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Evaluation of the project “Transforming the Indus Basin with Climate Resilient Agriculture and Water Management”

Interim report

Project Evaluation Series
23/2025

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Abstract

This report presents the findings, conclusions and recommendations of the interim evaluation of the project "Transforming the Indus Basin with Climate Resilient Agriculture and Water Management". The project aims to enhance climate resilience in the Indus Basin by promoting sustainable agricultural practices and effective water management strategies. This contributes to food security and environmental sustainability in Pakistan. The Food and Agriculture Organization of the United Nations (FAO) is the Executing Entity of the project, which receives co-financing from the provincial governments of Punjab and Sindh.

The interim evaluation seeks to develop an evidence-based understanding of the project's progress towards its intended results and its potential to contribute to a paradigm shift in climate resilience. The evaluation focuses on assessing performance against Green Climate Fund (GCF) criteria, identifying implementation challenges, integrating stakeholder feedback, enhancing accountability, and validating underlying theories and assumptions.

Led by the FAO Office of Evaluation, the Evaluation Team included independent consultants and technical experts. The scope of the evaluation covers the project implementation from its launch in March 2020 to December 2024. The findings from this evaluation are expected to inform subsequent project phases and contribute to the design of similar projects in the future.

Despite significant initial delays due to the COVID-19 pandemic outbreak and the flood that affected the country in 2022, the project is making significant strides in achieving its intended outcomes – particularly in knowledge sharing across its three components. However, the Evaluation Team identified challenges related to its co-financing structures and knowledge loss due to high staff turnover. These issues may hinder the project's long-term sustainability and replicability.

Nevertheless, the implementation team has applied adaptive management and coping strategies to minimize the impact of these challenges.

Contents

Figures and tables

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The evaluation was led by a team from the FAO Office of Evaluation with support from external experts. The team included: Jorge Castro (Evaluation Leader and Manager, FAO Office of Evaluation); Francesca Viberti (Quantitative Analyst, FAO Office of Evaluation); Silvio Daidone (Responsible Officer, FAO Office of Evaluation); and Rebecca Pietrelli (Economist, Agrifood Economics and Policy Division). Special acknowledgements go to the following individuals from the FAO Office of Evaluation: Amélie Solal-Céligny for providing advice on the GCF requirements; Clair Null for providing technical advice; and Sarah Jaff, Pervez Akhtar and Shazia Hussain for providing administrative and logistical support. We would like to extend our sincere thanks to Musharavati Ephraim Munyanyi for his valuable work as the previous Evaluation Manager of this interim evaluation.

Abbreviations

ANOVA	analysis of variance
CBFS	Climate Business Field School
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field School
FGD	focus group discussion
GCF	Green Climate Fund
KII	key informant interview
M&E	monitoring and evaluation
MCDA	multicriteria decision analysis
MDE	Minimum Detectable Effect
MEL	monitoring, evaluation and learning
OFWM	on-farm water management
PyWaPOR	Python package Water Productivity Open-access Portal
SMS	short message service
TOC	theory of change
TOT	training of trainers
WOS	women open school

Executive summary

1. This report presents the findings, conclusions and recommendations of the "Transforming the Indus Basin with Climate Resilient Agriculture and Water Management" interim evaluation. Consistent with the Green Climate Fund (GCF) evaluation guidelines, the objective of this evaluation is to develop an evidence-based understanding of the likelihood that the project is on track to achieve its intended results and contribute to the envisaged paradigm shift. As such, the interim evaluation has a strong formative focus, serving both accountability and learning purposes.

2. The project covers the period from March 2020 to March 2026. The total budget is USD 47.69 million, and it is financed primarily by the GCF with co-financing contributions by the governments of the Punjab and Sindh Provinces in Pakistan.

3. The project objective is to increase resilience to climate change among the most vulnerable farmers in the Indus Basin and strengthen the government's capacity to support communities in adapting to climate change through three components:

    i. Component 1. Enhancing information services for climate change adaptation in the water and agriculture sectors
    ii. Component 2. Building on-farm resilience to climate change
    iii. Component 3. Creating an enabling environment for continued transformation

4. The project targets five districts in Punjab (Khanewal, Multan, Lodhran, Muzaffargarh and Dera Ghazi Khan) and three districts in Sindh (Badin, Sanghar and Umerkot).

5. The evaluation covers all activities implemented between March 2020 and December 2024. It focuses on ten evaluation criteria from the GCF evaluation guidelines, namely: relevance; effectiveness; efficiency; coherence; gender equity and social cohesion; country ownership; innovativeness; unexpected results; adaptation; and paradigm shift. Due to the COVID-19 pandemic, the 2022 floods and challenges with the co-financing mechanisms, the project has experienced significant delays.

6. The interim evaluation relies on both quantitative secondary data sources, such as the baseline household survey, the mid-term training assessment and the project's financial data, and primary qualitative data collection through focus group discussions (FGDs) and key informant interviews (KIIs) to gather information for each evaluation question. The evaluation process also involved a review of project documents and related literature.

Main findings

Relevance – successful

7. The project aligns with the national climate change agenda and the needs of vulnerable farmers in the Indus Basin. The findings confirm that:

    i. Despite the 2022 floods and the COVID-19 pandemic shock, the underlying theory of change (TOC) and barriers found at the design stage remain valid (Findings 1, 2 and 3).
    ii. Implementation areas were selected for their high exposure to droughts, floods, poverty and insecurity, ensuring that resources flow to the populations that are most at risk (Findings 4 and 5).

iii. Beneficiaries fit the agreed targeting criteria and are, on average, poorer and more climate-exposed than the general population (Finding 6).

8. Although data gaps limited a full replication of the methodology for selecting the project's areas and beneficiaries, the evidence is strong enough to uphold a successful rating.

Effectiveness – partially successful

9. Project interventions are clearly strengthening climate adaptation capacity, but evidence shows that knowledge is not yet being transformed into routine, resilient practice.

10. Institutional capacity (Component 1). Government staff trainings on climate data services raised post-course test scores for 66 percent of survey respondents. This is an appreciable gain but below the 75 percent logframe target. Less than half of the survey respondents (65 in total) reported using the new tools (such as the AquaCrop model, field data collection tools for crop type mapping, soil salinity measurement instruments and groundwater depth techniques, geospatial or geographic information system applications for crop type mapping, water management (on-farm water management [OFWM] and Farmer Field School [FFS]) module tools, groundwater modelling software, the Python package Water Productivity Open-access Portal (PyWaPOR), the Kobo Toolbox for mobile data collection, water accounting frameworks or tools, and satellite remote sensing tools for evapotranspiration and basic hydrology) in their day-to-day functions, and the frequency of use averages "sometimes" indicating a need for refresher support and workplace coaching (Findings 8 and 9).

11. Farmer-level change (Component 2). Climate Business Farmer School (CBFS) and women open school (WOS) initiatives have helped most participating farmers adopt at least one recommended technique, yet just 54 percent (out of 449 surveyed) reported using these techniques specifically to mitigate impacts during recent heat waves, heavy rains, droughts or floods. Beneficiaries express high satisfaction and perceive yield improvements. Although nearly nine out of ten respondents say they have fully integrated the recommended practices, the depth of adoption varies sharply by district – from just 53 percent in Dera Ghazi Khan to complete coverage in Lodhran and Muzaffargarh (Findings 10, 11 and 12).

12. Public outreach (Component 3). Radio and social media campaigns on climate change awareness have extended the project's reach nationwide. However, their effect on behaviour and the adoption of climate-resilient agriculture has not yet been quantified (Finding 14).

13. In sum, the project is successfully disseminating adaptation knowledge and catalysing initial behavioural shifts. However, gaps in retention, application and impact measurement remain. These shortcomings warrant a partially successful rating and point to three priorities: structured refresher training for complex topics; systematic follow-up to track practice adoption over time; a deeper analysis of barriers preventing the application of practices; and a rigorous impact evaluation design to attribute observed results to project participation.

Efficiency – partially successful

14. The project suffered from both delays in securing co-financing and underspending of available resources (Findings 15, 16, 17, 18 and 19).

15. In contrast, the project's ability to adapt based on lessons learned has been a key factor in its successful implementation. Through continuous adjustments in response to financial constraints, stakeholder dynamics, procurement challenges and external disruptions like floods, the project has remained effective and responsive to local needs (Finding 20).

16. The project has an urgent need to improve its resource mobilization and capacity to assign and distribute available resources for delivering its main activities that ensure the achievement of its objectives. However, the team’s proactive approach in finding alternative solutions to obstacles demonstrates a strong commitment to maintaining the project’s relevance and impact, which gets it a partially successful rating for the efficiency criterion.

Coherence – successful

17. Evidence from the KIIs shows that the project is coherent with initiatives implemented by other actors that contribute to climate change adaptation and mitigation objectives.

18. The FAO implementation team pointed out the “transaction cost” of coordination, which can be counterproductive due to lengthy negotiation processes. However, the project has already created successful synergies by offering the World Bank access to the Agriclimate Water Portal, which is known as the ACWA Portal (Finding 21).

19. In light of the evidence collected, the Evaluation Team rates coherence as successful.

Gender equity and social cohesion – needs improvement

20. The project ensured equal access to participation in project activities regardless of gender, ethnicity, religion or social background. It promoted gender-responsive design through the inclusion of the WOS initiatives, mandatory female participation in government trainings, and awareness-raising on gender equity and non-discrimination (Finding 22). However, female participation remains well below the logframe target, with only 28 percent of female direct beneficiaries as of 2024. The project must intensify efforts to identify and address barriers to women’s enrolment and retention (Finding 23).

21. Furthermore, the current methodology to count direct beneficiaries is likely to produce biased statistics and therefore an incorrect female ratio (see Appendix 8). The project team should revise it and ensure that it reliably captures the gender distribution of the project’s beneficiaries.

22. Despite strong design intentions, the achievement of 54 percent of the interim target and uncertainty related to the female ratio statistics warrants this criterion a needs improvement rating.

Country ownership – successful

23. The project demonstrates strong alignment with Pakistan’s national climate strategies and policies. Approximately 85 percent of key informants viewed the project as fully or moderately aligned with national priorities (Finding 24). Multiple government institutions were involved in decision-making, curriculum development and activity planning. The project also fully met the interim target for Outcome Indicator A5.0 by establishing interagency coordination groups in Punjab and Sindh (Finding 25). In Punjab, the government has begun to convene coordination meetings independently. This signals a meaningful shift towards institutional sustainability. Continued collaboration and ownership by federal and provincial governments are key to long-term success.

Innovativeness – partially successful

24. Most stakeholders consider the project innovative, especially for its integration of climate-resilient practices and digital tools like the ACWA Portal. Notably, 75 percent of trained farmers began to apply climate-resilient agriculture and OFWM techniques before completing the training,

therefore surpassing the logframe target. However, perceptions of innovation vary widely across districts, and adoption is uneven. Only 53 percent of farmers in Dera Ghazi Khan report full uptake, and improvements in government staff capacity lag behind targets by roughly ten percentage points (Finding 27). These gaps suggest the need for further support and follow up to ensure the sustained adoption of innovations.

Unexpected results – successful

25. The project has produced several positive, unintended outcomes.

i. Curriculum institutionalization: the Mehran University of Engineering and Technology integrated the project training into its academic programmes and publications.
ii. Farmer behaviour change: beneficiaries have not only shifted from traditional methods to research-based practices but also developed a more open mindset towards new technologies. They actively look for innovations beyond the project's scope.
iii. Social cohesion: stronger cooperation between farmers and institutions has emerged with collective learning, organic farming initiatives and joint resource management (Findings 28, 29 and 30).
iv. One negative effect was the rise in rental prices for laser levellers due to increased demand, making them less accessible for smallholders (Finding 31). A market assessment is recommended to mitigate this issue.

26. Overall, the criterion is rated successful given the net positive impact.

Adaptation – partially successful

27. The project clearly contributes to climate resilience through knowledge building and awareness raising. However, core adaptation indicators remain below interim targets (Finding 32). Although 88 percent of farmers have adopted at least one climate-smart technique, only 42 percent reported applying them during actual extreme weather events. The gap between knowledge and practice highlights the need for improved follow up, refresher trainings and better integration of practical support.

Potential for a paradigm shift – partially successful

28. There is clear potential for replicability and institutional uptake. Government stakeholders have expressed interest in adopting components of the project, and training materials are being shared widely. However, co-financing delays and high staff turnover have slowed momentum and disrupted knowledge continuity. While more than half of key informants believe the project's results will be sustained beyond its completion, unresolved financing and capacity gaps hinder its full transformative potential.

Key learnings

29. The interim evaluation identified several lessons with potential relevance for the design and implementation of future climate adaptation initiatives.

i. Robust monitoring and evaluation (M&E) frameworks are essential. To support rigorous impact evaluation, baseline and monitoring systems must be designed with compatible identifiers such as a national identification and consistent protocols. This accurately tracks targeting, treatment exposure and the attribution of results.

ii. Knowledge gains must be reinforced to ensure sustained adoption. While participants reported high satisfaction with training content, adoption rates fell short of expectations. This underscores the importance of refresher sessions, follow-up coaching, practical support to enable routine application and a deeper analysis of barriers that prevent the application of practices.

iii. The local context must inform the technical design. The effectiveness of climate-resilient agriculture and the OFWM practices depends on adaptation to local agroecological and socioeconomic conditions. Project teams should systematically integrate local knowledge and adjust content accordingly.

iv. Coordination mechanisms require flexibility and sustained engagement. While cross-institutional collaboration enhances coherence, it also increases transaction costs. Successful implementation depends on agile management and structured dialogue across stakeholder groups.

v. Complementary outreach methods enhance effectiveness. Mass media strategies, particularly radio campaigns, should be complemented by more interactive and targeted tools like short message service (SMS) and mobile applications to improve the adoption of promoted practices.

vi. Institutional memory must be actively preserved. The use of advanced methodologies (for example, multicriteria decision analysis [MCDA]) requires clear documentation of data sources, indicator construction and results interpretation. Storing analytical code, cleaned datasets and methodological reports in shared repositories is essential to mitigate knowledge loss from staff turnover.

vii. Market impacts should be anticipated. The promotion of specific technologies can generate unintended effects on local markets, such as price inflation. Project designs should include market assessments and mitigation measures to ensure equitable access.

viii. Information diffusion and spillover channels should be monitored. Knowledge transfer initiatives can produce broader behavioural change beyond direct beneficiaries. These potential spillovers should be identified, leveraged and incorporated into the project’s M&E framework.

Overall conclusion: adaptation impact – partially successful

30. The project is well aligned with the Indus Basin’s climate challenges and has strengthened institutional and farmer knowledge. However, this knowledge has not yet translated into widespread climate-resilient practice. Institutional uptake remains limited, and many farmers do not apply learned techniques during actual climate shocks. Public outreach has expanded awareness, but its behavioural impact is still unquantified. Unless co-financing issues are resolved, a deeper analysis of barriers preventing adoption in each component is conducted and post-training support intensified, the project will likely achieve only part of its intended adaptation impact.

Recommendations

Recommendation 1. Request an extension and restructure the co-financing agreement.

31. The project has faced several external challenges, including the COVID-19 pandemic, severe floods, frequent transfer and posting of bureaucrats at a higher level, and political changes. Additionally, the mandatory requirement to receive co-financing in the United States dollar has financially constrained the project due to the significant devaluation of the Pakistan rupee against

the United States dollar. As of June 2024, the project had made notable advancements given the financial constraints – achieving less than 50 percent of the expected progress despite only receiving 33 percent of the committed financial resources for this period. However, the remaining project duration (one year and four months, representing 22 percent of the total project time) is insufficient to complete all of the planned activities – even in the case of a full disbursement of the remaining funds. This may not be feasible due to the lengthy governmental procedures involved. In addition, we recommend addressing the co-financing challenges by adopting a more flexible co-financing strategy that is resilient to exchange rate fluctuations, such as allowing national co-financers to meet their obligations in their local currency.

Recommendation 2. Increase visibility of the project's purpose, scope and approaches with local stakeholders.

32. The analysis of project coherence highlights that stakeholders, especially among local government officials, would appreciate a higher level of collaboration and coordination, including being assigned clear tasks and responsibilities from the FAO implementation team. For this reason, the Evaluation Team recommends increasing the engagement of stakeholders and improving infrastructure management and ownership clarity. This could happen by the preparation of a memorandum of understanding to define responsibilities between the government and institutions, ensuring the sustainability of investments in portals, meteorological stations and other assets once the project is completed.

Recommendation 3. Enhance integration with existing climate actions to foster a paradigm shift.

33. To improve sustainability and better integrate with existing climate actions, the project should focus on further enhancing its alignment with national climate policies such as the recently approved climate change policy from October 2024. While most project activities already align with national policies, particularly in the agriculture and water sectors, there is a perception that alignment could be strengthened. Additionally, the project should align with the climate finance mechanisms of multilateral entities, especially in regions with similar projects. With international organizations like the Asian Development Bank, the World Bank, the GCF and the Global Environment Facility that are involved in climate-resilient agriculture and sustainable water management, the project has a significant opportunity to enhance its visibility and showcase its role within this broader ecosystem. Key strategies for achieving this include organizing collaborative workshops and information sessions, mapping stakeholders at all levels and among local authorities, establishing communication tools such as newsletters or reports, and strengthening partnerships to promote replicability and sustainability.

Recommendation 4. Strengthen staff retention and knowledge preservation strategies to mitigate the impact of high turnover.

34. To address the high turnover of key staff impacting the project, it is crucial to implement strategies that enhance staff retention and preserve institutional knowledge. This involves identifying critical roles such as the project manager, technical specialists, M&E officers and provincial coordinators, and offering them enhanced contract terms to provide job security. Additionally, developing succession plans, establishing detailed onboarding and handover protocols, and enhancing the existing centralized knowledge management system will facilitate smooth transitions and knowledge transfer.

Recommendation 5. Reassess and reinforce gender equity strategies for direct participation.

35. To address the gap between the current proportion of female direct beneficiaries and the established target, the project should reassess its gender equity approach by conducting an

assessment of barriers that limit women's participation – particularly in the WOS initiatives. Based on the findings, the project should determine whether these barriers can be addressed or if the target should be adjusted using evidence from similar contexts in Pakistan. Additionally, efforts should be made to expand successful gender-responsive models, increase the number of female facilitators, and strengthen the collection and use of gender-disaggregated data. Finally, the methodology to count the number of direct beneficiaries and estimate the share of female beneficiaries should be revised to ensure that statistics are grounded in reliable and realistic data. These steps will support more inclusive participation, ensure that the project contributes meaningfully to gender equity and improve the monitoring system of this critical criterion.

Recommendation 6. Strengthen post-training accompaniment and monitoring to improve knowledge retention and practice adoption.

