikistan, which depends on the needs of the domestic market of Tajikistan.

WAPRO measures play an important role in the organization of cotton production - BCI in Tajikistan and ginneries certification. WAPRO's cooperation with the cooperative SAROB on the implementation of the project components has increased SAROB's capacity and lead to it's institutional, technical and professional development. This allowed the cooperative to develop from the level of a regional organization to a republican (national) one. The central office of SAROB in Dushanbe cooperates closely with the BCI International Cotton Coordination Center in Pakistan.

The share of water withdrawal from the Syr Darya River for Tajikistan is limited by the interstate agreement of the riparian countries of the Syr Darya River. Everywhere in Sughd province there is a shortage of irrigation water during the irrigation season. Another negative factor is that in Sughd 80% of water for irrigation is supplied by pump stations and the cost of electricity rises periodically. Also, the irrigation infrastructure is worn out and water losses in inter- and intra-farm canals are observed. Unfortunately, water use efficiency at the small farm level is also low and low-productive. In this situation, the WAPRO project has acted as a driver for creating a general consensus among middle-level managers involved in irrigation and agriculture that the problem of efficient water use in the province has reached a critical level and there is no other solution than to reduce water losses in all parts of irrigation systems, especially at farm level. This will solve many related problems - reducing the duration of irrigations, increasing the water availability of irrigated land, increasing cotton yields, water use, and improving the environment.

POLICY Component aims to fill in the gaps that arise due to inadequate planning and management of water resources. Proper distribution of water, appropriate maintenance of the canal system and timely irrigation are in many cases ensured by agreed water use plans at all levels, bringing together water users for coordinated joint actions.

Evidence-based policy dialogue including water resource mapping and sustainable water management practices can lead to improved legal frameworks and water use plans to improve water security and hence sustainable agricultural production.

Efficient planning and management of resource conservation and increasing the efficiency of the use of natural resources, including water resources, are an important part of the water policy of Tajikistan. This is reflected in the strategic documents[12,13,14] and laws of the country [15,16].

The technology used by WAPRO to reduce water use by 30-40% in cotton irrigation is important in the implementation of this policy at the level of irrigation systems and irrigated fields by farmers.

The implementation of the WAPRO project and the cultivation of BCI cotton makes a great contribution to improving the productivity of water and land in land-poor Tajikistan and strategic importance. BCI provides for increasing the income of farmers and local ginneries, textile companies, saving farmers the cost of logistics in the production of raw cotton.

Growing conditions BCI cotton has a cumulative positive impact on water and energy conservation[17], protection of surface and groundwater and soil from pollution by pesticides and mineral fertilizers, increasing soil fertility and improving the environment.

The WAPRO project cooperates closely with the National Water Resources Management (NWRM) project in the Tajik part of the Syr Darya Basin, also financed by SDC and implemented by Helvetas Swiss Intercooperation. Since the Syr Darya River Basin Plan approved by the MEWR contains measures to reduce water losses during irrigation, the results of WAPRO on water saving were discussed with the management and specialists of this project and it is expected that they will be included in the plans for the implementation of water saving measures for irrigating crops.

WAPRO's systematic interaction with government and non-government stakeholders has raised their awareness of the relevance of increasing the productivity of water and land use through the production of high-quality BCI raw cotton, grown in the best conditions while conserving natural and material resources and protecting the environment.

WAPRO prepared 5 videos in April-June on the topics "Soil Treatment and Sowing of Cotton Seeds", "Water accounting at field level on demonstration site", "Short furrow", "Tubular irrigation" in "Sapidullo bobo" and "Alternate furrow irrigation", which are very important for spreading knowledge about water saving and increasing the productivity of water use at the level of the entire region and the country. From the point of view of the evaluator, it's most likely that WAPRO results will be used in the water information system created by Ministry of Energy and Water for dissemination of water safe technologies. This will help the development of water conservation policy throughout the country.

[12] Water sector reform program of the Republic of Tajikistan for the period 2016-2025. Approved by the Decree of the Government of the Republic of Tajikistan dated December 30, 2015, No. 791
[13] National Development Strategy of the Republic of Tajikistan for the period up to 2030. Approved by the Decree of the Government of the Republic of Tajikistan dated October 1, 2016, No. 392
[14] Draft National Water Strategy of the Republic of Tajikistan for the period 2025-2030.
[15] Water Code of the Republic of Tajikistan, April 2, 2020, No. 1688
[16] Law of the Republic of Tajikistan "On Association of Water Users". January 2, 2020, No. 1668
[17] Pumping stations annually consume 1.2-1.4 billion kWh of electricity to lift water.

Synergy of the WAPRO project with other projects

The WAPRO project has a close relationship with the NWRM project. Training and methodological materials, the monitoring format prepared by the WAPRO project is fully used by the NWRM project for: measuring water in the field; introduction of water-saving technologies; development, implementation and use of a water use plan by target WUAs. The NWRM project uses the best practices of WAPRO in its demonstration fields.

WAPRO and NWRM exchange information about opportunities to participate in advocacy in the "Syrdarya Basin Dialogue on IWRM", International Conferences at the national level, as well as participation in meetings with stakeholders.

Partnerships by WAPRO project

The WAPRO project cooperates with the Khujand Polytechnic Institute of the Technological University of Tajikistan in training irrigation specialists for practical training and internships in the framework of in WAPRO Project. As part of this partnership, WAPRO has brought a Junior Irrigation Specialist and an Assistant Irrigation Specialist, who will be independent Irrigation Specialists in a couple of years. Six students this year completed an internship at SAROB and were directly involved in the activities of WAPRO.

On May 30, 2022, a conference of young professionals was held on the topic "Water-saving technologies and their impact on people's well-being", in which 40 students took part. The conference was led by the project staff, teachers of the institute and young specialists in irrigation.

Project Shortcomings

Despite the great achievements (see findings above) compared to the relatively small budget of the WAPRO project, there are some noted shortcomings, the knowledge of which will be useful for the continuation of this project and future similar projects:

- In each project area, two demonstration plots were created, where the proposed irrigation technologies of the project were demonstrated, trainings-field days were held. It would be useful if in one area they taught irrigation along short furrows without the use of transport and irrigation pipelines, in another demo area with the use of such pipes;
- BCI cotton farmers expect to sell their BCI cotton to ginneries at a higher price in the future, which will not always be possible. This condition needs to be made clearer to farmers and reminded that they already have other bonuses in the form of free training and advice, sometimes free transport from the field to the ginneries, a lower percentage discount for weediness of raw cotton. From the point of view of market security for BCI certified cotton farmers, the consultant cannot make a clear statement, as the demand for BCI cotton in Tajikistan has shown to be volatile in the last years. If the demand for BCI cotton will grow, the BCI certified farmers (trained through WAPRO) are first contacted by cotton ginning companies, so they are on top of cotton suppliers and rather on the safer side than non-BCI farmers.

3 Conclusion

The project aims to increase water productivity in agriculture, which consumes more than 90% of the water resources used in Tajikistan. The project selected cotton as one of the most water-intensive crops and one of Tajikistan's main agricultural export commodities. Improving the water use efficiency of cotton has a greater effect than with other crops such as orchards.

The project offered the simplest, clearest and most affordable technologies for farmers to reduce water consumption and fertigation with organic fertilizer. This increased yields and saved field water use by 30 to 50%, which is very high for furrow irrigation. Qualitative and quantitative positive effects were achieved: increased uniformity of moisture along the length of the field; reduced discharge of surface water from the end of irrigation furrows; reduced duration of irrigation; reduced soil erosion, washout and removal of applied fertilizer from the end of furrows, increased soil fertility.

An important effect of saving water has been achieved in the places where there is an acute problem of shortage of water resources and irrigation is carried out by pumping stations. This will improve both the supply of water and save energy consumption and increase the productivity of water use.

The technologies proposed by WAPRO for reducing water use and increasing soil fertility are fully consistent with the principles of growing BCI cotton (under improved conditions). Implementation of the BCI cotton principles contributes to the achievement of the development goals of Tajikistan and the Strategic Development Goals agreed by Tajikistan. The production of BCI cotton in the future can become one of the important engines for increasing the productivity of water and land use, as well as environmental protection in the country.

Overall, the conditions for gender balance both in line with the BCI cotton principles and in line with the project logframe in the pilot zones are being met. With the implementation of the WAPRO training series, and subsequently with the introduction of BCI cotton principles, compliance with gender equality conditions in the project areas has improved. Consequently, farmers have paid more attention to compliance with local legislation to regulating the use of child labor. No use of child labor was detected during the assessment in both the project area and adjacent agricultural land.