36. To ensure that training translates into practical application, the project should reinforce its post-training support by, during sessions, identifying how participants plan to use new knowledge, provide accompaniment during the first implementation of practices and follow up with beneficiaries to address challenges. For the FFS initiatives, attendance should be tracked digitally and integrated into the monitoring system to identify participants who miss two consecutive sessions. Follow up should then be conducted to understand the reason for the absence and encourage continued participation. These actions will help to increase the adoption of climate-resilient practices and improve the overall impact of training efforts.

1. Introduction

1.1 Evaluation overview

1. This report presents the interim findings, conclusions and recommendations of the "Transforming the Indus Basin with Climate Resilient Agriculture and Water Management" evaluation. Consistent with the Green Climate Fund (GCF) evaluation guidelines (GCF, 2023),[1] the objective of this evaluation is to develop an evidence-based understanding of the likelihood that the project is on track to achieve its intended results and contribute to the envisaged paradigm shift. As such, the interim evaluation has a strong formative focus, serving the following accountability and learning purposes.

   i. Assessing the project's performance: the evaluation will gauge the progress made by the project against the GCF evaluation criteria of relevance; efficiency; effectiveness; impact; coherence; gender equity and social inclusion; national ownership; innovativeness; unexpected results; adaptation; and paradigm shift.
   ii. Identifying implementation challenges: the evaluation will help to identify any challenges or bottlenecks in the project's implementation process, which necessitate adjustments. This can include logistical issues, unforeseen environmental or socioeconomic changes, or challenges in stakeholder engagement.
   iii. Stakeholder feedback integration: this provides an opportunity to incorporate feedback from various stakeholders, including local communities, implementing partners and funders such as the GCF. This feedback is crucial for ensuring that the project remains aligned with stakeholder needs and expectations.
   iv. Enhancing accountability: this enhances transparency and accountability. It provides funders and stakeholders with evidence of how resources are being used and impacts generated.
   v. Learning and knowledge sharing: the evaluation aims to generate valuable lessons that can be shared with broader audiences, including other regions or countries that may benefit from similar projects.
   vi. Validation of theories and assumptions: evaluating the project at its midpoint tests the underlying theories and assumptions used during the planning phase. It checks the validity of the project design and can lead to significant insights into local climate resilience and adaptive practices.

2. The evaluation was led by the FAO Office of Evaluation, which operates independently according to its charter (FAO, 2017, volume 2, pages 147–154). The Evaluation Team members included the FAO Office of Evaluation leader or manager, responsible officer or supervisor, data analyst, technical quality assurance and an externally recruited service provider responsible for collecting qualitative data in Pakistan. The evaluation scope covered the timeframe from project launch in March 2020 to the completion of evaluation data collection in December 2024. The interim evaluation is expected to complement and inform the planned impact and final evaluation

[1] The GCF Operational Procedures and Guidelines for Accredited Entity-led Evaluations were used as overarching guidance, recognizing that the "Transforming the Indus Basin with Climate Resilient Agriculture and Water Management" project pre-dates the GCF evaluation policy (effective May 2022) and that there is no retroactive application to funding proposals approved prior to the GCF 32nd board meeting.

activities as part of the overall independent evaluation of the "Transforming the Indus Basin with Climate Resilient Agriculture and Water Management" project.

3. The main evaluation users include the following.

i. FAO: FAO will use the evaluation findings and lessons to adjust the second half of the project and refine its strategies and methodologies for similar projects globally. Insights into effective climate-resilient agricultural practices and water management strategies can be integrated into other regional and international programmes.

ii. GCF: the GCF can use evaluation findings and lessons from the project to refine its funding strategies and improve accountability. These insights help to assess the effectiveness of funded projects and guide future investments, particularly in adaptation and resilience strategies for agriculture and water management. Successful components, once evaluated, could serve as models for similar initiatives in other developing countries. This helps the GCF scale and replicate effective solutions globally. Additionally, the outcomes influence policy development, enhance stakeholder engagement and improve the design and implementation of projects. This bolsters the GCF's mission to support developing countries in responding to climate change impacts sustainably.

iii. Ministry of Climate Change and Environmental Coordination: as the national designated authority, this ministry will use the lessons learned to inform national policies and strategies related to climate change adaptation and sustainable agriculture. The findings can help to adjust the national climate change policy and guide the integration of climate resilience into other sectoral policies.

iv. Provincial governments of Punjab and Sindh: these provincial governments will use the project evaluations to assess the effectiveness of implemented practices and decide upon scaling up successful interventions across other regions. Lessons learned can inform regional development plans and water management policies.

v. Pakistan Meteorological Department and Pakistan Council of Research in Water Resources: these technical agencies can use data and findings to improve their prediction models and resource management tools. This enhances their capacity to provide accurate and timely information for agricultural and water resource planning.

vi. Farmers and local communities: the direct beneficiaries can apply lessons learned to continuously improve their farming techniques and water management practices. Community feedback mechanisms established through the project can help to disseminate these lessons more broadly within local contexts.

vii. Provincial government and technical departments: the departments that focus on agriculture, irrigation and water management can utilize the findings to enhance service delivery, improve extension services and better support the needs of local farmers through specific programmes and initiatives.

viii. Civil society organizations: the civil society organizations can leverage lessons to advocate for more robust support systems in rural communities, push for policy changes, and enhance their own programmes related to climate resilience and sustainable development.

ix. Private sector: businesses and technology providers can analyse the outcomes to identify market needs and opportunities for new products or services that align with the proven needs and successful strategies identified through the project.

x. International and development partners: these partners can use the lessons to refine funding strategies, enhance the design of future funding mechanisms and align their support with effective practices that yield tangible results.

xi. Academic and research institutions: scholars and researchers can use the project data and outcomes for further studies. This contributes to the academic body of knowledge on climate change adaptation, sustainable agriculture and effective water management strategies.

1.2 Country context

4. Pakistan is a semi-industrialized country that has transitioned from an agriculture-based economy to a service economy. Nevertheless, agriculture is still the largest employer, occupying 39.2 percent of the total workforce, followed by services (36.8 percent) and industry (24 percent) (Pakistan Bureau of Statistics, 2022). Agriculture is a major livelihood source. However, the country has a high exposure to climate hazards. This leads to devastating impacts on agricultural systems. Indeed, Pakistan faces some of the highest disaster risk levels in the world – ranked 23 out of 191 by the 2024 INFORM Risk Index (INFORM, 2024). This risk ranking is driven by the nation's exposure to both natural, climatic and political shocks and stresses, and by high socioeconomic vulnerability and a lack of adequate coping capacity at the individual, institutional and infrastructural level (INFORM, 2024).

5. Pakistan relies heavily on the Indus Basin as a major source of irrigation as it accounts for 95 percent of the country's total irrigation system (ADB, 2017) and contributes to an estimated 30 percent to the total national power production through hydropower stations. Any weather shock in this area will have direct repercussions on food production, livelihoods and food security for the entire country – especially smallholder farmers (Heureux *et al.*, 2022; Acevedo *et al.*, 2020). Pakistan already faces rates of warming above the global average, with a potential rise of 1.3 to 4.9 °C by the 2090 decades, which will put human health, livelihoods and ecosystems under pressure (Asia Development Bank and The World Bank, 2021). Moreover, changes to Pakistan's rainfall regimes will increase the likelihood of both drought conditions and flooding. Finally, projections suggest yield declines in many key food and cash crops, including cotton, wheat, sugarcane and rice.

6. These factors should be seen in the context of already high and persistent levels of undernourishment and deprivation and low access to social insurance, with around 16 percent of the population being moderately or severely food insecure (Pakistan Bureau of Statistics, 2021), 21.9 percent living below the poverty line (ADB, 2024) and 72.5 percent of the workforce employed in the informal sector (76.2 percent in rural areas) (Pakistan Bureau of Statistics, 2022). Therefore, climate change and its negative impacts will add an additional burden to an already fragile population if not adequately addressed and mitigated.

7. The number of vulnerable households in the project area is estimated at 2.6 million, with a total of about 16.1 million rural people living in the eight targeted districts. Their vulnerability to climate change is partly a function of their poverty, with about 39 percent of households in Punjab's project districts falling within the lowest wealth quintile and a corresponding figure of about 49 percent in Sindh. According to the National Nutrition Survey (UNICEF Pakistan, 2018), Sindh ranks as one of the poorest and most food-deprived provinces in Pakistan, with approximately 47.1 percent of households classified as food insecure and over 36 percent experiencing moderate to severe hunger. In Punjab, nearly 32.4 percent of households are classified as food insecure, with 21 percent experiencing hunger (Ministry of Planning, Development and Special Initiatives and Pakistan Bureau of Statistics, 2021). Overall literacy rates in the project districts are

low: 46 percent in Punjab and 34 percent in Sindh. Particularly concerning are low literacy rates among women, which are only 33 percent in Punjab and 16 percent in Sindh. The absence of children from school remains a prevalent issue across both provinces, with approximately 20 percent of children in Punjab and 43 percent in Sindh engaged in child labour or combining work with school – a situation considered detrimental according to the International Labour Organization and the United Nations Children's Fund.

8. In the project area, an estimated 63 to 85 percent of farmers operate small farms, which are defined as less than five acres (2.0 ha) in Punjab and less than 16 acres in Sindh. The total cropped area across the eight districts covered by the project amounts to approximately 3 million ha, representing roughly 60 percent of the total area in the target districts. Farming activities involve both men and women, including landowners, tenants and general labourers not residing on the farm. Integrated farming serves as a primary source of livelihood for both genders, with livestock, agriculture and agroforestry playing significant roles in daily sustenance. Despite their substantial involvement in farming work and contribution to household income, women often lack ownership over productive assets and control over financial resources.

9. Within the eight target districts, agriculture and the on-farm water management (OFWM) practices adopted at baseline are not adequate to mitigate the anticipated impacts of climate change in the region. This makes the production of major crops highly vulnerable to shocks and stresses. These challenges extend beyond the project areas, affecting agricultural production across the entire Indus Basin. Given the crucial role of these cropping systems for livelihoods and food security of the project's beneficiaries, as well as the overall population of Pakistan, urgent interventions are required to assist farmers in transitioning to climate-resilient alternatives.

10. Recent events and their catastrophic consequences such as the COVID-19 pandemic in 2020 and the 2022 floods that directly affected the project areas affirm the urgent need to increase the mitigation and adaptation capacity of institutions and farmers. In particular, the floods have disproportionally hit the poorest households in the poorest areas, including the project's beneficiaries. The Post-disaster Needs Assessment of the 2022 Pakistan floods (Ministry of Planning Development and Special Initiatives, 2022) highlights the much-needed investments in supporting Pakistan's adaptation to climate change and overall resilience of the country to climate shocks, which is coherent with the project's objectives.

11. The project integrates a framework of several other initiatives to increase resilience to climate change and enhance the mitigation and adaptation capacity of Pakistan and its population. For the period from 2023 to 2027, FAO has outlined three priority areas that are guiding its partnership with the Government of Pakistan: basic services; climate change and environment; and sustainable inclusive economic growth. FAO is currently implementing 36 other projects in the country, not including the project under this evaluation. These are in collaboration with national and local authorities, other United Nations agencies and international donors (FAO, n.d.). Among the many international actors working in the country, the Asia Development Bank has 22 active projects concerning climate-smart agriculture and sustainable water management, one of which is being implemented in Sindh and two in Punjab (ADB, 2025).[2] The World Bank is another main actor. It has 56 active projects that concern environmental and natural resources

[2] The projects were filtered by "active status" and "agriculture, natural resources and rural development sector" themes.

management, with Sindh and Punjab hosting nine projects each (World Bank, 2025a).[3] The GCF supports nine other projects in the country besides the one under evaluation in this report – five of which focus on adaptation, two on mitigation and two on cross-cutting themes (GCF, 2025). The Global Environment Facility currently has 12 active national projects in Pakistan, one of which was implemented by FAO and 15 regional or global projects where Pakistan is included (GEF, 2024). Finally, the United States Agency for International Development has seven active projects related to climate-resilient economic growth.

1.3 Project description

12. Initiated in March 2020, the "Transforming the Indus Basin with Climate Resilient Agriculture and Water Management" project in Pakistan is set to conclude by March 2026, spanning a duration of six years. It is supported with a budget of USD 34 990 832 from the GCF, USD 7 999 965 from the Punjab government and USD 4 699 966 from the Sindh government for a total of USD 47 690 763. FAO served as the Accredited Entity for the project. It was responsible for the overall management, including project appraisal, administrative and financial oversight, and effective fund management in order to achieve the project's objectives. FAO Pakistan fulfilled the responsibilities of the Executing Entity through a Project Management Unit. This unit oversaw two Provincial Project Implementation Units in Punjab and Sindh, along with Project Implementation Units per district. The governance structure included a Project Oversight Committee and Provincial Project Technical Committees. This has ensured coordination among federal and provincial stakeholders, aligning project activities with government policies and priorities.

13. The project area was specifically defined to include the most vulnerable districts within the Indus Basin. This prioritized the vulnerability of both the population and their agricultural systems. This area includes the districts of Dera Ghazi Khan, Khanewal, Lodhran, Multan and Muzzafargarh in Punjab, as well as Badin, Sanghar and Umer Kot in Sindh. Figure 1 shows the location of the Indus Basin in Pakistan.

[3] The projects were filtered by "active status" and "environment and natural resources management" themes, Level 1.

Figure 1. Location of the Indus Basin

(a) Project locations (dark grey areas) (b) Indus River Basin

Note: Refer to the disclaimer on the copyright page regarding the names and boundaries used in this map. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

Source: (a) own elaboration based on OCHA (Office for the Coordination of Humanitarian Affairs), 2025. Pakistan Waterways (OpenStreetMap Export). In: *humdata.org*. The Hague, Kingdom of the Netherlands. [Cited 24 September 2025]. https://data.humdata.org/dataset/hotosm_pak_waterways?force_layout=desktop; and (b) Internet Geography. 2023. The Indus Basin irrigation system case study. In: *internetgeography.net*. Sheffield, United Kingdom of Great Britain and Northern Ireland. [Cited 24 September 2025]. https://www.internetgeography.net/topics/the-indus-basin-irrigation-system-case-study/

14. The project's objective is to: increase resilience to climate change among the most vulnerable farmers in the Indus Basin; and strengthen the government's capacity to support communities in adapting to climate change. The project has three components.

Component 1. Enhancing information services for climate change adaptation in the water and agriculture sectors.

15. This component focuses on building capacity in Pakistan to utilize advanced technology for addressing climate change impacts on agriculture and water management. It aims to improve monitoring, analysis and the dissemination of climate, water and agriculture information. This aligns with the goal of increasing the generation and use of climate information in decision-making. By providing real-time data, the component enhances the effectiveness of climate change adaptation and supports informed resource distribution and usage.

16. The project includes various supports to strengthen government capacity in key technologies through three subcomponents.

    i. Developing a water accounting system: this subcomponent ensures that relevant institutions in Pakistan utilize a scientifically sound national water accounting system at various levels, compliant with international standards and based on satellite and ground measurements.

    ii. Establishing an evapotranspiration-based water management system: this subcomponent equips entities like the Pakistan Meteorological Department and Irrigation Departments in Punjab and Sindh with the capability to implement a robust system for monitoring actual water consumption in agriculture. This allows for better resource distribution based on crop water requirements.

iii. Improving availability and use of information services: this subcomponent ensures that real-time data and analysis are accessible to those affected by climate change in the Indus River Basin. It addresses the fragmentation of climate-related information across agencies, facilitating the availability of cohesive and coordinated data to decision-makers. This includes policymakers, irrigation managers and farmers.

Component 2. Building on-farm resilience to climate change.

17. The purpose of this component is to build on-farm resilience to climate change by supporting farmers in acquiring skills in climate-resilient agriculture and OFWM, adopting technologies and engaging with relevant stakeholders for climate change adaptation in agriculture.

i. Improving practices for climate resilience: this focuses on the widespread availability of up-to-date information and learning materials on agricultural and OFWM practices for increased resilience. Tested climate-resilient agriculture and OFWM practices have been identified through ongoing government and donor initiatives in the Indus Basin.

ii. Training of trainers (TOT) on climate-resilient agriculture and OFWM: this aims to enable skilled professionals working in the project area to promote climate-resilient agriculture and OFWM practices. A core team conducts the TOT to develop the capacity of extension workers.

iii. Developing farmers’ capacity to transform agriculture practices: this develops the coping and adaptation capacity of farmer beneficiaries through various training methods, including the Farmer Field School (FFS), the Climate Business Field School (CBFS) and the Women Open School (WOS) initiatives. These establish demonstration plots to display and showcase climate-resilient agriculture practices and organize field days. Farmers are trained in climate-resilient agriculture and OFWM practices for their specific agroecosystems (cotton-wheat cropping system, rice-wheat cropping system, homestead gardening system), and the use of information and communications technologies is promoted to enhance their capacity to apply findings.

Component 3. Creating an enabling environment for continued transformation.

18. The purpose of this component is to create a wider enabling environment for the sustained uptake of climate-resilient agriculture by farmers in the Indus Basin. It is aligned with the GCF outcomes related to the strengthened awareness of climate change threats and risk reduction processes, as well as strengthened institutional and regulatory systems for climate-responsive planning and development. This component has the following subcomponents.

i. Improve information and awareness raising campaigns: the project runs information and awareness raising campaigns on the impact of climate change in the Indus Basin and options for farmers to adapt to these changes. Campaigns are developed at federal, provincial and district levels using a mix of communication channels. This expands project outreach and reinforces messages for farmers reached under Component 2.

ii. Support policy implementation by federal and provincial governments: this subcomponent supports policymakers in using project results and data for evidence-based decision-making to transition the agriculture sector in the Indus Basin towards a climate-resilient development pathway. It helps provinces translate the new National Water Policy into operational policy and procedures, responding to the National Climate

Change Policy and Climate Change Council established under the Pakistan Climate Change Act of 2017 (Government of Pakistan, 2017). It strengthens institutional arrangements needed to scale up beyond the project area and mainstream climate change resilience across relevant policies.

iii. Develop services that enable farmers to adopt climate-resilient practices: to expand farmers' access to services that facilitate increased resilience to climate change, the project develops partnerships with non-governmental organizations, the private sector and selected ongoing development programmes. This approach leverages resources, existing delivery mechanisms and networks that partners offer to both enhance support to producers directly targeted by the project and extend its reach to other farmers.

19. In addition to the original activities of the project, a temporary initiative known as the Agripackage was incorporated. This was not part of the original project plan but introduced in 2020 in response to a request from the government following the COVID-19 pandemic in 2020 and the 2022 floods. This initiative provided a set of agricultural inputs, including seeds and fertilizers. The delivery of the Agripackage took place in 2021 and 2022.