The project interventions to increase cotton yields with lower agricultural input costs have contributed to improved food security for farmers. Most farmers indicated that the income from the sale of raw cotton to the ginneries is sufficient to cover 50-70% of the annual food costs of the farm families. The rest of the food supply is covered by growing food crops on the rest of the farmer's land.

WAPRO invited representatives of all stakeholders to the trainings, thereby contributing to the emergence of a platform for mutual exchange of knowledge from farmers and WUAs to ALRI and the Department of Agriculture. The trainings "opened the eyes" of the farmers and gave hope that the application of new approaches in the rational use of water and land will help them solve the problems of obtaining more income from cotton production, which will improve their well-being and the environment.

A notable result of the project can be considered a sustainable change in the behavior of farmers regarding the efficient use of water and land. They began to understand that the saved water would go to the neighboring farmer and, as a result, this would have a positive effect on the overall state of water supply in the common area of the WUA, and thus increase the income of all farmers.

Due to the apparent effectiveness, farmers are convinced that even after the end of the project, they will continue to use short furrow irrigation and the supply of liquid organic fertilizer along with irrigation water.

The WAPRO Tajikistan project staff for the PUSH component have fulfilled the assigned tasks according to the project log frame and obtained results to achieve the project objectives.

Pull Component:

The components of the WAPRO project are closely intertwined with each other and have links in both directions: top down and bottom up. While from below, farmers complain about water scarcity and low income from agricultural production, RDLRI and ODLRI, local authorities and the Department of Agriculture have limited capacity to improve the situation of farmers. The WAPRO project has therefore been of great help in increasing the capacity of these government agencies by inviting representatives of these organizations to their events each time. They are now more optimistic in their support for water-saving technologies and improving cotton yields.

BCI cotton production can become a connecting object of an agricultural business integrated with the rational use of water and land and the protection of water bodies. WAPRO facilitated the start of BCI production in Tajikistan. Data on water and other agricultural inputs for BCI cotton production on project farms indicate that this is a very promising area of cotton production in Tajikistan. At the beginning of the stage, the first steps towards creating a full cycle of BCI cotton production were made: a series of trainings were held, relations between BCI cotton farmers and ginnery were established.

As a result of a series of trainings, speeches by WAPRO project specialists in various meetings with stakeholders, publications in local media, the WAPRO project created an atmosphere of general agreement and understanding that the economical use of water and increasing the productivity of water and land use is one of the priority tasks of all stakeholders.

POLICY Component.

Efficient planning and management, resource conservation and increased efficiency in the use of natural resources, including water resources, are an important part of Tajikistan's water policy. This is reflected in the strategic documents and laws of the country.

The technology used by WAPRO to reduce water use by 30-40% in irrigating cotton has, through a series of trainings and consultations with local farmers, become part of the policies of local authorities and government stakeholders. They cite these results in their speeches and meetings with other farmers during conversations about the possibilities of improving cotton yields and water supply to irrigated land. Most probably, the water efficiency measures used for cotton growing can be extended to other crops such as onion, wheat, gourds, water melon, peanuts, however, the consultant has not seen its application in the field.

The implementation of the WAPRO project's water safe measures and BCI cotton cultivation makes a great contribution to increasing the productivity of water and land in Tajikistan has a strategic importance. BCI provides for increasing the income of farmers and local ginneries, textile companies, saving farmers the cost of agriculture inputs in the production of raw cotton.

Growing conditions BCI cotton has a cumulative positive impact on water and energy conservation, protection of surface and groundwater and soil from pollution by pesticides and mineral fertilizers, increasing soil fertility and improving the environment.

WAPRO's systematic interaction with government and non-government stakeholders has raised their awareness of the relevance of increasing the productivity of water and land use through the production of high-quality raw cotton BCI grown in the best conditions while conserving natural and material resources and protecting the environment.

4 Annexes

Annex 1: Actual schedule of WAPRO project evaluation visits of Carsten Schulz and Anvar Kamolidinov in the Tajik part of Sirdarya River basin in Sugd oblast, in the period of from 24 July to 08 August 2022

№	Date/time	Location of sites/ Districts	Meetings with	Subject
I	**Field trip of National Expert Anvar Kamolidinov to Sugd oblast**			
	24.07.2022	Departure Dushanbe-Khujand	Meeting with Bakhtiyor Yusupov, WAPRO Khujand	
A	**Assessment of family farms - microlevel = local, district, regional (oblast) levels**			
1	25.07.2022	B. Gafurov District	Farmers: a. one demonstration farms ([redacted]) b. two project farms c. one traditional farms d. representative of WUA "Khistevarz"	1. The Q&A will take about one hour with each interviewee 2. Visits may start at 06 or 07 o'clock in the morning as agreed
2	26.07.2022	Kanibadam District	Farmers: a. one demonstration farms ([redacted]) b. two project farms c. one traditional farms d. representative of WUA "Iram 2014"	1. The Q&A will take about one hour with each interviewee 2. Visits may start at 06 or 07 o'clock in the morning as agreed
3	27.07.2022	J. Rasulov District	Farmers: a. one demonstration farms ([redacted]) b. two project farms c. one traditional farms	1. The Q&A will take about one hour with each interviewee 2. Visits may start at 06 or 07 o'clock in the morning as agreed
4		Private Textile Company "Rahimov"	Director: [redacted]	BCI cotton textile and backward relation of the company with farmers
5		Cooperative SAROB	[redacted], project manager, [redacted],	Cooperation of SAROB and WAPRO, WAPRO activities
B	**Stakeholders and others, involved into creation of value chain/market system of main goods (products) in a microlevel = local, district, regional and national levels.**			
6	28.07.2022	Khujand town	Department of Land Reclamation and Irrigation of Sugd Oblast– [redacted], Deputy Chief (ALRI) Sirdarya River Basin water resources management Department, MEWR – [redacted], Chief Main Agriculture Department of Sugd Oblast, MoA – [redacted], First Deputy of Chef	Oblast ALRI and WAPRO cooperation SRBWRMD and WAPRO cooperation MADof Sugd oblast and WAPRO cooperation

№	Date/time	Location of sites/ Districts	Meetings with	Subject
7	**28.07.2022**	**Departure Khujand - Dushanbe**	**Anvar Kamolidinov**	
I	**Field trip of International Expert Carsten Schulz and National Expert Anvar Kamolidinov to Sugd oblast**			
	04.08.2022	**Departure Dushanbe-Khujand**	**Meeting with Bakhtiyor Yusupov, WAPRO Khujand**	
1	04.08.2022	Cooperative SAROB	[redacted], Deputy Director; [redacted], manager; [redacted], irrigation consultant; [redacted], junior specialist	Activities of SAROB in the frame WAPRO project: irrigation, fertigation, BCI cotton, trainings
2	05.08.2022	J, Rasulov district, Jamoat Gulakandoz	Farmers; [redacted] – 12 ha tube irrigation od cotton; [redacted] – 60 cotton; [redacted] – 4 ha cotton; [redacted] – 7 ha cotton; [redacted] – 4 ha cotton	Experience, achievements and problems of the farmers in the frame of cooperation with WAPRO project,
3		J, Rasulov district, Jamoat Gulakandoz	[redacted], Demoplot of WAPRO	Experience, achievements and trainings, expenditures, water availability
4		J, Rasulov district, Jamoat Gulakandoz	[redacted], traditional farmer	Opinion of traditional farmer on WAPRO, use of WAPRO experience
5		Khujand town, Oblast ALRI	Deputy Director oblast ALRI	WAPRO and ALRI relation and cooperation
6		Main Agriculture Department of Sugd oblast	[redacted], First Deputy of Chef of Department	WAPRO and MAD relation and cooperation
7		Ginnery "Shams 777",	[redacted], Director	BCI cotton, support of Ginnery of BCI cotton producers
8	06.08.2022	Kanibadam District, Jamoat Firizoba	[redacted], WAPRO Demoplot farm	Experience, achievements and trainings, expenditures, water availability
9		Kanibadam District, Jamoat Firizoba	WUA "Iram 2014", [redacted], Director	WUA cooperation with WAPRO, Water use plan, WUA map, Water management, Water problems
10		Khujand town, Private textile company Rahimov	Director: [redacted], Three IFC Experts, [redacted] – national textile Expert	BCI cotton textile and backward relation of the company with farmers
11		Khujand town, WAPRO office	Bakhtiyor Yusupov, National expert of WAPRO	WAPRO Presentation, Project activities, available data, further communication
	07.08.2022	**Departure to Dushanbe**		
12	08.08. 2022	Dushanbe city Helvetas office, NWRM project	Marian Szymanowicz, Project manager	Interrelation and cooperation of WAPRO and NWRMP
13		Dushanbe city Helvetas office, WAPRO	Maciej Rams WAPRO Project manager	Project activities, achievements and shortages