1.4 Project's theory of change

20. In September 2024, a validation process for the project's original theory of change (TOC) (see Figure 2) was conducted in collaboration with the Project Management Unit and the two Provincial Project Implementation Units in Punjab and Sindh. We reviewed the barriers and activities outlined in the project's TOC. Over the course of one week, the Evaluation Team gathered insights from each component's perspective through group sessions and independent work activities.

21. The original TOC identified nine barriers:

i. weak institutional and technical capacity in planning and managing water-related information and data;

ii. lack of integration of climate monitoring with agriculture and water information;

iii. lack of user-friendly analytical tools, information dissemination platforms and early warning systems;

iv. farmers' limited access to adaptation options for climate change, including droughts and floods;

v. farmers' low comprehension and cultural adaptation of opportunities based on climate information and water productivity;

vi. weak agricultural extension services and a lack of understanding of climate-sensitive adaptation among practitioners;

vii. lack of a climate change communications strategy and practices to reach wider audiences;

viii. lack of sectoral coordination and the government's capacity to mainstream climate change into water management and agricultural development; and

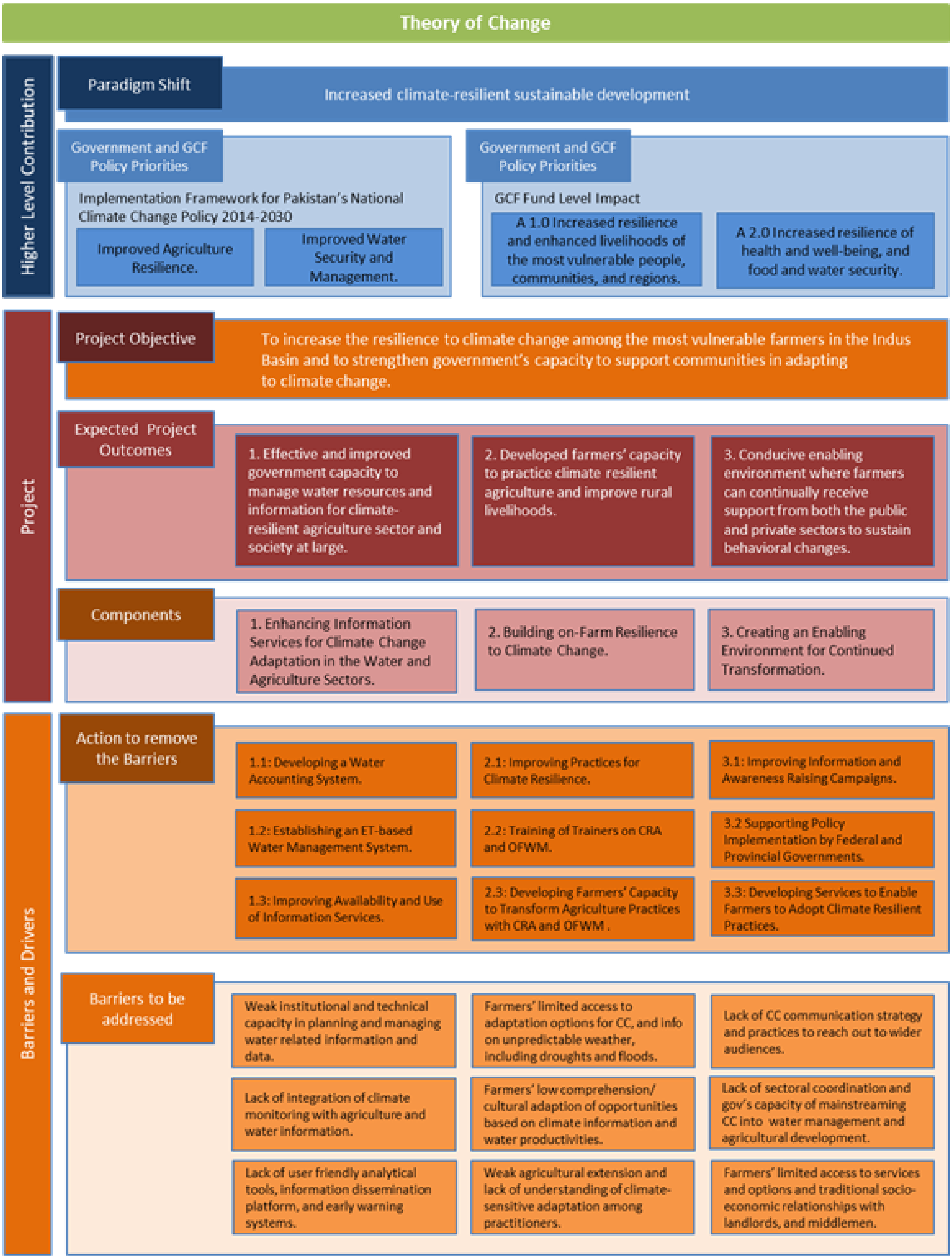
ix. farmers' limited access to services and options, as well as traditional socioeconomic relationships with landlords and middlemen.

22. The implementation team considers that all these barriers are addressed by at least one of the three components. Component 1 aims to integrate and generate information while building institutional capacity among key stakeholders, focusing on the first three barriers. Component 2

develops climate change materials to teach practices in climate-resilient agriculture and OFWM by training extension workers and trainers who then teach farmers directly. This creates a cascading scheme for sharing knowledge in the field and addressing the next three barriers. Last, Component 3 includes innovative strategies to disseminate information to a wider audience, primarily through radio advertising, and includes specific activities to address barriers with key actors such as the government and the private sector, tackling the final three barriers.

23. The implementation team confirmed that the original TOC remains valid at the current stage of the project, even after accounting for factors such as floods and the COVID-19 pandemic, which have introduced new complexities. However, these challenges have not necessitated changes in the components and actions outlined in the original formulation. The barriers and activities described in the funding proposal accurately reflect the obstacles and implementation processes of the project. While some processes have been adapted to specific challenges, the project activities continue to align with those designed in the funding proposal. This builds on the project's existing framework.

Figure 2. Theory of change



Source: Funding proposal.

2. Evaluation approach and methodology

2.1 Evaluation design, process and key questions

24. In this interim report, the Evaluation Team conducted an analysis of primary qualitative data and secondary quantitative and qualitative sources. The primary data sources were the FGDs and the KIIs. This information was complemented and triangulated with qualitative secondary sources, such as project documents, progress reports and technical documents prepared by the FAO Pakistan Country Office. Moreover, national strategic plans, records from regional and provincial governments, and documents from involved organizations and institutions were also reviewed. Additionally, the Evaluation Team used the baseline household survey conducted by the Country Office, along with monitoring data such as financial data, the beneficiaries' enrolment list, the village profiling database, the Training Interim Evaluation survey and the Farmers' Learning Assessment to conduct a quantitative analysis. Finally, the secondary data sources compiled and used by FAO Pakistan for the MCDA to select the project's implementation areas have been verified and analysed. We also used data from the 2019 and 2020 Social and Living Standards Measurement Survey to triangulate results from the household baseline survey.

25. The data collection strategies were guided by the themes outlined in Table 1, ensuring that the most appropriate method was utilized to address each thematic area effectively.

Table 1. Evaluation criteria, definitions and methods

Evaluation criteria	Definitions	Questions	Data sources and collection methods
Relevance	The extent to which the project design responds to beneficiaries' needs, policies and climate priorities	Criterion 1.1 How was the project designed to identify and respond to beneficiaries' needs? Criterion 1.2 To your knowledge, do you consider the project activities to fit the beneficiaries' needs? Why? Criterion 1.3 Is there anything else you think would be helpful to better support them? Criterion 1.4 How was the project designed to respond to the main policies from the Pakistan Government and other international institutions? Criterion 1.5 To your knowledge, do you consider the project activities to fit those policies? Why? Criterion 1.6 How was the project designed to identify climate priorities? Criterion 1.7 To your knowledge, do you consider the project activities to respond properly to climate priorities? Why?	KIIs, FGDs and literature review
		Criterion 1.8 Are the activities developed under this project useful to help your household increase its resilience to climate change? Criterion 1.9 Is there anything else you think would be helpful to support you better?	FGDs and literature review
	The responsiveness of the project to climate-related needs	Criterion 1.10 What specific climate-related risks has the project identified, and how are these integrated into its planning and implementation? Criterion 1.11 What agricultural adaptation practices and technologies are promoted by the project to mitigate climate impacts, and how are these practices tailored to local farming conditions?	KIIs, MCDA dataset, village profiling database, beneficiaries' enrolment list, Baseline Household Survey and 2019/20 Social and Living Standard Measurement Survey
Effectiveness	The extent to which the project achieved its objectives	Criterion 2.1 Do you think climate-resilient agriculture and OFWM trainings are useful in helping your household mitigate some of the negative impacts of climate change? Criterion 2.2 As a result of the climate-resilient agriculture and OFWM trainings received as part of the project, has your household been able to respond better to climate change impacts?	FGDs, KIIs and data from the training interim evaluation report and the Farmers' Learning Assessment
Efficiency		Criterion 4.1 Are the actual project costs aligned with the planned budgets?	Analysis of monitoring and financial data

Evaluation criteria	Definitions	Questions	Data sources and collection methods
	The extent to which the project delivers, or is likely to deliver, results in an economic and timely way	Criterion 4.2 How do the fixed and variable costs compare across different stages of implementation?	Analysis of monitoring and financial data
		Criterion 4.3 What percentage of administrative costs is allocated to start up, roll out, operations, management and evaluation?	Analysis of monitoring and financial data
		Criterion 4.4 What is the administrative cost per activity-related expense?	Analysis of monitoring and financial data
	The degree to which resources have been optimized to maximize the impact of resources spent on climate adaptation and mitigation results	Criterion 4.5 What is the cost per beneficiary and household compared to the planned cost per stage and year?	Analysis of monitoring and financial data
		Criterion 4.6 What percentage of the total project cost is transferred directly to beneficiaries?	Analysis of monitoring and financial data
		Criterion 4.7 What is the average value of transfers to beneficiaries?	Analysis of monitoring and financial data
		Criterion 4.8 How do currency exchange rates and inflation adjustments affect the project costs?	Analysis of monitoring and financial data
	The extent to which the project deals with issues and risks in implementation in an efficient manner	Criterion 4.9 How were potential risks identified and assessed during the project's implementation phase? Criterion 4.10 Can you provide examples of specific issues or risks that arose during the project and explain how they were addressed? Criterion 4.11 What measures were put in place to monitor and mitigate risks throughout the project's lifecycle, and how effective were these measures?	KIIs
	The extent to which and how the project applies adaptive management	Criterion 4.12 Can you describe instances where the project plan was adjusted in response to new information or changing circumstances? Criterion 4.13 What mechanisms were in place to regularly review and adapt project strategies and activities?	
Coherence	The extent to which the project is coherent with the climate finance delivery of other multilateral entities	Criterion 5.1 What other multilateral entities are funding climate change projects in the region? Criterion 5.2 To what extent is the project compatible and/or does it complement other climate finance funding? Criterion 5.3 Does the project avoid creating parallel systems?	KII and desk review
Gender equity and social cohesion	The extent to which the project ensures equal participation (men, women, youth,	Criterion 6.1 What strategy was implemented to ensure equal participation of men, women, youth, Indigenous Peoples and other marginalized groups?	KIIs and FGDs

Evaluation criteria	Definitions	Questions	Data sources and collection methods
	Indigenous Peoples and other marginalized groups)	Criterion 6.2 Was this strategy effective? What quality assurance was used to verify this?	
		Criterion 6.3 Do you think all social groups have equal access to trainings? Why? Criterion 6.4 Could the project be more inclusive? If so, how?	KIIs, FGDs, beneficiaries' enrolment lists and monitoring data
	The extent to which climate change impacts are differentiated by gender and/or other markers of difference	Criterion 6.5 Do you think there are some social groups more affected by climate change impacts than other? If so, which ones?	FGDs
Country ownership	The extent to which the project is consistent with the existing national policies/climate strategies and capacity to deliver How well country ownership is reflected in the project's governance, coordination and consultation mechanisms or other consultations	Criterion 7.1 What relevant national policies or climate strategies has the project identified, and how are these integrated into its planning and implementation? Criterion 7.2 To what extent does the project build and use local knowledge/capacity?	KIIs and annual reports
Innovativeness	The extent to which the project creates opportunities for developing/adopting new technologies, and adopts innovative solutions	Criterion 8.1 To what extent does the project introduce new technologies/solutions to improve government capacity to provide adequate support to vulnerable farmers? Criterion 8.2 Do you have knowledge about new technologies or innovative solutions used by beneficiaries that are different from the technologies and practices provided by the project?	KIIs
		Criterion 8.3 Has this project introduced to you new technologies/solutions that you did not know before/did not have access to? Criterion 8.4 Do you have knowledge about new technologies or innovative solutions used by you or other beneficiaries that are different from the technologies and practices provided by the project?	FGDs
Unexpected/unintended results	The extent to which unforeseen and unintended outcomes – both positive and negative – that were not initially anticipated in the planning or articulated in the original TOC, were identified and documented	Criterion 9.1 Have there been any positive or negative unintended results generated by the implementation of the project so far?	KIIs
		Criterion 9.2 Did your participation in the project positively affect you in any different way than other participants? Criterion 9.3 Did your participation in the project negatively affect you in any different way than other participants?	FGDs

Evaluation criteria	Definitions	Questions	Data sources and collection methods
Paradigm shift: scale	The degree to which there has been a significant increase in quantifiable results within and beyond the scope of the project/programme	Paradigm shift 1.1 Can you provide specific examples or data showing how the project has increased its quantifiable impact in mitigation and adaptation measures beyond the initial targets? Paradigm shift 1.2 How has the commitment or interest from existing project holders or new parties evolved since the project's inception? Can you provide specific instances or expressions of this increased commitment or interest? Paradigm shift 1.3 Are there any strategies developed within the project that cover larger target areas or populations? Please describe these strategies and their expected impacts. Paradigm shift 1.4 Have there been any results from the project that exceeded initial expectations? If so, please provide details and data to illustrate these outcomes. Paradigm shift 1.5 Can you describe any significant expansions of the project that have occurred due to increased resource allocation from new or existing sources? Paradigm shift 1.6 Are there measurable and quantifiable results from the project that demonstrate a significant impact beyond the original scope? Please provide specific examples and data.	KIIs
Paradigm shift: replicability	The degree to which key structural elements of a project/programme are exported elsewhere within the same sector and/or to other sectors, regions or countries	Paradigm shift 2.1 Are there examples of how the intervention models from this project are being considered or implemented in different geographical or sectoral settings? Please describe these examples in detail. Paradigm shift 2.2 Are there any new organizations planning or piloting similar intervention models influenced by this project? Provide details about these organizations and their planned interventions. Paradigm shift 2.3 Can you provide multiple examples of models similar to those used in this project being funded and implemented in other contexts? Describe how these models have been adapted to meet local contexts and needs.	KIIs

Evaluation criteria	Definitions	Questions	Data sources and collection methods
Paradigm shift: sustainability	The degree to which the results of a project/programme are sustained beyond completion through the creation of a structural and/or financial base, as well as climate-resilient practices	Paradigm shift 3.1 Are there institutional structures and behavioural norms in place to sustain climate mitigation and adaptation benefits without external funding? Why? Paradigm shift 3.2 Can good practice norms and institutional structures be observed across a range of stakeholders? Could you provide some examples? Paradigm shift 3.3 Are institutional structures and stakeholder groups capable of leading, facilitating and supporting interventions independently? Why? Paradigm shift 3.4 Is there evidence of further expansion and improvement in climate mitigation and adaptation benefits due to these structures and norms?	KIIs
Adaptation targets	The extent to which the project meets adaptation targets	Adaptation target 1 What are the expected adaptation benefits of the project? Adaptation target 2 How is a direct or an indirect beneficiary of the project defined?	KIIs and annual reports

Source: Authors' own elaboration.

2.2 Primary data collection

26. During this evaluation, qualitative data collection was conducted to obtain insights from key stakeholders and final beneficiaries involved in Component 2 activities (TOT, CBFS, WOS). These data collection activities were carried out by a local service provider (APEX Consulting Group), which collected all FGDs and KIIs from September to November 2024.

27. For this project, the APEX Consulting Group prepared comprehensive guides for the KIIs and the FGDs, as well as trained facilitators. Their responsibilities extended to contacting beneficiaries, convening participants for discussions, and conducting the KIIs and the FGDs. Additionally, the APEX Consulting Group transcribed the discussions and provided a qualitative analysis that highlighted emerging evidence.

28. To identify participants for both the KIIs and the FGDs, the Evaluation Team collaborated with the Project Management Unit, the two Provincial Project Implementation Units in Punjab and Sindh, the District Project Implementation Units, and the M&E team to create a list of potential candidates for the KIIs, including names, emails and contact numbers. This list provided more candidates than needed, allowing the service provider to find replacements in case some of the initial options were unavailable. The selected individuals were those directly involved with at least one of the project subcomponents and deemed capable by the implementation team to generate relevant insights about the project.

29. For the FGDs, we provided the service provider with the contact information for the district team leader in each district. The district implementation unit then contacted the beneficiaries to convene the discussions. Beneficiaries were selected based on their year of participation, the total number of participants in the respective FFS and their availability.

30. FGDs: data collection involved carrying out 17 FGDs in 17 project-targeted villages, with at least two FGDs held in each of the eight project districts. The data collection service provider led the village selection process in consultation with the rest of the Evaluation Team, aiming to ensure enough participants in all activities provided by the project. Each FGD included more than eight participants, with an average of 11 participants per FGD – all of whom were project beneficiaries from the CBFS, the WOS or the TOT. In addition to the FGDs, all participants were surveyed with a short questionnaire during the registration process. Information collected through this survey allowed a better contextualization of the results from the FGDs, but sampling was not random. Therefore, the results should not be generalized for the whole population of beneficiaries. The survey included questions on geographic location, respondent details, school details and beneficiary satisfaction with the respective FFS (see Appendix 10).

31. Out of 174 participants in the FGDs, 120 (69 percent) are from Punjab and 54 (31 percent) are from Sindh (see Table 16 for full disaggregation by geographic location). Among those interviewed, 48 percent were or are enrolled in the WOS, 40 percent in the CBFS, and 12 percent participated in the TOT sessions. The majority of participants are farmers (90 percent). However, there were four public employees who participated in the TOT sessions, ten unemployed women who enrolled in the WOS and three independent workers. Further, 68 percent of the interviewed beneficiaries do not live in the same village as the school, and 57 percent of them have already completed all the classes to cover their respective curriculum. This includes all respondents who were enrolled in 2021 and 2022, and 41 percent and 48 percent of those enrolled in 2023 and 2024, respectively.