№	Date/time	Location of sites/ Districts	Meetings with	Subject
14		Dushanbe city, SAROB office	[redacted], Director	BCI cotton and other WAPRO cooperation
15		Dushanbe city, SDC office in Dushanbe	Richard Chenevard, head of SDC office in Dushanbe Ruslan Sadikov, National Program Officer	views and perspectives on the project, WAPRO interaction, dissemination of project achievements

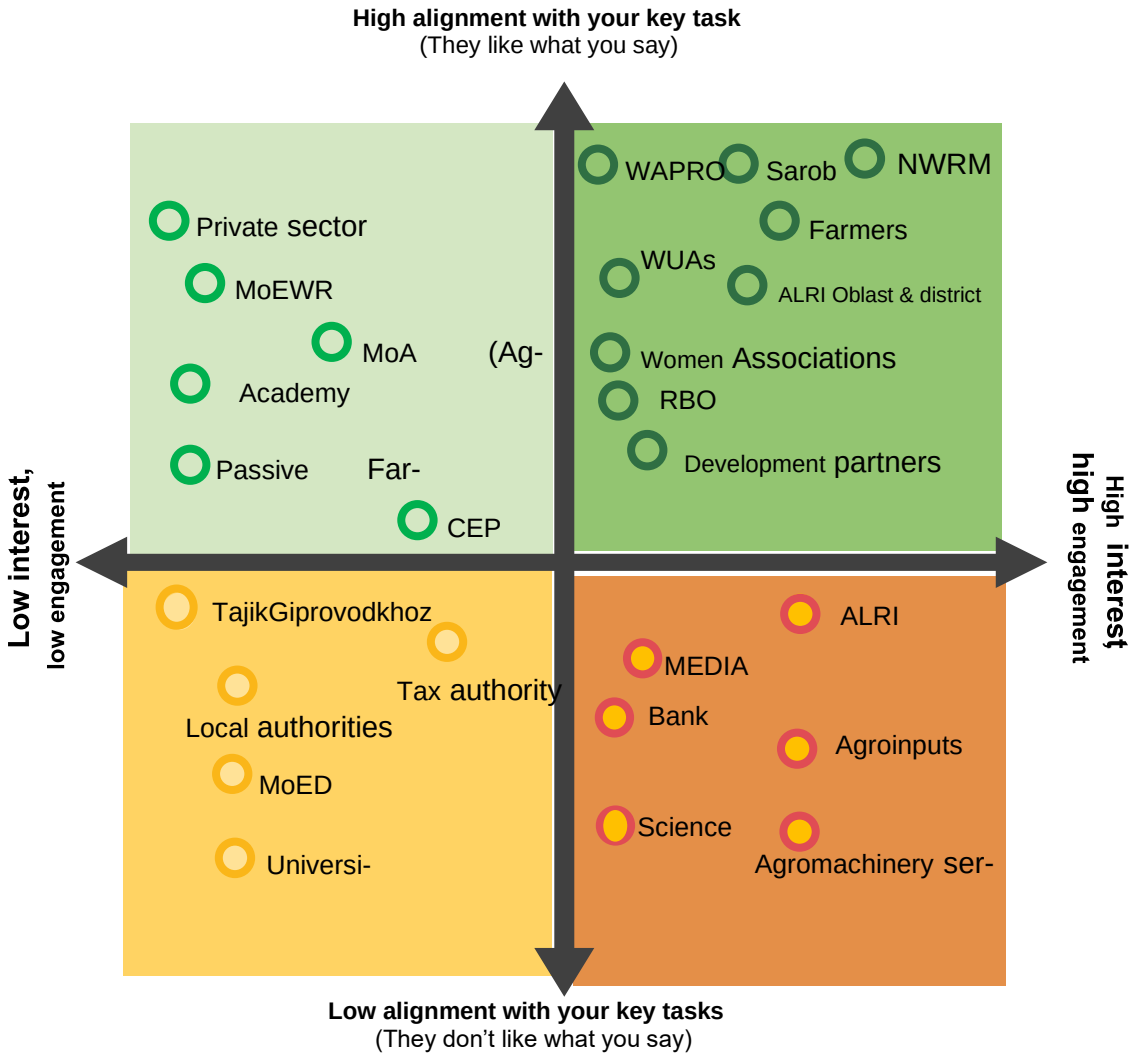
Annex 2: Stakeholders' map

Cotton production in Tajikistan has been elevated to the rank of a strategic industry that creates a sustainable, internationally sought-after export commodity, creates jobs in rural areas and generates income for tens of thousands of farmers. With all agricultural inputs becoming more expensive, increasing irrigation water productivity is becoming a priority. In the context of cotton cultivation, one of the most water-intensive crops, increasing water productivity is an urgent task. The objectives of the WAPRO project fully coincide with those of the National Development Strategy of Tajikistan until 2030 and the Water Sector Reform Program for the period 2016-2025.

The list of stakeholder ministries and agencies, non-governmental organizations and international Development partners of Tajikistan involved and associated with cotton production is long. Below, a stakeholder map is provided with brief explanations, as well as an assessment of their involvement in raw cotton production

#	**Ministry, agency, NGO and Development Partners**	**Short description of involvement**
1	Government of Tajikistan	implements general water policy, manages water resources at the interstate level, including water resources of the Syrdarya, Khojabakirgan, Isfara, Asku and Isfana rivers in the project area
2	Rayon Hukumat (Government)	Executes government policy, controls the use of local water sources, manages agriculture
3	Jamoat (Government)	Lower level of local government, monitors local development and use of land and water resources, production processes
4	Agency of Land Reclamation and Irrigation (ALRI)	Manages irrigation and land reclamation at country level
5	Oblast ALRI	Manages irrigation and land reclamation at Oblast level
6	Rayon ALRI	Manages irrigation and land reclamation at District level
7	Water User Association	A NGOs that brings together a large group of farmers to jointly plan and use water for irrigation on land within the laws of the country
8	Farms, Family farms	Individual or Smallholdings whose members are family members and/or close relatives. They share land and sell their produce in local markets
9	Ginning plant	Ginnery plants that buy raw cotton from local farmers with or without pre-contracts. Ginneries also ginning BCI cotton
10	Ministry of Energy and Water Resources	The MEWR leads overall water use policy at the country and at major river basin levels, including in the Syr Darya River Basin
11	Syrdarya River Basin Department	The SRBD conducts water resources planning at the river basin level and monitors water use in accordance with legislation
12	Ministry of Agriculture	The MoA administers and monitors the general agricultural policy in the country
13	Agriculture inputs market	Local small-scale or centralized private markets for the agriculture inputs required for cotton production
14	Agriculture machinery services	Local private agricultural mechanization services ranging from ploughing to crop harvesting

#	**Ministry, agency, NGO and Development Partners**	**Short description of involvement**
15	Extension services	WAPRO cooperate with local NGOs to providing extension service to farmers in the project area
16	Land Committee	The Committee on Land Management and Geodesy under the Government of Tajikistan is the land use control authority in the country
17	Environment Protection Committee	The Committee on Environmental Protection under the Government of the Republic of Tajikistan, monitors and controls the use and pollution of surface and groundwater resources, and issues permits for the use of surface and groundwater
18	Main Geology Department	The General Directorate of Geology under the Government of the Republic of Tajikistan, monitors groundwater sources and approves the issuing of permits for the use of groundwater
19	Tax Authority	Farmers pay a single tax on irrigated land according to the Tax Code of Tajikistan
20	Bank	If Farmers apply the private banks provides credits to farmers to grow and harvest cotton
21	NWRMP Helvetas	The National Water Resources Management project, funded by the CDS, has close links with the WAPRO project and carries out joint activities
22	SDC and other Development Partners	Undertake many projects related to rehabilitation and modernisation of irrigation infrastructure, management and institutional development
23	Field consultants SAROB	SAROB field advisers provide direct counselling to farmers at field level, providing practical training
24	WAPRO Helvetas	The WAPRO project provides training to farmers, including on demonstration plots to improve water productivity with affordable and low-cost technologies for cotton cultivation, including the BCI cotton
25	MEDIA	The MEDIA informs the achievements of the WAPRO project on the local newspapers and TV
26	Research institutes (Science)	Research institutes collaborate with WAPRO to use rational parameters for simple irrigation technologies