32. KIIs: the service provider administered 76 KIIs to representatives from several institutions included in the governance of the project, at both the central and district level. Table 2 presents the KII sample distribution covered in this evaluation.

33. During fieldwork for the KIIs, interviews were conducted from September to November 2024. The distribution of KIIs included 48.7 percent in Punjab, 30.3 percent in Sindh, 17.1 percent in Islamabad and 3.9 percent internationally. The study focused primarily on district-level stakeholders (56.6 percent), with 25 percent at the provincial level and the remaining 18.4 percent involving national-level officials, FAO and GCF stakeholders.

34. The service provider ensured fair representation and participation of all relevant groups or stakeholders (including men, women and the disabled) in both the FGDs and the KIIs.

Table 2. Targeted institutions and number of key informant interviews

Stakeholders	Total KIIs
National/federal ministries/institutions 1. Arid Zone Research Institute (1) 2. Climate Energy and Water Research Institute under the National Agricultural Research Centre (1) 3. Global Climate Change Impact Studies Centre (1) 4. Indus River System Authority (1) 5. Pakistan Council of Research in Water Resources (1) 6. Pakistan Meteorological Department (2) 7. U.S.-Pakistan Center for Advanced Studies in Water, Mehran University of Engineering and Technology (1)	8
District-level stakeholders (Punjab) 1. Agricultural Mechanization Research Institute (1) 2. Crop Reporting Services (1) 3. Department of Agriculture, Extension Wing (5) 4. Department of Agriculture, Water Management (OFWM) Wing (6) 5. Department of Irrigation (8) 6. Department of Livestock (3) 7. Deputy Commissioner Office/District Disaster Management Authority (1) 8. Directorate General of Agriculture Extension, OFWM and Animal Husbandry (1) 9. Farmers' association (4) 10. Muhammad Nawaz Shareef University of Agriculture (1) 11. Planning and Development Board (1) 12. Seed corporation (1) 13. Water users' association (3)	36
District-level stakeholders (Sindh) 1. Agriculture Research Sindh (1) 2. Sindh Agriculture University, Tando Jam (2) 3. Department of Agriculture, Extension Wing (5) 4. Department of Agriculture, Water Management (OFWM) Wing (3) 5. Department of Irrigation (1) 6. Department of Livestock (2) 7. Deputy Commissioner Office/District Disaster Management Authority (1) 8. Directorate General of Agriculture Extension, OFWM and Animal Husbandry (1) 9. Farmers' association (2) 10. Pakistan Meteorological Department (1) 11. Seed corporation (1) 12. Sindh Irrigation and Drainage Authority (1) 13. Sindh Rural Support Organization/Rural Support Programme Network (1)	22
FAO project team 1. Country Office, national level (5) 2. Country Office, provincial level (2) 3. Regional Office (1) 4. Headquarters (1) 5. GCF Secretariat (1)	10
Total	**76**

Source: Authors' own elaboration.

2.3 Secondary sources of information

35. To respond to the key evaluation questions described in Subsection 2.1, the Evaluation Team complemented the primary data collected through the FGDs and the KIIs with several secondary data sources. The Evaluation Team defines as secondary sources all data that were not collected directly by the FAO Office of Evaluation or through a service provider under the direct supervision of the FAO Office of Evaluation. This therefore ensures compliance with a rigorous sampling methodology and adequate protocols for data quality and reliability.

36. Such secondary sources were either collected directly by the project team throughout the inception and monitoring process,[4] used by the project team to inform the implementation strategy but collected by other parties or downloaded by the Evaluation Team from online repositories. Table 3 summarizes all the secondary data sources used for this evaluation, which entity is responsible for collecting them and which analysis was performed with them for the purpose of this evaluation. For a more detailed description of each of these secondary sources and how they contributed to the evaluation, please refer to Appendix 5.

Table 3. List of secondary sources used by the Evaluation Team

Data source	Entity leading data collection	Type of analysis performed
Baseline Household Survey	FAO project team	One-way analysis of variance (ANOVA) across beneficiaries and non-beneficiaries respondents
Project's financial reports (from 2020 to 2023)	FAO project team	Financial analysis
Beneficiaries' enrolment list	FAO project team	Profiling of beneficiaries and matching with baseline household survey
Training Interim Learning Assessment Survey	FAO project team	Effectiveness of Component 1
Farmers' Learning Assessment	FAO project team	Effectiveness of Component 2
MCDA database	Composite database aggregating sources from: FAO and Space and Upper Atmosphere Research Commission Pakistan Meteorological Department United Nations Satellite Centre FAO's locust monitoring data	Relevance analysis for the selection of prioritized project's union councils
Village profiling database	FAO project team	Relevance analysis for the selection of targeted villages
2019/20 Social and Living Standards Measurement Survey	Pakistan Bureau of Statistics	Relevance analysis for the selection of beneficiaries

Source: Authors' own elaboration.

[4] As per its mandate and status, while being part of FAO, the FAO Office of Evaluation is not directly involved in the implementation or monitoring of any of the organization activities, including data collection to monitor project activities.

2.4 Quality assurance protocols

37. To ensure the highest standard of quality, transparency and independence, the Evaluation Team adopted strict quality assurance protocols following the FAO Office of Evaluation procedures. Measures were taken to mitigate bias at every stage of the evaluation:

i. selection of an Evaluation Team with no professional or personal linkages with any member of the implementation team, the Country Office management or the host government;
ii. validation of evaluation terms of reference, including evaluation design, evaluation questions and methodology by two Evaluation Officers of the FAO Office of Evaluation;
iii. revision and approval of qualitative survey instrument by two Evaluation Officers of the FAO Office of Evaluation;
iv. hire an external service provider through a competitive tender process to conduct the qualitative data collection with beneficiaries and key stakeholders to minimize any response bias;
v. revision of final interim evaluation report draft, inclusive of all annexes, by two Evaluation Officers of the FAO Office of Evaluation and one FAO Office of Evaluation Senior Evaluation Officer;
vi. revision of final interim evaluation report draft by the FAO Country Office, including the FAO Representative and project team;
vii. revision of final interim evaluation report draft by hosting government; and
viii. revision of final interim evaluation report draft by the FAO Office of Climate Change, Biodiversity and Environment.

38. Furthermore, despite being part of FAO, the FAO Office of Evaluation is operationally independent within the Organization and benefits from total freedom regarding the selection of the Evaluation Team, the drafting of the evaluation's terms of reference and the drafting of the evaluation's report. While the implementation team of the project under evaluation was naturally consulted throughout the process, there was no external influence regarding: i) selection of the Evaluation Team; ii) scope of the evaluation; iii) key stakeholders to be interviewed; and iv) evaluation findings and recommendations.

2.5 Evaluation limitations and mitigation measures

39. The Evaluation Team decided not to conduct a robust quantitative impact assessment at this stage. There are several reasons behind this choice, which are explained in Appendix 6. The Evaluation Team has also assessed the feasibility of a solid impact evaluation covering the activities implemented from 2025 until the end of the project. The proposed impact evaluation design is included in Appendix 9 of this report.

40. The FAO Office of Evaluation collected data exclusively through qualitative methods. To mitigate this limitation, we drew on multiple qualitative sources, KIIs and FGDs, covering all levels (national, provincial, local and beneficiary). However, nearly all evaluation criteria incorporated quantitative analysis using:

i. survey data from three separate assessments;

ii. financial and monitoring data from the beneficiaries list and village profiles provided by the FAO Country Office; and

iii. secondary sources such as geospatial information and the 2019 and 2020 Social and Living Standards Measurement Survey.

41. Finally, we conducted a short survey among our FGD participants to gather feedback on the general performance of project activities. Although this survey provided additional insights, it was not intended to be representative: beneficiaries were selected to ensure coverage across all districts and activities (CBFS, WOS, TOT) – not reflect the entire beneficiary population.

42. Another limitation arises from relying on an external company to collect qualitative data as there may be a lack of alignment with project-specific standards. We conducted an in-person training in Pakistan with the core team to mitigate potential bias arising from misunderstandings regarding the criteria and objectives of this interim evaluation. This ensured that the qualitative data collection process adhered to both technical and ethical standards. Additionally, we created a training manual that includes all the materials from the training sessions.

43. The fieldwork encountered several significant limitations that affected the overall data collection process. As noted, the service provider had paused field data collection after interviewing most district-level stakeholders, and it resumed the process beginning with federal-level stakeholders before progressing to those in the Punjab and Sindh Provinces. During the first phase of fieldwork, the service provider faced considerable challenges due to political unrest, protests and riots, which made it difficult to conduct many district-level interviews. Additionally, the hosting of the Shanghai Cooperation Organization Summit in Islamabad (from 15 to 16 October 2024) further heightened security measures. This led to restricted access to certain areas and even temporary loss of internet connectivity.

44. Some respondents were reluctant to let the service provider record the interviews. This limited the ability to capture their responses verbatim. In such instances, detailed notes were taken during interviews and transcribed by the interviewer, potentially introducing biases or inaccuracies in the captured data. Oftentimes, at both the national and provincial levels, stakeholders were not easily accessible. This posed additional challenges to our outreach efforts. Many of them requested a specific reference letter before agreeing to participate in interviews. This further complicated the process.

45. Due to staff turnover and the lack of proper handovers, there are some institutional knowledge gaps regarding key methodological approaches to select the project's implementation areas and beneficiaries. This led to delays in retrieving critical data to assess the validity of the selection performed by the FAO Country Office, as well as incomplete information that hindered the quality of the analysis, and potentially the transparency and accountability of the selection process. For the future, the Evaluation Team recommends adequately documenting and storing all information needed to allow for analysis replicability in common repositories. The Evaluation Team also recommends ensuring that there are knowledge sharing practices among everyone involved in the project's implementation to avoid critical information getting lost over time.

46. Although the village profiling database provided valuable insights into how well the selected villages met the criteria, with the available information it was not possible to verify whether the project targets the most suitable villages within the identified union councils. Additionally, some criteria are not directly verifiable such as the availability of transportation and the willingness of farmers to participate in the project since this information was not collected during the profiling exercise.

47. The Training Interim Evaluation Survey was administered to 191 participants from the Departments of Irrigation, Water Management and Agriculture in the Punjab and Sindh Provinces, yielding 91 responses (with 97 entries in total, as six individuals responded twice). This represented an approximate 47.6 percent response rate. This relatively low response rate may be due to many participants being field staff in rural areas with limited access to email, suggesting that the survey results may be subject to selection bias.

48. Subcomponents 2 and 3 of Component 3 have not been fully implemented, which means we are currently unable to measure their effectiveness. Additionally, Subcomponent 1 requires a mobile phone-based feedback system for effectiveness measurement, and this has not been implemented.

3. Findings

3.1 Relevance

49. The relevance of the project is assessed by answering two questions: 1) the extent to which the project design responds to beneficiaries' needs, policies and climate priorities; and 2) the responsiveness of the project to climate-related needs.

50. We conducted an in-depth literature review and desk analysis to understand the climate change threats to the Indus Basin area, the potential role of climate-resilient agriculture and OFWM practices to increase resilience, and the vulnerability status of the selected areas and beneficiaries for project implementation. This evidence has been triangulated with project reports and results from baseline analysis and qualitative data collection (FGDs, KIIs). The main findings are summarized in the following points, and the complete analysis is available in Annex 1.

Finding 1. The project is relevant to existing climate priorities and risks, and contributes to increased adaptation and mitigation capacity.

51. Key stakeholders from the local and national government, the FAO Pakistan Country Office, and farmers' association who have been directly involved in activity implementation all expressed positive opinions regarding the relevance of the project and its contribution to Pakistan's climate priorities. It is a unanimous belief that climate change is already affecting the agricultural sector by reducing crop yields and increasing pests and diseases due to the combined effect of different climate hazards, including droughts and heatwaves, dust storms and increased humidity. Stakeholders and beneficiaries agree that the project has the potential to enhance adaptation capacity at both the institutional and individual levels through its proposed activities. In particular, stakeholders appreciate the project's focus on empowering the most vulnerable farmers through climate-resilient agriculture practices and weather information systems. This allows them to respond to climate change challenges rather than be victims: "They [farmers] need to know how to handle this [climate change], what new crops to plant, when to harvest, when to spray and when to water" (Deputy Director, Department of Livestock).

52. Additionally, stakeholders remarked on the appropriateness of the project's design to effectively respond to a complex phenomenon whose causes and impacts are interdependent. By involving national and local institutions, academia and local communities, the project fosters synergies and integration across multiple levels, favouring a systemic approach to tackle climate challenges. Indeed, Component 1 focuses on addressing technological gaps on one hand, and improving existing systems and building local institution capacity on the other hand. Component 2 strengthens farmers' technical knowledge and mitigation capacity by equipping them with appropriate tools and information. Finally, Component 3 focuses on enhancing evidence-based policy and increasing awareness of the overall population. Hence, the project successfully identifies and addresses both short- and long-term climate risks and priorities and has the potential to enhance adaptation capacity at both the institutional and individual levels if implemented according to its design.

53. Finally, the evaluation and implementation team revised the TOC together with the project team during the in-country mission and confirmed its validity at the current stage of the project – even after accounting for factors such as floods and the COVID-19 pandemic. While some processes have been adapted to specific challenges, the project activities continue to align with Pakistan's climate priorities.

Finding 2. The project is coherent with national policies and objectives.

54. Based on a desk review of the national policy framework and insights from national government officials, the Evaluation Team confirms that the project is coherent with the national climate change mitigation and adaptation objectives by promoting climate-resilient agriculture and sustainable water management practices.

55. The 2012 National Climate Change Policy (Government of Pakistan, 2012) highlights the vulnerability of the water and agriculture sectors to climate change and pursues the development of climate-resilient agriculture and food systems as mitigation measures. The 2018 National Food Security Policy (Government of Pakistan, 2018a) envisages the adoption of climate-resilient agriculture and OFWM practices to increase productivity, sustainability and resilience of the agriculture sector and guarantee food security. Finally, the 2018 National Water Policy (Government of Pakistan, 2018b) identifies sustainable water management and efficient irrigation systems as a key priority since 95 percent of national water resources are devoted to irrigation.

56. Just like the project, these three policies focus on enhancing climate resilience and food security through the adoption of climate-smart agriculture and water management practices. Additionally, it was also noted that the project aligns with the National Fiberization Policy (The Express Tribune, 2025) objectives by leveraging technological solutions for sustainable development, such as enhancing information technology systems and platforms for effective decision-making.

57. At the international level, the project builds on the Paris Agreement, to which Pakistan is a signatory, and contributes to several critical Sustainable Development Goals, including sustainable agriculture, water conservation, food security and disaster risk reduction.

Finding 3. Overall, the proposed project's activities are adequate for the climate-related needs of the selected project area and the project's beneficiaries. For Component 1, some activities have been successfully re-adapted due to a changed context or barriers that were not initially considered. For Component 2, there is unanimous agreement of the relevance of climate-resilient agriculture and OFWM trainings. However, beneficiaries and farmers' association representatives also advocate for the provision of agricultural inputs.

58. The Evaluation Team analysed the FGDs and the KIIs, triangulating them with the Training Interim Evaluation Survey and the FGD Validation Survey, and concluded that the project activities meet beneficiaries' needs. The team also adopted effective mechanisms to identify those needs, including conducting needs-based assessment surveys and consulting with the government. The following points summarize each specific project component.

59. Component 1: results from the Training Interim Evaluation Survey conducted by the monitoring, evaluation and learning (MEL) team show that over 90 percent of participants rated the training as very helpful, with more than 60 percent expressing strong agreement.

60. By interviewing the implementation leader for activities under Component 1, it emerged that some of the activities had to be re-adapted due to a changed context or a barrier that was not initially foreseen. In the first case, due to a lengthy project formulation that took several years, a specific software that was part of the training curriculum became outdated. Nevertheless, trainings on a newly developed electronic portal were provided instead after consultations with the government. In the second case, the project was supposed to provide a specific piece of equipment to monitor water usage. However, it was discovered that no private or public actor in Pakistan had the required knowledge to install it after the tender was launched. Again, a new available instrument that performs a similar function was identified and installed instead.

61. Component 2: results from the FGDs validation survey show good satisfaction levels with the project activities and trainers' performance among the FFS beneficiaries. Satisfaction with school activities and infrastructure is rated on a scale from one to five and is overall high. Indeed, 68 percent are satisfied with school infrastructure, 86 percent think activities are well organized, 84 percent consider activities engaging and 82 percent consider activities to be relevant.[5] When comparing different school types, the CBFS beneficiaries are slightly below the average for every category. However, there is only one response across all the categories rated below three. This indicates that averages are skewed by a higher number of neutral rather dissatisfied respondents.

62. Supportive evidence from the learning assessment reinforces these findings. Overall satisfaction with the FFS training was strong in both 2023 and 2024 but improved further in 2024 as most districts reported higher "excellent" ratings and lower "good" ratings compared to 2023. In Punjab, the share of "excellent" ratings climbed from 55 percent to 74 percent, with Lodhran, Multan and Muzaffargarh showing the most pronounced gains as Dera Ghazi Khan remained steady around mid-40 percent. Khanewal's "excellent" rating shifted from 89 percent down to 54 percent, but this decline was offset by a rise in "good" responses. In Sindh, "excellent" edged up modestly from 69 percent to 72 percent overall, despite slight dips in Sanghar and Umerkot that were balanced by "good" gains. "Poor" ratings remained negligible in both years. More detailed results and district-level breakdowns can be found in Appendix 14.

63. Among interviewed beneficiaries who already completed activities, 87 percent are satisfied with the trainers' skills in session facilitation, 78 percent agree that trainers answered satisfactorily to questions, 80 percent think that trainers managed sessions according to plan, and 65 percent think that trainers adopted adequate teaching techniques. Moreover, there are only three respondents who gave negative feedback on trainers' performance,[6] while the rest is neutral. When disaggregating by school type, almost all beneficiaries of the WOS and the TOT are satisfied with the trainers' performance. Among the CBFS respondents, 81 percent are satisfied with the trainers' skills in session facilitation, 72 percent think that trainers answered satisfactorily to questions, 72 percent agree that trainers managed sessions according to plan and 51 percent think that trainers adopted adequate teaching techniques. Satisfaction rates among the WOS respondents are 80 percent or above for each category. Finally, the Khanewal District exhibits some of the lowest trainer satisfaction ratings, with 14 percent of respondents who think that trainers do not have adequate skills in facilitation, 7 percent do not believe that trainers answered satisfactorily to questions, and 56 percent do not have an opinion on trainers' management performance and the adequacy of teaching techniques. The low attendance rate observed in this district might partially explain the higher dissatisfaction in this area for trainers' performance.

64. Satisfaction with trainers' performance among beneficiaries who are still attending trainings is very high, with all respondents agreeing or strongly agreeing that trainers have adequate skills in session facilitation, leadership, curriculum management and teaching strategies.

65. Furthermore, none of the interviewees expressed any complaint related to the activities implemented. This confirms that they satisfied the farmers' needs and were well tailored to the climate-related challenges they face. However, beneficiaries suggested that the provision of

[5] Satisfaction with school activities and infrastructure was rated from one (very bad) to five (very good). Statistics report percentage of answers rated four or above.

[6] Since the validation questionnaire was anonymous and lacked follow-up questions, we could not gather specific feedback. However, during the FGDs, participants were able to provide collective insights into their satisfaction with the trainer.

additional agricultural inputs, such as high-quality seeds or tools and machinery (for example, tractors, blades for land levelling and seed grading machines) will further increase their productivity. They also suggested other possible climate-resilient agriculture and OFWM practices to be adopted, such as the release of birds as a pest control mechanism and the use of sprinkler irrigators. Finally, women farmers pointed out that additional support in terms of the provision of internet connectivity and mobile phones or tablets are key for their business growth as they can expand their pool of clients.

66. Two main points of view emerge from the analysis of key informant perspectives. National and local government officials and FAO personnel agree that farmers in the project areas still rely on traditional farming techniques that are inadequate to face the new challenges posed by climate change and variability. They also agree that the climate-resilient agriculture and OFWM practices introduced by the project will significantly improve their resilience. Moreover, they believe that mechanisms to identify beneficiaries' needs and capacities were adequate, with several government officials mentioning direct involvement or knowledge of needs assessment surveys conducted prior to implementation. Their view can be summarized with the words of a local government official from the Muzaffargarh District: "We equip farmers with the knowledge to adopt new practices that align with changing weather patterns, emphasizing practical, hands-on learning. Through these trainings, farmers gain awareness of cost-effective techniques that reduce input costs and increase crop yields. The focus is on enhancing their ability to face climate challenges while improving overall farm productivity. By learning and applying these practices directly in the field, farmers are empowered to make informed decisions, resulting in more resilient and sustainable agricultural outcomes."

67. At the same time, however, respondents from grassroots organizations such as farmers' association members mentioned that the trainings are certainly relevant and useful but should be paired with in-kind assistance like high-quality inputs and farm machinery. While learning better practices is critical, they believe that access to adequate inputs in order to properly apply these practices should also be addressed by the project.

Finding 4. Selected Districts and Union Councils are aligned with the project's objectives, but the validation exercise of the MCDA performed by FAO Pakistan to identify the project areas is limited by data availability and methodological knowledge gaps.

68. The project's districts and union councils were identified through a two-stage MCDA technique using a geographic information system. This was performed by FAO Pakistan and validated by the Government of Pakistan. Villages within the prioritized union councils were then identified according to a set of eligibility criteria.

69. An analysis of the correct identification of districts according to the MCDA indicators relies on secondary data sources (FAO, 2014a; 2014b; 2016; Pakistan Bureau of Statistics, 2010; NDMA & WFP,; UNDP and Government of Pakistan, 2016) and qualitative data collection. The results were triangulated with the project's documents and technical reports. Findings indicate the high vulnerability to floods and droughts, and the high poverty and insecurity rates for all eight districts when compared to other districts within their respective provinces. As far as cropped area (percentage of total land) and share of smallholder farmers' population and agricultural households are concerned, results are more heterogeneous with the selected districts not necessarily ranking at the top of their provinces. Nevertheless, the economy and livelihoods of all eight targeted districts rely heavily on the agricultural sector. Therefore, their population will undoubtedly benefit from increased resilience to climate change. In summary, the validation exercise conducted by the Evaluation Team confirms the relevance to project objectives and activities of the eight selected districts.

70. Validation of the union councils' selection process was conducted by analysing the databases compiled by FAO Pakistan to perform the MCDA from secondary sources, such as the 2013 FAO and Space and Upper Atmosphere Research Commission land cover data, the Drought Hazard Index (Pakistan Meteorological Department), the 2011 and 2012 Moderate Resolution Imaging Spectroradiometer and the United Nations Satellite Centre flood data, and FAO locust monitoring data. The Evaluation Team compared and triangulated the results with the project's technical documents. However, because the project lacks proper documentation for the indicator construction methodology and the union council selection approach, the team could not replicate the analysis or properly validate its selection. In conclusion, the Evaluation Team recognizes that reliable data sources underpin the union council selection, but it needs more detailed information to complete the analysis.

71. Moreover, the Evaluation Team noticed an institutional knowledge gap. Many details on how the MCDA was designed and implemented got lost due to staff turnover and the lack of appropriate handover to colleagues, resulting in incomplete information that hinders the quality of the validation analysis. Indeed, none of the key stakeholders interviewed from the Country Office could provide any additional insights or explanations related to this process. Nevertheless, government officials and members of farmers' associations did not express any concerns or complaints. This suggests that the methodology was successful in identifying the most relevant areas.

Finding 5. Most targeted villages fit the established eligibility criteria, which have been applied flexibly, with the inclusion of some villages that do not comply with all of the requirements.

72. To select the targeted villages, FAO Pakistan held initial consultations with union council notables or government stakeholders to draft a proposed list. This was then validated through a joint review process and the selected villages profiled.

73. An analysis of the village profiling database shows that the only criterion strictly applied is the geographic location, with profiled villages being all in one of the prioritized union councils. For the others, most villages are overall aligned with those criteria that were possible to verify through available data, such as road accessibility, having at least 25 farmers sharing the same cropping system and the prevalence of vulnerable or low-income household family farmers. Nonetheless, criteria seem to have been applied in a flexible way, with the inclusion of villages that do not necessarily comply with all of the requirements (13 percent of the profiled villages have less than 25 farmers sharing the same cropping system, and 5 percent do not have road accessibility). Some of these discrepancies might be due to errors in the database, but no other source of information is available at the moment to validate them. It is too early to assess if possible village inclusion errors will have an impact on the project's effectiveness, but it is something that should be monitored throughout the next project's phase and analysed in the final project evaluation.

Finding 6. Beneficiaries enrolled in the FFS are vulnerable farmers who might benefit from increased resilience through participation in project activities. The adopted open-door policy to training requires careful monitoring to ensure that project resources are not diverted to non-beneficiaries.

74. Beneficiaries' selection relied on a broad-based community meeting to engage the entire community, including all tribes, castes and hamlets. During these meetings, project objectives, activities and criteria for participation in the CBFS and the WOS were explained. Farmers expressing interest and meeting criteria were considered. The village committee, democratically formed by participating farmers, played a consultative role in identifying potential beneficiaries. The FAO team then verified and registered the most suitable 25 farmers for each FFS group, ensuring compliance with the established criteria. While there is a list of relevant criteria to guide

the selection, no categorical approach with precise indicators or cut-off thresholds to determine eligibility is adopted.

75. The Evaluation Team compared the Baseline Household Survey indicators that best align with the targeting criteria against secondary data sources[7] to assess how beneficiaries differ from the rest of the population. They triangulated those results with findings from qualitative data collection. The analysis confirms that the project selected beneficiaries who, overall, meet the targeting criteria and, to some extent, that those beneficiaries are more relevant than the general population. To increase transparency and accountability, the team recommends converting eligibility criteria into measurable indicators and recording that information for every enrolled beneficiary.

76. Furthermore, results from interviews with key informants directly involved in the training sessions such as farmers' association members or local government officials, as well as insights from the FGDs, suggest that an open-door policy has been adopted. It also suggests that participation from non-enrolled farmers to classes is welcomed and indeed well received by beneficiaries themselves and stakeholders. Indeed, it is a common opinion among both beneficiaries and stakeholders that project coverage should be expanded, both in terms of the number of farmers enrolled and of new schools and demonstration plots opened.

77. While it is not problematic per se if more farmers attend classes, it is important to ensure that project resources are not diverted to farmers originally not eligible for the programme. This is to avoid hindering the project's effectiveness and the overall fairness and transparency of the targeting process. Careful monitoring of this aspect from the Country Office is advised, and a more comprehensive assessment of the open-door policy in terms of its impact to the project's effectiveness should be conducted in the final evaluation.

3.2 Effectiveness

78. This section aims to determine the extent to which the project achieved its objectives regarding increased awareness and resilience to climate change through the generation and transmission of climate-related data, as well as the implementation of climate-resilient agriculture and OFWM practices. The effectiveness analysis is organized by components, with Findings 8 and 9 analysing Component 1. This analysis is based on data from the Training Interim Evaluation report prepared by the MEL team of the FAO Pakistan Country Office. For a better understanding of this survey, refer to Subsection 2.3 and Appendix 12. Component 2 includes Findings 10, 11, 12 and 13, which are based on the analysis of the FGDs and their validation survey. This survey profiles participants through a short questionnaire to assess overall satisfaction with the activities and trainers, as well as attendance rates (see Appendix 10). Moreover, the FFS Learning Assessment was also analysed (see Appendix 14). Last, Finding 14 for Component 3 is based on a desk review and focuses on Subcomponent 1 as there are current limitations in measuring effectiveness for Subcomponents 2 and 3. These subcomponents have not been fully implemented, which means that we are unable to assess their effectiveness at this time. Additionally, we provide one finding that affects the whole implementation process (see Finding 7) about staff turnover.

[7] The 2019 and 2020 Social and Living Standards Measurement Survey (Pakistan Bureau of Statistics) was used to compare descriptive statistics of the treatment group from the baseline household survey.

Finding 7. High staff turnover has contributed to delays and a loss of critical institutional knowledge.

79. The implementation team has suffered from significant staff turnover during project implementation. This has created challenges in tracking certain processes, particularly from the first two years, as noted in the relevance section. Additionally, retraining new staff and the time spent searching for suitable candidates have led to further delays. According to the implementation team, the high turnover is attributed to uncertainty surrounding the project as FAO procedures require issuing annual contracts that are subject to fund availability. Delayed disbursements in the early years meant that the contracts of key staff depended on the availability of resources for the following year. The project design also relies on multiple sources of funding for some activities, including consultants, which means that certain personnel require disbursements from the GCF, as well as the Punjab and Sindh Provinces, to ensure continuity of activities. Furthermore, key personnel possess skills that make them valuable for similar projects in the region, and some have opted to join other projects in search of greater stability. It is important to note, however, that key personnel, such as the project manager, have remained consistent over the past years. This provides continuity and stability to the project despite these challenges.

Component 1

Finding 8. Satisfaction levels with the Component 1 trainings are high, and participant feedback indicates overall approval of the session length and content coverage.

80. This analysis is based on data from the Training Interim Evaluation report prepared by the MEL team of the FAO Pakistan Country Office. For a better understanding of this survey, refer to Subsection 2.3 and Appendix 12.[8] During Component 1 activities, which aim to enhance information services for climate change adaptation in the water and agriculture sectors, several training sessions were conducted for stakeholders from various institutions, including the Punjab and Sindh Provincial Departments of Irrigation, Water Management and Agriculture. These trainings focused on effectively utilizing climate data services and covered topics such as climate information and crop productivity models, field data collection for crop type mapping, and FFS training modules on soil salinity and groundwater measurements. Additional sessions addressed crop type mapping, the water module for OFWM and agriculture extension staff, and groundwater modelling conducted by various universities. Further trainings included monitoring evapotranspiration with the PyWaPOR, a one-day KoboToolbox Field Survey workshop, and multiple Water Accounting sessions from 2022 to early 2024. Lastly, a course on satellite remote sensing for estimating evapotranspiration was also offered, covering key hydrology concepts.

81. Participants in Component 1 were consulted about the helpfulness, duration and clarity of the trainings, as well as their confidence in applying the knowledge gained. Almost all participants who responded to the post-training survey rated the training as very helpful, with the majority expressing strong agreement. In terms of duration, most respondents found the length of the training to be appropriate, while a small minority felt it was too short. This suggests that it was a generally adequate session length for most attendees. Additionally, almost all agreed that the presenter clearly outlined the training objectives, and a large majority felt the time allocated to presentations was sufficient. Almost all found exercise sessions valuable for enhancing practical knowledge, and most felt confident in their ability to apply the knowledge gained. Overall, while satisfaction with Component 1 trainings remains high, these results indicate that only a few

[8] Since the response rate was approximately 50 percent, data are treated as illustrative rather than relied upon for statistical inference. This is because any derived estimates would be highly approximate without knowledge of how the non-responding participants' results might have influenced the findings.

expressed concerns about duration – suggesting that minimal adjustments may be needed for future sessions.

Finding 9. The training increased knowledge scores among many participants, but these gains appear to have fallen below the target set in the project logframe. Further, less than half of the training survey respondents report applying the knowledge gained in their professional work.

82. The trainings were conducted from 2022 to early 2024, while the survey took place between June and July 2024. Trainings covered topics such as: the AquaCrop model; field data collection tools for crop type mapping; soil salinity measurement instruments and groundwater depth techniques; geospatial or geographic information system applications for crop type mapping; water management (OFWM, FFS) module tools; groundwater modelling software; the PyWaPOR platform; the KoboToolbox for mobile data collection, water accounting frameworks or tools; and satellite remote sensing tools for evapotranspiration and basic hydrology. Therefore, the time elapsed since the trainings varied for each participant, depending on when they attended.

83. Across all trainings, the overall improvement rate indicates that most training survey respondents achieved higher scores in the interim survey than the pre-survey. However, this improvement falls short of the target outlined in the project's logframe, signalling a need for further enhancement in training effectiveness. Additionally, fewer than half of the training survey respondents reported applying their acquired knowledge and skills in their professional roles. This suggests that many participants still face challenges in putting their training into practice. For those who do adopt the practices, the average frequency of use is between "sometimes" and "often". When accounting for non-adopters, the overall average frequency of use shifts to "rarely" indicating that, on average, training survey respondents apply these practices infrequently.

84. Factors contributing to the shortfall in improvement and adoption rates include the considerable time gap for some training sessions conducted two years ago, which may have hindered participants' retention of knowledge. However, it is also possible that participants initially applied and adopted the knowledge from the trainings but later abandoned its use. To better understand the evolution of knowledge application over time, we encourage implementation and monitoring, and that the Evaluation Team continue to apply this kind of exercise and develop a system for follow-up surveys at various intervals after the trainings. This would provide valuable insights into how knowledge use may change over time.

85. Additionally, some participants entered the training with pre-existing knowledge or expertise, limiting their potential for further improvement. In summary, while the majority of participants experienced an improvement in their knowledge, the lower-than-expected improvement and adoption rates indicate areas that require further attention, such as training duration. Some participants suggest that due to the complexity of the topics, the trainings should be longer and that participant engagement may be hindered over time. Therefore, reinforcement strategies should be established to maintain participant engagement as this necessitates ongoing support to enhance knowledge retention and application.

Component 2

Finding 10. The project beneficiaries report the adoption of climate-resilient agriculture and OFWM practices being associated with reduced expenditures and increased income.

86. Beneficiaries reported improvements in farming skills and the adoption of climate-resilient agriculture and OFWM practices. One participant shared: "Yes, there has been an increase in capabilities. New methods have been implemented, such as sowing wheat on beds, which saves water and reduces fertilizer costs. They have provided seeds that withstand climate change."

Another noted the benefits of laser levelling, saying: "This project has enhanced our capacity to face climate change. Previously, we did not prepare the land properly. Now, we prepare the land thoroughly, use laser levelling and cultivate on raised beds." Multicropping strategies like planting raya or oat around wheat were reported to reduce pest impacts and input costs, while the shift to organic fertilizers was said to "reduce expenses and increase income, as we now prepare fertilizer ourselves." Moreover, women farmers reported that vegetable production increased enough to satisfy both household consumption and selling the surplus in the market to generate an additional income source. None of the interviewed beneficiaries expressed any complaint related to the activities implemented, but they suggested that the provision of additional agricultural inputs such as high-quality seeds or tools will further increase their productivity. They also suggested other possible climate-resilient agriculture and OFWM practices to be adopted, such as the release of birds as a pest control mechanism. The project has already incorporated practices such as biological control, using beneficial insects to manage pests by installing cards that contain the eggs of the required insects. They also suggested the use of sprinkler irrigators. Finally, women farmers pointed out that additional support in terms of the provision of internet connectivity and mobile phones or tablets are key for their business growth as it allows them to expand their pool of clients.

87. Quantitative results from the 2023 Farmers' Learning Assessment show that Sindh beneficiaries report: 48 percent increased yields versus 18 percent in Punjab; 81 percent improved household food access compared to 68 percent; 61 percent gained productive assets against 37 percent; 77 percent reduced pesticide use versus 35 percent; and 55 percent accessed agricultural information and climate forecasting versus only 5 percent in Punjab. These differences reinforce the focus group testimonies on lower costs and higher income. In the 2024 survey, fewer outcome options were offered, and nearly every participant in both provinces reported experiencing all of the listed benefits (see Appendix 14).

Finding 11. The FFS initiatives are associated with enhanced climate change awareness, improved farming practices and strengthened on-farm resilience during extreme weather.

88. Existing evidence from previous projects in Pakistan and other countries with similar climatic conditions shows the efficacy of climate-resilient agriculture and OFWM practices to increase farmers' resilience. This is done by mitigating the negative effects of climate change, namely water shortage and the depletion of natural resources like groundwater and soil, increasing yields and crop production and improving food security (Laghari *et al.*, 2012; Abid, Schneider and Scheffran 2016; Ali and Erenstein, 2017; Jamil *et al.*, 2021; Sikka *et al.*, 2022; Zong *et al.*, 2022). Moreover, extension services and awareness outreach are critical factors for the effective adoption of climate-resilient agriculture and OFWM practices, especially to increase women's participation (Belay *et al.*, 2017; Jiri *et al.*, 2017; Acevedo *et al.*, 2020; Etana *et al.*, 2021; Thinda *et al.*, 2021; Patro *et al.*, 2022).

89. The FGDs consistently revealed that the FFS initiatives were effective in raising awareness about climate change and equipping participants with practical skills to mitigate its impacts. Farmers learned how to adapt agricultural practices across the crop life cycle, particularly in reducing costs and improving productivity. One male participant noted: "Yes indeed, this FFS has succeeded in achieving its goals. We have become aware of approaches and tools, our expenses have decreased and our production has increased." Another participant emphasized how the FFS curriculum covered crucial agricultural practices: "Members of the FAO team informed us about climate change and how to mitigate its effects. They provided information about seeds, including how much to use and how to avoid water wastage, how to properly use chemical and indigenous fertilizers, and when and how much to apply." These insights suggest that the FFS provided a

holistic and practical approach to agricultural resilience, integrating both modern and traditional techniques to better equip farmers in the face of changing climate conditions.