High alignment with your key task
(They like what you say)
Low interest, low engagement
High interest high engagement
Low alignment with your key tasks
(They don't like what you say)
WAPRO
Sarob
NWRM
Farmers
WUAs
ALRI Oblast & district
Women Associations
RBO
Development partners
Private sector
MoEWR
MoA
(Ag-
Academy
Passive
Far-
CEP
TajikGiprovodkhoz
Tax authority
Local authorities
MoED
Universi-
ALRI
MEDIA
Bank
Agroinputs
Science
Agromachinery ser-

Annex 3: WAPRO outcome stories

Outcome Story 1

Shukurjon Etmishev, farmer from Konibodom District of Sugd oblast started have a high yield of 4,5 ha cotton area. Neighboring farmers come to him for advice and counselling. He has reduced the cost of agriculture inputs and is getting more than 5 tons of raw cotton per hectare. This achievement not only provides him and his family with food, but also makes it possible to buy other commodities the family needs.

The WAPRO project conducted a series of trainings as part of its assistance to cotton farmers in Tajikistan. Having participated in WAPRO trainings since 2014, he realized that with all inputs becoming more expensive and cotton yields low, he had no choice but to implement all the project's recommendations: using a simple and affordable water-saving irrigation technique. In addition to applying a small amount of chemical fertilizer, he started applying fertigation with liquid organic fertilizer at the suggestion of the project.

Outcome Story 2

Naimjon is a head of family farm has 6 ha land. In 3 ha he cultivating cotton. His farm located in Jamoat Khistevarz of Bobojon Gafurov district and has 6 members: 3 man and 3 women. Naimjon and other local farmers in 2018 start participate in the trainings and field days conducted by SDC funded WAPRO project

When he learned in trainings that all the mineral fertilizer, he was applying might be washed out by the irrigation stream provided in long furrows. WAPRO project advised to farmers use much shorter furrows than traditional 150-200m length and fertigation of soil. In 2020 he decided to use short length 50 m irrigation furrows and fertigation. Instead of 500-600 kg/ha application of fertilizer, Naimjon now applies 100-200 kg. Most of mineral fertilizer, he replaced with liquid organic fertilizer. Now he and the other members of the farm enjoying much higher income than before.

Outcome Story 3

Water User Association "Iram 2014" in Kanibadam district of Sugd oblast has started to allocate water to its members based on a water use plan and a map of the association members' locations, which shows all outlets and irrigated areas of 1019 member farms. As a result, cases of water disputes between water users, between the WUA and the Kanibadam district ALRI have been reduced and ended.

WAPRO project assisted to WUA develop map of on-farm irrigation infrastructures and water use plan, conducted trainings on water measuring and management. Chairman of WUA Hamid Mulloev with pleasure received and introduced all recommendation of the project.

When Hamid Mulloev was elected as a chairman of WUA in 2017, WUA has 39'000.0 TJS debt to ALRI and tax authority, water distribution was disordered, in tail part of canals farmers had not water, water disputes were often. Cooperation of WUA and WAPRO increased potential of WUA. WUA has started planning of water use and management of water based on plan. In 2017-2022 farmers using short furrows and fertigation which decreased water demand. Debt of WUA was paid, farmers pay water fee on time and water disputes ended

Outcome Story 4

Zokirjon Bobobekov is head of 32 ha farm and 36 members in Jamoat Ghulakandoz of Jabbor Rasulov district. He holds himself responsible for the dignified lives of the members of the farm he leads. During past three year he increased average yield of cotton from 2,5 th/ha to 3,8 th/ha. In this period, he reduced water use from 8'000.0– 9'000.0 m^3/ha to 5'000.0 – 6'000.0 m^3/ha, fertilizer use from 500kg/ha to 150-200kg/ha. Income of farm increased from around 40'000.0USD to 74'000.0USD.

When, until 2017, his farm was producing low cotton yields, he was frustrated and realized that what was being taught in the WAPRO project training could help him. He introduced not only short furrow irrigation and fertigation, but additionally started using water distribution to furrows from pipes. This significantly increased yield of cotton, reduced times of cotton waterings and reduced the amount of water used. Tanks to WAPRO trainings he solved farm problems, and he realized that he needed to keep looking for and using new technologies that would help increase the productivity of water and land use

Outcome Story 5

Halim Hojiev, Deputy of Sugd oblast Agency of Land Reclamation and Irrigation (ALRI) has complained for many years about the need to rehabilitate the region's deteriorating irrigation systems. In recent years, he has become a staunch advocate of modernizing irrigation systems, including the use of water-saving technologies on irrigated land, improving the management system and enhancing the capacity of irrigation management institutions.

Halim Khojiev has been cooperating with the WAPRO project since 2017 and been participated in a many of the project's trainings and events.

In beginning of the project the Sugd oblast ALRI expected very little successes from the low-budget WAPRO project which had not plane to rehabilitate big pump stations or hydraulic structures.

However, the practical results of the pilot farmers' trainings on water saving and the adoption of the practice by other farmers convinced him that it was the right way to improve water availability for irrigated agriculture in the region. Now, in 2022, he is one of the active supporters of the inclusion of water conservation and improved irrigation water management in all irrigation projects

Annex 4: Agriculture input's cost for production of row cotton in 1ha in WAPRO project and traditional (control) farms in 2021

Currency: USD

Location of farms	District Mastcha, Farmer Mullojonov F.	District J. Rasulov Farmer Ochilov S.	District Zafarobod, Farmer Rahmatova M.
Agriculture Inputs	**WAPRO farm**	**WAPRO farm**	**Traditional farm (control)**
	USD	**USD**	**USD**
Seeds	72.82	81.55	83.88
Mechanization work, fuel	91.65	139.03	153.88
Hand work	48.54	116.50	108.74
Transportation costs	58.25	38.83	91.26
Irrigation	52.43	49.71	43.69
Organic fertilizer	19.42	24.27	40.78
Mineral fertilizer	209.22	286.41	91.46
Toxic chemical	12.62	11.65	11.65
Harvesting	398.06	407.77	300.97
Tax	218.45	145.63	110.87
Unexpected expenses	12.62	97.09	82.14
Total, expenses	1'194.08	1'398.45	1'119.32
Yield, mt/ha	0.48	0.50	0.24
Income from 1 ha land	4'805.83	4'970.87	2'669.90

Note: 1USD = 11,3.0 Tajik Somoni (December, 2021), National Bank of Tajikistan

Annex 5: Location of WAPRO project demonstration plots in Sugd oblast (region) of Tajikistan

Annex 6: Abbreviations

ABBREVIATIONS	
ALRI	Agency for Land Reclamation and Irrigation
BCI	Better Cotton Initiative
CEP	Committee for Environmental Protection
GIS	Geographical Information Systems
MEWR	Ministry of Energy and Water Resource
MoA	Ministry of Agriculture
NGO	Non-governmental organizations
NWRM	National Water Resources Management (project)
ODLRI	Oblast department of land reclamation and irrigation
RBC	River Basin Council
RBO	River Basin Organization
RDLRI	Rayon department of land reclamation and irrigation
TJS	Tajik Somoni
USD	United States Dollar
WAPRO	Water Productivity (project)
WUA	Water user association

Annex 7: Documents used for the evaluation

Year	Title of document	Author or editor of document, Source
2022	WAPRO Evaluation: Kick-Off workshop for online survey	Sophie Staheyeff, Roman Troxler, Carsten Schulz, KEK-CDC Zurich
2022	Outcome Harvesting Stories Examples	Carsten Schulz
2022	WAPRO Farmer Interview (Pakistan)	Carsten Schulz
2021	Annual report of WAPRO Tajikistan	Maciej Rams
2022	Stakeholder Analysis	Maciej Rams
2021	Protocol "Forum on improving water efficiency and productivity in cotton production"	Maciej Rams
2021	Water Productivity Project (WAPRO) Tajikistan_presentation with comments	Maciej Rams
2014	Scaling up productive water Phase ii. Market creation for micro irrigation technologies project (MIT). Kyrgyzstan and Tajikistan. Project Document Phase II, 2014 - 2016	Daniiar Andakulov, Project Manager & Markus Brauchli, Consultant iDE
2021	Annual project report. Draft version 01/01/2021 – 20/12/2021	Aiubjonov Gufronjon
2022	semi-annual project report. Draft version. 01/01/2022 – 01/07/2022	Nasridinova Gavkhar
2021	Annex 7_Income and expenditure.	Rahmatov Jurabek