90. The FFS programme helped farmers to adopt more climate-resilient practices, particularly in reducing their reliance on chemical inputs and learning how to manage the effects of extreme weather. Participants emphasized the transition to using indigenous pesticides and making compost from crop residues and animal excrement, which is a more sustainable and cost-effective approach. One male FGD participant noted: "As a result of the training provided by the FFS, our household is now better equipped to withstand the adverse effects of climate change. In case of rain, we tie our ready crops and keep them elevated to minimize damage." Farmers also benefited from new technological tools, such as the Plant Test application, which allows them to predict weather patterns. Another participant stated: "Thanks to FAO, we can now predict the weather in advance. This allows us to know when it will rain and how to care for our crops." These findings underscore the effectiveness of the FFS in promoting both traditional and modern techniques to mitigate climate risks. This helps farmers better prepare for and respond to environmental challenges.

91. Data from the 2023 Farmers' Learning Assessment indicate that the overall adoption of climate-resilient agriculture and OFWM practices was high but unevenly distributed. Province-wide, 94 percent of Punjab farmers and 100 percent of Sindh farmers reported adopting at least one recommended practice. In districts such as Khanewal, Lodhran, Multan, Muzaffargarh, Badin, Sanghar and Umerkot, every farmer (100 percent) had implemented at least one practice. In contrast, Dera Ghazi Khan lagged behind: only 74 percent of the surveyed farmers had adopted any climate-resilient agriculture or OFWM technique, leaving 26 percent who had not yet put new methods into use.

92. In 2024, the adoption of at least one practice became virtually universal across all districts: Dera Ghazi Khan increased to full uptake (0 percent non-adopters) and only 1 percent of Khanewal respondents reported zero adoption. The percentage of practices adopted on average by farmers also increased: in Punjab this climbed from 20.9 percent (2023) to 37.6 percent (2024), while Sindh held steady at approximately 22 to 23 percent. This confirms that nearly every farmer had implemented at least one FFS practice by the second round. These gains indicate that, by 2024, the FFS training effectively encouraged almost all participants to apply new practices, with Punjab showing the most rapid expansion.

93. In 2023, just over half of all respondents (54 percent) reported that, when faced with extreme weather, they had applied at least one FFS-taught practice: 69 percent of Sindh farmers versus 41 percent in Punjab. By 2024, 35 percent of all farmers had experienced extreme weather (50 percent in Punjab and 14 percent in Sindh). Of those exposed, nearly all Punjab farmers (95 percent) used their FFS training to mitigate impacts, while no Sindh farmers in that subgroup reported applying techniques. Overall, 80 percent of all farmers who experienced extremes in 2024 drew on the FFS methods.

Finding 12. The WOS initiatives empowered female farmers with skills in kitchen gardening, livestock management and household hygiene.

94. The WOS initiatives were particularly effective in empowering female farmers by providing targeted trainings in kitchen gardening, livestock management and maintaining hygienic households. Female FGD participants reported that they acquired skills in not only agricultural production but also value-added activities such as preparing and selling by-products. One female participant shared: "We learned about the preparation of by-products such as pickles and preparing and selling milk and its by-products. We learned how to prepare neem spray,

established our own kitchen gardens and utilized home-produced vegetables." Additionally, women gained knowledge on livestock care and disease prevention with another participant stating: "We learned from school that we should clean livestock areas and apply chemicals to kill pests as this reduces the chances of livestock diseases." The emphasis on practical skills, such as shed management and pest control, helped female participants improve their agricultural productivity and the health of their families. The WOS has significantly enhanced their capacity to cope with climate change and contributed to better livelihoods.

Finding 13. Low attendance rates were observed in Khanewal, Lodhran and Umerkot.

95. A willingness to participate in all the sessions for the whole duration of the CBFS or the WOS training module is one of the eligibility criteria. Results from the FGD validation survey show that among respondents who already completed all of the sessions, most CBFS beneficiaries and a large majority of WOS beneficiaries attended classes once a week or more. This aligned with the project's requirement. In contrast, attendance was notably lower among those who had not yet finished all of the sessions. In fact, only some CBFS beneficiaries and a smaller proportion of WOS beneficiaries attended weekly.

96. Issues with low attendance seem related to the place of implementation, rather than the specific activity. Indeed, in Dera Ghazi Khan, Multan, Muzaffargarh, Badin and Sanghar, nearly all beneficiaries of the CBFS and the WOS attended at least once a week. In contrast, respondents in Khanewal and Umerkot[9] typically attended only quarterly, and those in Lodhran attended rarely (around once per year). These results suggest that the project might have encountered some implementation issues in Khanewal, Lodhran and Umerkot. It is important to highlight that these results are self-reported by beneficiaries. These are not representative of the entire district, but only apply to the villages visited during the qualitative data collection. Nevertheless, a more in-depth review of the status of activities and the attendance rate in these three areas is suggested. This would utilize the information available in the FFS Record Book, which still needs to be digitalized.

97. Evidence from the learning assessment (see Appendix 14) further underscores the link between regular attendance and positive training outcomes. In Sindh, Spearman's rank-order correlation between class intensity and participant satisfaction rose from 0.1967 in 2023 to 0.3397 in 2024. This indicates that farmers who attend more sessions consistently reported higher satisfaction levels – an association that strengthened over time. In contrast, Punjab's correlation remained weakly negative (-0.1073 in 2023 and -0.1179 in 2024). This reinforces the need to closely monitor attendance rates.

Component 3

Finding 14. The awareness-raising campaigns are progressing well, but outreach may fall short of the targets outlined in the logical framework.

98. According to the annual reports, this activity faced delays in initiating the letter of agreement with government organizations due to the frequent transfer and posting of competent authorities and political instability. However, the project has launched a comprehensive multimedia campaign in partnership with the Pakistan Broadcasting Corporation. This utilizes various media tools, including radio, telephone messages and direct communication methods. The campaign broadcasted 52 radio programmes and developed 11 instructional videos on key climate-resilient agriculture techniques across Punjab and Sindh. To enhance outreach, an SMS and robocalls

[9] Only WOS information was collected for Umerkot.

campaign is being prepared to provide farmers with timely information on climate-resilient agriculture and OFWM practices. From 28 February to 30 June 2024, listenership data revealed a total of 5 065 654 radio listeners in Punjab and Sindh, with 3 712 709 in Punjab and 1 353 844 in Sindh, comprising 2 989 266 males and 2 076 388 females. The campaign also generated significant social media engagement, totalling 414 223 responses.

99. According to the logical framework (see Appendix 2), the project aims to reach about 10 million farmers through awareness-raising campaigns, with the expectation that around 10 percent will adopt at least one promoted climate-resilient agriculture and OFWM practice. This equates to approximately 1 million farmers. It is important to note that this figure (10 percent adoption rate) may be optimistic. Evidence suggests that adoption rates for radio campaigns can vary significantly depending on the type of practices promoted. Some experience considerable improvements, while others may show little to no effect based on the difficulty of adoption (Agwu, Ekwueme and Anyanwu, 2008). In addition, listener data indicates limitations in reach through radio alone. The total number of listeners does not necessarily represent unique individuals each month. This suggests that the effective listener count may be significantly lower. Additionally, not all listeners are farmers. The project may struggle to meet its target of 1 million adopters through radio campaigns alone. It is crucial to expedite the use of SMS (Silvestri *et al.*, 2021) or other strategies such as smartphone applications, which have demonstrated better adoption rates (Giulivi *et al.*, 2023). This mitigates the risk of not achieving the target.

3.3 Efficiency

100. This section aims to address the following questions: To what extent does the project deliver, or is likely to deliver, results in an economic and timely manner? How effectively have resources been optimized to maximize the impact of expenditures on climate adaptation outcomes? Using the most recent financial data from the annual financial reports, the Evaluation Team conducted a financial analysis. Appendix 11 includes definitions, tables and figures regarding this analysis, while the key results are presented here.

Finding 15. The release of co-financing funds has been delayed due to administrative issues and changes in prioritization resulting from environmental challenges such as floods. While agreements have been signed and partial funds released, floods and government restrictions have slowed progress.

101. The implementation of the project has primarily relied on the GCF financing due to significant delays and challenges in the co-financing process. Initially, in 2020 and 2021, the approval of Planning Commission Form 1 of Sindh and Punjab and the finalization of co-financing commitments were hindered by lengthy administrative procedures and coordination issues within the governments of Punjab and Sindh. Although the government of Sindh signed the Unilateral Trust Fund agreement in 2021, committing USD 4.70 million, the release of funds was delayed with the first tranche not expected until early 2022. Similarly, the government of Punjab faced delays with the signing of the Unilateral Trust Fund agreement postponed until 2023. As indicated in Appendix table 10, the project did not receive any funds in 2021.

102. In 2022, the situation worsened due to severe monsoon floods in Sindh, which redirected funds towards emergency relief efforts. This resulted in only partial disbursement of the allocated co-financing. Punjab also experienced delays, despite the eventual approval of the Planning Commission Form 1 by the federal government.

103. By 2023 and 2024, continued communication and negotiations with the relevant authorities led to some payments in both provinces, along with one additional payment from the GCF in 2023. However, as of 2024, significant amounts remain unpaid (see Appendix table 10) with 67 percent

of the expected total (approximately USD 27.3 million) still outstanding. Notably, 79 percent of the planned co-financing for Punjab and 81 percent for Sindh remain unpaid.

Finding 16. The project suffered from both financial restrictions and the underutilization of available resources, especially under Component 3.

104. According to the most recent financial annual report, by the end of 2024, the accumulated expenditure of the project reached a total of USD 10 875 224, of which USD 2 575 989 (23.69 percent) came from co-financing. The total expenditure shows a significant delay (see Table 4) compared to the approved budget, with only 23.69 percent of the approved budget spent by 2024. When broken down by components, there are substantial variations in the level of resource utilization compared to the budget. Among the components, the third has the lowest realization rate (6.47 percent), while Component 1 has the highest (29.44 percent). Overall, the management costs of the project had the highest resource usage but remained lower than expected (48 percent budget realization rate).

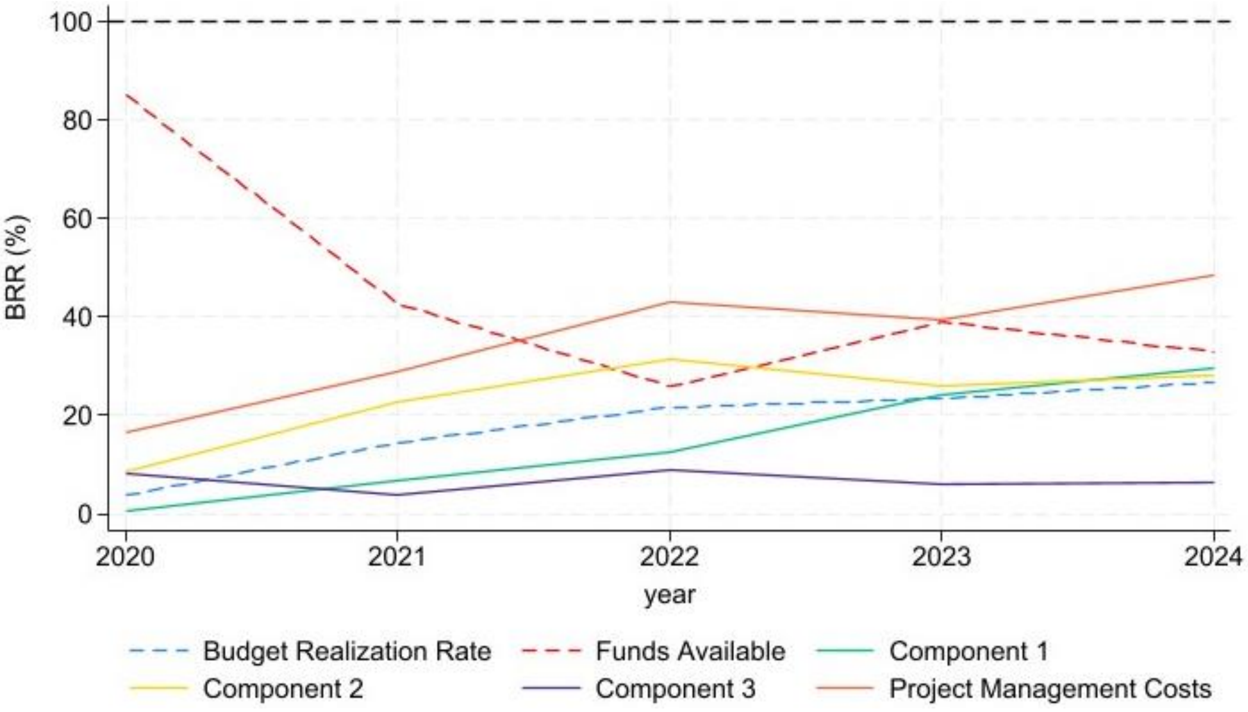
Table 4. Budget realization rate by component (until 2024)

Components	**Budget realization rate percent**
Component 1	29.44%
Component 2	28.04%
Component 3	6.47%
Project management costs	48.46%

Source: Authors' calculations based on financial annual reports from 2020 to 2024.

105. The project’s overall budget realization rate remained around 20 percent throughout the entire period from 2020 to 2024 (see Figure 3, blue dashed line). This trend is mainly explained by the lower-than-expected amount of resources received by the project. In Figure 3, we can see that in 2020, 2021 and 2022, almost all of the project's activities were financed by the first GCF disbursement in 2020, which covered 85 percent of the expected expenditure for that year (red dashed line). The red dashed line represents the actual funds received as a percentage of the expected budget.

Figure 3. Budget realization rate total and by component



Note: BRR stands for budget realization rate.

Source: Authors' calculations based on financial annual reports from 2020 to 2024.

106. The analysis of the available funds shows an overall project utilization rate of 81.02 percent as of 2024 (see Appendix figure 3). Hence, the project underutilized the already scarce available resources. This suggests some issues with the implementation of activities beyond the lack of sufficient resources. According to interviews with the project team, the uncertainty around the availability of funds for the following year made them more cautious in their spending. The maximum utilization rate of the available resources reached 83.4 percent in 2022 but decreased after a disbursement of USD 6.4 million in 2023 from the GCF. However, each component was different from the others. In Component 1, the utilization rate increased year by year. In 2024, all components except Component 3, including project management costs, experienced an increase in utilization rates. Component 3 consistently underperformed compared to the other components, with a utilization rate below 10 percent throughout the entire period. This can be explained by the fact that Subcomponent 3.1 accounts for approximately 62 percent of the total budget for Component 3. However, according to the 2023 Annual Performance Report, there had been delays in initiating the letter of agreement with government organizations until 2023. This was largely due to frequent transfers and postings of competent authorities, as well as political instability.

Finding 17. The analysis of project management costs highlights a budget realization rate of 48.46 percent. We observe significant differences between expected and actual expenditures, with the project management cost ratio for direct services[10] expenditure exceeding expectations. Although

[10] This includes expenditures such as: agricultural inputs; agrometeorological stations; awareness activities; curricula and knowledge products; equipment for the FFS and demonstration farms; field days and demonstration plots activities; printing materials; water accounting; groundwater monitoring; hydrological activities; trainings; analyses and studies; and contracts to build district-level capacity. Non-

financial oversight and alignment with expected expenditures improved over time, by 2024, the administrative costs remained significantly higher than expected due to a slow start in operational activities. Better resource allocation towards direct services will be essential to meet the project's goals efficiently.

107. The analysis of project management costs is essential, particularly given the realization rate of 48.46 percent of the expected budget expenditure, which stands as the highest among all project components. This realization rate prompts a closer examination of how funds were allocated and spent across different categories – start up, management and operation – to ensure that resources were used efficiently and in alignment with the project's goals.

108. Appendix 11 figure 4 illustrates notable differences between expected and actual expenditures from 2020 to 2024. A significant shift is observed after 2022. Operation costs were notably higher. Start-up costs, although decreasing in relevance since 2022, remained significant throughout the period. There was a slow start in operational activities, so the budget allocated for operation and management activities in 2020 was completely unutilized. This resulted in all expenditures being directed towards kick-off budget items. In the following years, increased expenditure on operational activities gradually aligned the actual expenditures more closely with the expected budget. However, when we compare this with the initial forecasts at the programme's inception, management costs have remained relatively low – even though they are higher when comparing between components.

109. The assessment of administrative costs per amount expended on direct services to beneficiaries reveals insights into how project funds were utilized. In particular, this concerns activities directly benefiting the project's beneficiaries. Notably, while the project management costs accounted for a proportion of expenditures higher than the other components of the project, the funds allocated for beneficiary-related activities have been significantly underutilized. Appendix table 11. Ccompares the expended and expected administrative costs associated with beneficiary-related activities from 2020 to 2024. In 2020, there was a marked discrepancy where expended costs far exceeded expectations. This was due to delays in the implementation of activities that directly impacted beneficiaries. However, in subsequent years, the gap between expended and expected costs narrowed. This reflected an increase in the implementation of beneficiary-related activities and partially addressing the effects of the project's slow start. Currently, the implementation team is optimistic about how project implementation has improved, as we can observe through the KIIs. One member of the project implementation team from the inception phase recognizes: "In my opinion, initially, there were a lot of problems, and progress was very slow. Some issues were related to co-financing, and other things were unclear. But now it has picked up. If we look back six months, there probably weren't many achievements. The project was quite lagging behind. But now it's on track."

Finding 18. The cost per beneficiary has fluctuated, with significant high costs in 2020, 2022 and 2023. This was largely due to the inclusion of an input transfer component to the project (Agripackage). Excluding this package, the average cost per beneficiary remains above the original plan. However, the simulated project cost is lower than initially projected. This suggests that the project may achieve its goal of 200 000 households without additional costs.

110. Regarding the implementation of the project, a target of 200 000 households was established. By 2024, a total of 62 618 households had benefited from the project. Among these, 27 645 households received an agricultural input package known as the Agripackage, which was not part

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direct service items included costs such as drivers, daily subsistence allowance, furniture, office maintenance, staff salaries and stationery.

of the original project plan but was incorporated in 2020 in response to a request from the government following the 2020 floods. This addition was made possible through the use of Article 6.01 of the Funded Activity Agreement, which permits reallocating funds among budget components for variations of less than 10 percent of the original budget. The total cost per beneficiary up to 2024 was USD 163.72 (see Appendix table 12). This reflects a better performance compared to the originally anticipated cost of USD 238.4 per beneficiary on average and suggests economies of scale during the last two years of implementation.

111. However, since the Agripackage was a temporary measure and not part of the original project, the total cost per beneficiary, considering only those involved in the original project activities, could serve as a ceiling for the real cost per beneficiary averaging USD 293.14 – higher than the planned amount. This figure includes additional costs associated with implementing the Agripackage, which have not been separately itemized. This makes it an unreliable basis to assess the project's efficiency in carrying out its planned activities.

112. As suggested by other financial indicators, the project's performance was highly variable throughout its implementation. There was a high cost per beneficiary in 2020, 2022 and 2023 (see Appendix figure 4) but a lower cost per beneficiary in 2021 and 2024. This was mainly due to the implementation of the Agripackage, which was largely carried out in 2021. We exclude the years 2021 and 2022, when the Agripackage was provided to beneficiaries, in order to obtain a realistic average cost for the activities initially included in the GCF project. In doing so, we find that the average cost per beneficiary ranged from USD 144.29 in 2024 to USD 282.6 in 2023. This involves values before 2024 that are above the originally planned cost per beneficiary, indicating additional expenditures beyond what was initially budgeted for each specific activity. This increase can also be attributed to inflation, which will be further discussed in the next finding. Additionally, insights from the project participant KIIs revealed significant challenges in the procurement process. The bids received frequently surpassed budget limits or, in some cases, yielded no responses for the needed items. Despite obtaining quotations prior to launching the tenders, the actual bids turned out to be substantially higher than expected. This led to a refinement of the specifications and scope of work to align with the available budget.

113. However, using the USD 238.45 per beneficiary figure and considering that, by 2024, the total number of beneficiaries was 62 618, the estimated total cost of USD 43 011 280 versus the original projection of USD 47 690 763 reflects a saving of 9.8 percent due to a more efficient use of resources since 2024. This saving suggests that the project is on track to meet its target of 200 000 households without additional costs.

Finding 19. The devaluation of the Pakistan rupee against the United States dollar affects the project's implementation by increasing the co-financing burden on the provincial government and exacerbating inflation in agricultural inputs. This inflation impacts both the project's operational costs and the ability of farmers to adopt the promoted practices.

114. With future disbursements expected from the GCF in the United States dollar, and co-financing from the Punjab and Sindh Provinces, the exchange rate fluctuation could be beneficial as the stronger United States dollar relative to the Pakistan rupee provides more local currency for the same amount of United States dollar. This potentially increases the project's purchasing power. However, it is important to account for two key factors that could erode this benefit.

115. *Government co-financing in the United States dollar:* the Punjab and Sindh governments must convert the Pakistan rupee into the United States dollar in order to meet their co-financing obligations. Given the depreciation of the Pakistan rupee, this conversion has become significantly more costly for them and has led to challenges in fulfilling their commitments. The second

disbursement from the GCF had already been delayed until 2023 due to the governments' inability to meet their financial obligations.

116. *Local inflation on project costs:* while the stronger United States dollar might boost the purchasing power of the GCF funds, inflation on key local goods such as agricultural inputs and livestock can counterbalance this advantage. In some cases, the inflation rate for these specific items may exceed the appreciation of the United States dollar. This reduces the overall benefit derived from the favourable exchange rate. Moreover, this is particularly concerning as the project requires purchasing many local products, which have been subject to significant inflation. The implementation team emphasized the significant impact of high inflation in Pakistan since 2020 on the GCF project's targeted outcomes and operational costs. This inflation has limited smallholder farmers' ability to adopt beneficial practices, including climate-resilient agriculture and OFWM. The prices of fertilizers, particularly urea and diammonium phosphate, have surged due to the Pakistan rupee devaluation and supply chain disruptions. This strains farmers cultivating high-nutrient crops like wheat and cotton. Similarly, the cost of high-quality seeds for climate-resilient crops has risen. This makes it challenging for farmers to sustain production and adopt advanced agricultural practices. Increased fuel costs have affected all stages of agricultural production, further raising overall expenses. Input costs for prioritized crops, including wheat, rice, cotton and high-value vegetables, have escalated. This strains profitability as market prices have not sufficiently offset rising production costs. In the poultry sector, input costs for feed have soared. This negatively impacts market prices and profitability for producers. Additionally, the rising costs of agricultural machinery complicate investments for smallholder farmers who often rely on shared or rented equipment. These economic challenges have hindered the implementation and adoption of effective agricultural practices, undermining the project's goals.

117. Using price index data from the Pakistan Bureau of Statistics, we observed (see Appendix table 13) significant increases in the prices of the three prioritized crops – rice, wheat and sugarcane – between 2020 and 2024. Some alternative crops, such as sorghum in 2020 and oilseeds like groundnut, sunflower, soybean, safflower and sesame in 2021 and 2022, and more recently pulses in 2024, experienced even greater price hikes. This trend was particularly notable from 2020 to 2022. However, in 2023 and into 2024, the price increases for rice and sugarcane began to align more closely with those of pulses. Wheat, in particular, saw a sharp rise in 2022 and 2023, with prices nearly tripling from the December 2019 level by the end of 2023, before decreasing in 2024. In the initial years of project implementation, the steeper price increases for alternative crops like sorghum and oilseeds made them more attractive to farmers, potentially threatening the adoption of the project's promoted practices. However, the recent surges in prices for sugarcane and rice suggest that this risk has diminished.

118. Regarding inputs, the most significant changes were seen in fertilizer and transport costs, aligning with concerns raised by the implementation team. These rising costs could pose challenges to the project, and further analysis is needed to mitigate future impacts. While specific price changes for rice and wheat seeds were difficult to confirm, cottonseed prices increased by 64 percent since 2019, which is notably lower than the general inflation rate during the same period (from December 2019 to December 2024, national inflation reached 104 percent).

Finding 20. Adaptive management based on lessons learned improved project implementation.

119. Most respondents believe that lessons learned during project implementation were effectively used to adaptively manage the project, enhancing both implementation and decision-making processes. However, it is important to note that district-level respondents often referred to specific activities they were involved in such as capacity building trainings, the FFS or demonstration plots when discussing the project. Additionally, "don't know" responses were

primarily reported by individuals from the Agriculture Extension Department, the Pakistan Meteorological Department and the Sindh Rural Support Organization.

120. The project has demonstrated a strong capacity to adapt to various circumstances, as evidenced by several KIIs from the project team. One noted: "During the project's formulation, we had an assumption that the government would contribute 25 percent and that for every dollar we invested we would receive three dollars. This assumption turned out to be incorrect, highlighting a risk we didn't fully understand." This realization prompted the team to adjust plans in response to unforeseen financial dynamics.

121. Additionally, the complexities of coordinating with multiple stakeholders were acknowledged by a former FAO Pakistan member: "The project involves numerous partners and stakeholders, each with their own interests and active participation." The involvement of various government departments, each with its own dynamics, required ongoing adaptations in strategy to maintain alignment and progress.

122. The procurement process initially faced significant challenges, with one KII stating: "In the first year and a half, we faced a lot of problems in the procurement. We launched tenders and sometimes the price they are getting on the bids go beyond, far beyond our budget lines" (FAO implementation team member). However, after this initial period, the project successfully adapted its procurement strategies. This led to a refinement of the specifications and scope of work to mitigate these issues. As a result, the procurement process became more streamlined, significantly reducing the occurrence of similar problems in subsequent phases.

123. Moreover, the project's response to changing external conditions was evident when it was noted that: "When it comes to the impact of floods, many development agencies in Pakistan ... shifted their focus"(former FAO Pakistan member). This presented challenges for the project. Regardless, the team conducted emergency operations, namely Agripackage, in the same districts where they were active. This approach showcased their ability to pivot and address immediate needs while aligning with the priorities of other agencies, all without losing focus on the project's core objectives.

124. The team's willingness to reassess and adapt training materials is another testament to their flexibility, particularly given the substantial time invested in the project's design phase. Despite this initial planning, certain software included in the design became obsolete over time, as noted by a KII respondent: "We found that software is not anymore used by anyone and it became really not relevant" (FAO implementation team specialist). This led to adjustments in training content and methods. Further, this ongoing evaluation and adaptation process ensures that the project remains relevant and effective in addressing the needs of local communities.

125. Additionally, the team faced challenges with specific instruments intended for installation in the project, as described by a FAO implementation team specialist: "We did a tender and basically no one could install this instrument in Pakistan, so we had to cancel it." This adaptability was further demonstrated as they sought alternative solutions: "We found instruments that do a similar function and requested approval in the Project Oversight Committee (POC) meeting, and then GCF." This allowed them to replace cancelled installations with different materials or infrastructure. They also provided training on newly identified software topics to ensure that the training remained pertinent and beneficial.

3.4 Coherence

126. This section presents findings on the alignment of the project with other climate financing mechanisms and the extent to which the project contributes to creating synergies with other existing initiatives, rather than parallel systems.

Finding 21. While there was no mention of any conflicting objective with other initiatives in the country, it is a common perception that collaboration could be improved – especially with local government authorities. However, the FAO implementation team highlights the risk of increasing transaction costs, with greater harmonization potentially leading to counterproductive and lengthier processes.

127. From interviews with government officials, farmers' association members and the project implementation team, it emerges that there are many governmental and non-governmental actors working in the same sector of the project. While no one mentioned any conflicting objectives with any of these initiatives, it is a common perception that collaboration could be improved – especially with local government authorities. A recurrent comment across the Departments of Livestock, Irrigation and Agriculture Extension services of the eight districts is that coordination with local government teams should be enhanced. In particular, many local government officers mentioned that no specific tasks were assigned to them by FAO, and their involvement in the project is mostly driven by their own initiative to visit the FFS and participate in trainings. Moreover, stakeholders believe that a more active role from local government staff will improve implementation since government officials have an extensive knowledge of their farmers' communities, as well as ensure project sustainability.

128. In contrast, a member of the FAO project implementation team pointed out that there is a "transaction cost" in coordination, and perfect harmonization will result in lengthy negotiation processes that are sometimes counterproductive. Nevertheless, there are positive examples of constructive collaboration with other initiatives, such as the World Bank's Sindh Water and Agriculture Transformation project. The FAO implementation team confirmed that coordination meetings were organized, and FAO offered the World Bank use of the ACWA Portal and the training material prepared for the CBFS under the GCF project.

129. Moreover, none of the interviewed key stakeholders expressed any concerns regarding the project's contribution to the creation of parallel systems. On the contrary, the project's attempt to coordinate different authorities working in water management has been defined as unprecedented and highly appreciated.

130. Finally, a desk review conducted by the Evaluation Team confirms the project's alignment with other climate financing mechanisms and actors working in Pakistan in climate change adaptation and mitigation, such as the Asian Development Bank, the Global Environment Facility, the United States Agency for International Development and the World Bank. A review of their project portfolio highlights the complementarity of this intervention with their strategic vision and objectives. Indeed, all of these different actors have a common focus on climate-resilient agriculture and sustainable and efficient water management. However, each intervention addresses it at different levels or in different provinces, including support for policy formulation, infrastructure development, data collection and monitoring for evidence-based policymaking and capacity building. This therefore favours an integrated and comprehensive approach. While these different actors do not necessarily work together on a daily basis, the FAO implementation team confirmed that a comprehensive review of active projects was conducted prior to project formulation in order to avoid duplication. Moreover, the GCF stakeholders confirm that, as a specialized agency, FAO's contribution and its critical role in promoting "scientific approaches

adapted to local contexts and knowledge" complements other actors that focus more on farmers' access to the market and market insurance.

3.5 Gender equity and social cohesion

131. This section examines the extent to which the project ensures equal participation and the extent to which climate change impacts are differentiated by gender or other markers of difference.

Finding 22. The project successfully incorporated equal access to participation into its design and project activities.

132. All participants in the FGDs agree that the project ensured equal opportunities by including different social groups without discrimination. Moreover, they highlighted that the project included an awareness-raising component to promote equal rights and treatment for everyone, despite their gender, ethnic, religious or sexual orientation. In these awareness-raising sessions, specific emphasis was placed on the importance of fair wage payment for both male and female workers.

133. The implementation lead for Component 1 explained that to ensure gender equity, whenever invitations to capacity building are sent out to the government, it is clearly specified that at least one participant from the allocated spots should be a female.

134. For Component 2, the fact that the project has specific FFS initiatives dedicated to women indicates great attention to ensure equal access and participation within the social and cultural norms of Pakistan. This has been highly appreciated by interviewed stakeholders, many of whom positively remarked on the livelihoods and income generation possibilities opened up by the new practices learned in the trainings.

Finding 23. The current share of female beneficiaries enrolled (28 percent) still falls behind the established target (49 percent). Uncertainty remains regarding the methodology adopted to count the number of female beneficiaries.

135. The project has specifically set a 49 percent female direct beneficiaries' target. However, data from 2024 report a female enrolment ratio at 28 percent, which falls considerably short of the interim target. Greater efforts to promote the inclusion of more women in the project in the coming years should be prioritized, together with an assessment of potentially overlooked gender-specific barriers that prevent female direct participation or an evidence-based revision of the initial target if not realistically achievable.

136. Additionally, the Evaluation Team identified a possible source of bias in the methodology adopted to count the number of direct beneficiaries, and hence female beneficiaries' ratio (see Appendix 8). The current monitoring system counts the number of direct beneficiaries with the following method.

137. *Male direct beneficiaries:* by assuming that each FFS enrols 25 farmers, the total number of FFS initiatives established each year is multiplied by 25 to get the total number of male beneficiaries enrolled. This number is then multiplied by the average household size of 6.5 to get the estimate of the total number of male beneficiaries reached.

138. *Female direct beneficiaries:* by assuming that each WOS enrols 30 women, the total number of WOS initiatives established each year is multiplied by 30 to get the total number of female beneficiaries enrolled. This number is then multiplied by the average household size of 6.5 to get the estimate of the total number of female beneficiaries reached.

139. Besides relying on a series of assumptions that might not hold in reality, such as the average household size and the number of beneficiaries enrolled in each school, the main issue of this method is that all the household members of male beneficiaries are counted as males and all the household members of female beneficiaries are counted as female. This way of counting beneficiaries does not reflect a realistic household composition and will likely produce misleading statistics. The Evaluation Team suggests collecting basic household-level information for each beneficiary enrolled, such as household size and number of male and female members, to ensure an accurate estimation of the total direct beneficiaries and the female ratio achieved.

3.6 Country ownership

140. This section examines the alignment of the project with existing national policies, climate strategies and the country's capacity to implement its objectives effectively. It explores how well the project reflects country ownership through its governance, coordination and consultation mechanisms. It also assesses the involvement of national stakeholders and the extent to which consultations have informed project design and execution.

Finding 24. There is a strong perception of project alignment with national policies and climate strategies.

141. Approximately four-fifths of KII respondents, particularly at the district level, believe the project is well-aligned with national policies, climate strategies and the country's capacity to implement these frameworks (see Table 5). This demonstrates a strong perception of coherence between the project’s objectives and the national agenda, particularly in addressing climate-related challenges.

142. The project has closely collaborated with multiple government institutions, involving them in every stage of implementation. As previously highlighted, the government has been engaged in various stages, from selecting curriculums to choosing participants and activities. This ensures that the project's content and practices are validated and aligned with government priorities at both the district and federal levels. This alignment has been achieved through committees and workshops, as well as project formulation that explicitly includes government priorities and policies. This commitment is reflected in Component 3, specifically Subcomponent 3.2, which is dedicated to supporting policy implementation by federal and provincial governments. This subcomponent not only seeks to understand existing policies but also aims to create climate policy dialogue to enhance current climate policies.

143. According to Annex 13 of the 2023 Annual Performance Report, the project has identified and analysed policies from key ministries, such as; the Ministry of Climate Change and Environmental Coordination; the Ministry of Science and Technology; the Ministry of National Food Security and Research; the Ministry of Agriculture in Punjab and Sindh; the Ministry of Livestock; the Ministry of Information Technology and Telecommunication; and the Ministry of Planning, Development and Special Initiatives. However, there is some concern regarding the continuity of the project as was reported by one key informant: “Climate change policy fits well within the framework. However, we are not sure if the government will continue to carry it forward once the project ends” (former project manager).

144. The project also leverages local knowledge from universities, research institutions and extensionists to tailor content for greater impact. Despite these efforts, there are occasional gaps in fully incorporating local knowledge, particularly due to the project's broad geographic reach. As noted in one KII: “I believe that your FAO team, though undoubtedly composed of experts, may not always fully understand the local context immediately, especially when you move from district to district in Punjab. The crops vary across regions, and in South Punjab, the climate and temperature are quite different. When people come from outside, they may not immediately

grasp the issues faced by farmers or how their management can be improved" (agronomist from the Water Management Wing, Department of Agriculture). This feedback highlights the importance of continuously adapting project approaches to address local agricultural needs across diverse regions.

Table 5. Key informant views of the extent to which the project is consistent with the existing national policies and climate strategies, and its capacity to deliver

	Don't know	Fully	Moderately	Not at all	Total
Islamabad	**2**	**5**	**3**		**10**
Islamabad	2	5	3		10
Punjab	**3**	**18**	**7**	**1**	**29**
Khanewal	1	1	3		5
Lahore	1	6			7
Lodhran		5			5
Multan		3	2		5
Muzaffargarh	1	2			3
Dera Ghazi Khan		1	2	1	4
Sindh	**3**	**12**	**3**		**22**
Badin		3			3
Hyderabad	1	1	2		4
Sanghar		4	2		6
Tando Jam		2			2
Umerkot	2	2	3		7
Total	**8**	**35**	**17**	**1**	**61**

Source: Own elaboration based on the KIIs.

Finding 25. The project fully achieved Outcome Indicator A5.0, which focuses on establishing effective coordination mechanisms.

145. An analysis of the logframe revealed that Outcome Indicator A5.0 (number and level of effective coordination mechanisms) fully achieved its interim target, with two federal interagency groups successfully established – one in Punjab and one in Sindh. The goal of such groups is to facilitate coordination between the Department of Agriculture and the Department of Irrigation in each respective state. Regular interagency meetings have been held since group formation, four in Punjab and two in Sindh, to discuss the realization of the ACWA Portal. FAO's leadership is still required in Sindh. In Punjab, however, leadership has already started to shift to the government, which took an autonomous initiative to call for a meeting.

146. Establishing the interagency groups is just a first step, but full achievement of such an outcome indicator by interim signals that the project is successfully working to ensure full country ownership and that the host government is supportive and actively engaged towards the realization of such a target. During the final evaluation, it is advised to carry out a more detailed assessment of the functioning and achievements of such interagency groups throughout the project's life cycle. Indeed, the sustainability of such interagency coordination mechanisms beyond project completion will only be feasible if a substantial shift in ownership from FAO to the federal governments has successfully occurred.

Finding 26. Despite accelerated progress towards the adaptation targets in 2024, stakeholder uncertainty persists. Improving information sharing mechanisms with key actors is advised.

147. Nearly half of the key informants related to implementation expressed uncertainty about whether the project is meeting its adaptation targets (see Table 6). The lack of early progress in the project fostered a perception of underperformance, which persists despite the sharp turnaround in 2024 and the achievement of many interim adaptation targets, as analysed in Finding 32.

148. Such discrepancies between stakeholders' scepticism and the actual implementation rate might indicate a lack of appropriate communication between the project team and its stakeholders. Improving information sharing mechanisms such as developing a quarterly progress newsletter or sharing regular project report briefs could help to shift this distorted perception on project performance.

149. In contrast, gaps still exist and have been acknowledged by the implementation team. Indeed, many indicators that are crucial to the project's success and sustainability are still far beyond their interim target. Tailored corrective actions, especially towards strengthening enabling factors, should be prioritized. In this sense, unevenness in the adaptation target achievement rate at interim explains stakeholders' uncertainty.

Table 6. Key informant views of the extent to which the project meets adaptation targets (only implementation-related KIIs included)

	Fully	Moderately	Not at all	Don't know	Total
Islamabad	**1**	**2**		**3**	**6**
Sindh		**2**			**2**
Badin		1			1
Sanghar		1			1
Total	**1**	**4**	**0**	**3**	**8**

Source: Own elaboration based on the KIIs.

3.7 Innovativeness

150. This section assesses the project's ability to create and promote opportunities for the development and adoption of new technologies. It also explores the extent to which innovative solutions have been integrated into project activities.

Finding 27. The project has created opportunities for developing and adopting new technologies and innovations, but there are variations across districts.

151. Almost four-fifths of KII respondents believe that the project has either fully or moderately created opportunities for developing and adopting new technologies and innovative solutions (see Table 7). The livestock department expressed more optimism, with many respondents rating the opportunities as "fully" while the Water Management and Agriculture Extension Departments tended to rate them as "moderate". However, a few respondents from Sanghar and Badin indicated that they observed no adoption of new technologies or innovative solutions.

Table 7. Key informant views of whether the project creates opportunities for developing and adopting new technologies, and adopts innovative solutions

	Fully	Moderately	Not at all	Don't know	Total
Islamabad		**1**			**1**
Punjab	**7**	**9**	**2**	**1**	**19**
Dera Ghazi Khan	1	3	1		5
Khanewal	1	4			5
Lodhran	2	1			3
Multan	1		1		2
Muzaffargarh	2	1		1	4
Sindh	**6**	**7**	**4**	**3**	**20**
Badin	1		2		3
Hyderabad		1		1	2
Sanghar	4	1	2		7
Umerkot	1	5		2	8
Total	**13**	**17**	**6**	**4**	**40**

Source: Own elaboration based on the KIIs.

152. In assessing the project's capacity to foster and promote opportunities for new technologies and innovative solutions, several valuable insights were highlighted from the KIIs.

i. **Innovation in climate-resilient practices**
"The innovation brought in now is our best practices for climate resilience, which were part of our previous projects, and have now been validated and are being adopted as climate-resilient practices in agriculture" (former project manager).

ii. **Project's influence on other development programmes**
"FAO's subsequent projects, including those with the GCF, the European Union and Italy, have been influenced by the philosophy of this project. These projects have adopted a similar approach, incorporating changes in technical aspects and working styles" (former FAO Pakistan member).

iii. **Capacity building and technology training for government staff**
"The project focused on training government staff in the use of modern agricultural technologies, such as the installation of weather stations and piezometers ... This enhances the government staff's ability to track crop health, assess land use and forecast agricultural risks" (assistant director from the Water Management Wing, Department of Agriculture).

iv. **Efficient water management practices**
"The project has promoted efficient water management solutions such as drip irrigation systems, weather stations and precision irrigation. By integrating these technologies, the government is better equipped to guide farmers on sustainable water usage" (executive engineer, Department of Irrigation).

v. **Innovative training approaches**
" ... the FFS and WOS, which are also very important innovations" (former project manager).

vi. **Advancements in the water sector**
"Perhaps the most important in the water sector is that the information about climate change sensors have been installed, towers set up and other equipment in place, all of which are innovations" (former project manager).

vii. **Use of information technology for farmer support**
"Another thing is the recent integration with information technology, like the ACWA Portal for farmers, which gathers all the information, including climate and agriculture data, and delivers it to the farmers. So, different innovative things are being done using information technology to quickly provide farmers with information" (former project manager).

153. These examples illustrate the diverse innovations introduced and supported by the project, showing how it has enabled both technology adoption and capacity building in various agricultural and water management practices. Furthermore, according to the 2024 Annual Performance Report, 75 percent of the trained farmers begin to apply climate-resilient agriculture and OFWM practices on their fields before the completion of their respective project trainings. This result exceeds the logframe interim target (70 percent) concerning the adoption rate of the innovative agricultural adaptation practices promoted by the project. In contrast, improvements in federal and provincial government staff capacity falls short of the interim target by around ten percentage points. This highlights the existence of more significant obstacles within the government systems that hinder beneficiaries' capacity to apply innovative practices.

3.8 Unexpected results

154. This section evaluates whether there are unintended outcomes, both positive and negative, that were not anticipated during the planning phase or articulated in the original TOC.

Finding 28. The Mehran University of Engineering and Technology actively integrates training materials into its curriculum and publications.

155. One university has begun to incorporate the training materials and skills (Water Accounting Training Series) learned from the project into its courses and academic publications. This integration reflects the relevance and applicability of the project content in academic settings, enriching the educational experience for students. It is reported that the training resources have provided valuable insights and practical examples that enhance their teaching, particularly in fields related to agriculture, climate resilience and community development. This result indicates a positive trend towards the institutionalization of project knowledge, potentially expanding its reach and impact beyond the immediate training of participants.

Finding 29. The project is shifting farmers' attitudes towards learning and innovation.

156. One significant, unexpected outcome of the project is the noticeable shift in farmers' attitudes towards learning and innovation. Previously, many farmers were confident in their traditional methods, firmly believing that they "knew best". However, one KII noted: "I've heard many farmers say that earlier they had the mentality of 'we know best'. But after interacting with these people - project personnel - … they have now realized how to benefit from the latest research and technology" (Assistant Director from the Agriculture Extension Wing, Department of Agriculture). Results from the 2024 Annual Performance Report align with this statement by showing that 75 percent of the trained farmers have begun to apply climate-resilient agriculture and OFWM practices on their fields before the completion of their respective project trainings. This transformation in attitude marks a substantial step towards modernization, as farmers increasingly recognize the value of learning about modern technologies and practices.

157. This openness has fostered a broader shift towards innovative agricultural practices. Another KII observed: "There has been a significant positive change in this regard. Everything has a theme. In our community, the overall prosperity has definitely improved. The better the yield, the better input the farmer will receive … This will reduce any hesitation in adopting modern techniques, leading to positive results" (Subdivisional Officer, Department of Irrigation). Improved yields and better-quality crops have bolstered confidence in adopting new methods, reducing hesitation and paving the way for sustainable agricultural practices. Farmers are moving beyond conventional methods and embracing practices that are both environmentally friendly and economically advantageous.

Finding 30. The project has catalysed unexpected positive outcomes in the form of collaboration and community bonding.

158. The project has also fostered a heightened sense of community and collaboration, particularly in relation to climate resilience and sustainable water management. This shift has encouraged cooperation between farmers and water management institutions, as one KII explained: "The emphasis placed by the project on climate-resilient practices and water management promoted an enhanced collaboration between farmers and water management institutions" (assistant director, Department of Agriculture, Water Management Wing). As a result, the project has inspired farmers to adopt environmentally friendly practices, such as organic farming and reducing chemical inputs. These efforts extend beyond individual farms, creating broader environmental benefits and highlighting a collective commitment to sustainable agriculture.

159. Moreover, the project's initiatives have strengthened informal community bonds, where farmers actively share knowledge and resources to support one another. Another KII reflected on this sense of unity, saying: "I personally observed the positive, unintended results during the project, such as the installation of weather stations and water management. There has also been enhanced community bonding in this process, with informal connections developed where farmers assist each other through knowledge and resource sharing. This helps to promote climate resilience in the community" (executive engineer, Department of Irrigation). Through these connections, farmers now work together more closely, building a support network that extends to sharing expertise, managing resources, and even assisting with equipment use and maintenance.

160. This sense of collaboration extends to engaging with relevant institutions, which has proven vital in fostering sustainable practices. As one respondent put it: "One important lesson we've learned from this project is the significance of effectively engaging the community in various activities, particularly by connecting them with relevant institutions" (executive engineer, Department of Irrigation). This institutional linkage not only enhances farmers' access to resources but also ensures that they are aligned with broader environmental goals and policies.

Finding 31. The increasing demand for laser levellers has driven up rental prices.

161. The project interventions trained farmers and line departments on the utilization and benefits of laser levellers. The benefits were shown through demonstration plots. Almost all farmers want to use laser levellers, however, an interesting unintended negative result emerged from Sindh where the rental (price) of laser levellers has grown because of increased demand. This is negatively affecting the vulnerable or small farmers to access (rent) laser levellers. Agriculture (sowing) is a time-sensitive activity. If the required tools are not available on time and at a bearable price, then adaptation becomes very difficult. The Sindh OFWM focal point explained this situation: "There is a big gap in this laser leveller availability. The period of cultivation or sowing is one month or a maximum of two months. There is a huge competition when every farmer wants to avail of laser levellers, but it becomes difficult due to its availability, affordability and capacity at the district level. One laser level can do from 200 to 250 acres per season, but here there are thousands of acres, so the availability can't be ensured."

3.9 Adaptation

162. This section explores the degree to which the project is meeting its adaptation targets. This complements Finding 7 from the effectiveness section, where farmers expressed that they are more aware of climate change and feel better prepared due to the improvements in farming practices.

Finding 32. At the interim, the average achievement rate of targets across the 17 adaptation indicators is satisfactory. The rate of achievement, however, is uneven. The first half of project implementation focused on capacity building and awareness raising. From this point onwards, it should concentrate on reinforcing the key enablers of paradigm change, with a particular emphasis on sustainability.

163. The Evaluation Team compared the cumulative figures from the 2024 Annual Performance Report against the interim targets approved in the logical framework to assess how well the project met its adaptation goals (see Table 8). The team then translated each indicator's 2024 performance, expressed as a percentage of its target, into a four-tier scale: unsatisfactory (under 40 percent achieved); partially satisfactory (from 40 to 80 percent achieved); satisfactory (from 80 to 100 percent achieved); and highly satisfactory (80 percent or more achieved). See Appendix 15 for a detailed methodological explanation of how the Evaluation Team verified the logical framework indicators and assessed their performance against the interim targets. When possible,

the Evaluation Team verified the indicators reported by conducting an independent analysis of the monitoring data provided by the MEL team (see Appendix table 19). In the lack of required data to verify the reported value, the Evaluation Team relied on the 2024 Annual Performance Report data as the basis for the indicator rate of achievement against its interim target.

164. Despite significant delays in the initial stages of the project, performance data at the interim show a sharp acceleration in implementation with eight out of 17 indicators achieving 80 percent or more of their targets, six achieving between 40 and 80 percent, and finally three achieving less than 40 percent. Overall, the average achievement rate across all adaptation targets is at 65 percent.

165. For the core indicators, the totals for direct and indirect beneficiaries – and for overall population coverage – already exceed their interim targets, earning highly satisfactory ratings and signalling pronounced acceleration. However, female participation among direct beneficiaries still trails its benchmark, with only 56 percent of its interim target achieved as of 2024. This suggests significant struggles in enrolling female participants, which should be addressed immediately to ensure the achievement of this target by the end of the project. Suggestions on how to increase female participation, as well as concerns regarding the methodology adopted to estimate the female beneficiary ratio, were discussed in Finding 23.

166. At the outcome level, coordination mechanisms have reached their target and climate-risk awareness is advancing satisfactorily. In contrast, improvements in water distribution reliability are partially satisfactory, and the geographic reach of risk reduction measures is well behind schedule (unsatisfactory). Similarly, at the output level, the project performed satisfactorily in terms of capacity building and awareness raising. However, several enabling factors such as expanding early warning systems, increasing the use of the ACWA Portal and broadening farmers' access to financial services remain in the unsatisfactory tier.

167. Overall, the project has been successful in building beneficiaries' knowledge on agricultural adaptation practices and effective water management. In contrast, results related to developing an enabling environment for such adaptation and water management practices to thrive are still weak. The successful establishment of the project's enabling factors is pivotal to foster a paradigm shift and ensure the project's sustainability after its completion. Focusing on the achievement of these outputs is advised in the second half of the project to avoid jeopardizing long-term benefits of the project.

Table 8. Adaptation core indicators

				Interim target		
Expected result	**Indicator**	**Baseline**	**Cumulative value 2024**	**Value**	**Percent achieved (as per 2024)**	**Performance rating**
Adaptation core indicators						
Adaptation Core Indicator 1	Direct beneficiaries of GCF-funded project/programme	0	407 128	400 000	102%	Highly satisfactory
	% female	0	28%	49%	56%	Partially satisfactory
Adaptation Core Indicator 2	Indirect beneficiaries of GCF-funded project/programme	0	6 579 402	8 000 000	82%	Satisfactory
	% female	0	49%	49%	100%	Satisfactory
Adaptation Core Indicator 3	Number of total beneficiaries relative to total population	0	2.5%	3%	83%	Satisfactory
	% female	0	0.69%	1.5%	46%	Partially satisfactory
Outcomes that contribute to fund-level impacts						
A5.0 Strengthened institutional and regulatory systems for climate-responsive planning and development	A5.2 Number and level of effective coordination mechanisms[1]	1	2	2	100%	Satisfactory
A6.0 Increased generation and use of climate information in decision-making	Level of reliability of water distribution measured by average fluctuations in soil moisture (%)	0	2.9	5	58%	Partially satisfactory
A7.0 Strengthened adaptive capacity and reduced exposure to climate threats	A7.2 Total geographic coverage of climate-related early warning systems and other risk reduction measures established/ strengthened (ha)	1 200 000	2 572 750	50 000 000	5.15%	Unsatisfactory
A8.0 Strengthened awareness of climate change threats and risk reduction processes	A8.1 Number of males and females made aware of climate threats and related appropriate responses	0	407 128	650 000	62.64%	Partially satisfactory
Outputs that contribute to outcomes						
Component 1. Enhancing information services for climate change adaptation in the water and agriculture sectors						
Irrigation/water management departments use a functional evapotranspiration-based water monitoring and management system to rationalize the distribution of water resources	Change in awareness, knowledge and understanding of irrigation/water management department staff (in Punjab and Sindh) in relation to current water	0	62	75	83%	Satisfactory

				Interim target		
Expected result	**Indicator**	**Baseline**	**Cumulative value 2024**	**Value**	**Percent achieved (as per 2024)**	**Performance rating**
according to actual crop water requirements and government priorities	resources, water use patterns and water needs in the agriculture sectors in their respective provinces					
ACWA Portal accessed	Share of portal return visits by users in the Indus Basin in proportion to unique visitors (%)	0	0	5	0%	Unsatisfactory
Component 2. Building on-farm resilience to climate change						
Extension workers, partner field staff and farmer facilitators are skilled in promoting climate-resilient agriculture and OFWM practices	Change in farmers' understanding of climate-resilient agriculture and OFWM practices as a result of trainings provided by extension workers, partner field staff and farmer facilitators	0	86	80	108%	Highly satisfactory
Farmers are skilled in using climate-resilient agricultural practices	Proportion of farmers trained by the project who begin to apply climate-resilient agriculture and OFWM practices on their fields before the completion of their respective project trainings	0	75	70	107%	Highly satisfactory
Component 3. Creating an enabling environment for continued transformation						
Heightened awareness, understanding and action by farmers throughout the project area with regard to climate change issues	Number of farmers reached through awareness-raising campaigns who have begun to apply at least one project-promoted climate-resilient agriculture and OFWM practice	144 218	0	NA	-	-
Relevant federal and provincial government staff capacity in place for use of climate information in policymaking	Change in trained staff's capacity to utilize project-supported information systems, which will be measured by assessing their: (i) understanding of relevant climate information;	0	43%	70%	61%	Partially satisfactory

				Interim target		
Expected result	**Indicator**	**Baseline**	**Cumulative value 2024**	**Value**	**Percent achieved (as per 2024)**	**Performance rating**
	(ii) knowledge of where to find this information; and (iii) knowledge of how to use this information in their work (%)					
Farmers have access to and use services that enable them to adopt climate-resilient practices	Percentage of targeted farmers to be reached through the structured extension activities (Component 2) who have diversified their use of financial services and/or value chain	0	0	30	0%	Unsatisfactory
	Proportion of union councils in which private service providers (input dealers, agrotechnicians, farm management consultants) provide specialized services to the growing clientele of farmers adapting to climate change	0	45	60	75%	Partially satisfactory

Note: [1] The level for each coordination mechanism is expressed on a scale from one to four. Each level refers to a different degree of effectiveness.

Source: Authors' own elaboration based on the logical framework and the 2021 Annual Performance Report.

3.10 Paradigm shift

168. The project's potential for a paradigm shift has been hindered by co-financing issues, which have caused significant delays in activities. Additionally, high staff turnover due to uncertainty has resulted in a loss of knowledge that is critical to the project's success (see Table 9).

Table 9. Paradigm shift scorecard

Dimension	**Score (low/medium/high)**	**Score explanation**
Scale	Medium	More than half of the respondents reported a significant increase in awareness and resilience to climate change, both within and beyond the project's scope. Respondents from the Department of Livestock exhibited a more optimistic outlook regarding the potential for the project to extend beyond its original objectives compared to their counterparts in other sectors. Although the project has not met its mid-term targets, which still fall short of expectations after more than four years of implementation and with only one and a half year remaining, the findings suggest promising spillover effects. These effects are largely due to the accessible sharing of course materials disseminated through trainings in Component 1, the FFS in Component 2 and radio outreach in Component 3. To fully capitalize on this potential and meet the targets, the project must address several underlying structural issues, such as: ensuring greater certainty around financial resources; developing strategies for monitoring; ensuring the sustainability of investments in tools and instruments under Component 1; implementing strategies to increase the reach to both direct and indirect beneficiaries; and enhancing the effectiveness of awareness campaigns in Component 3. These campaigns must aim to reach the expected number of farmers and achieve the desired level of adoption through all available channels.
Replicability	Medium	The evaluation explores replicability as to which degree key structural elements of a project/programme are exported elsewhere within the same sector and/or to other sectors, regions or countries. The FAO Country Office and regional colleagues were probed about the possibility of replicability, and all eight of them said yes – it is moderately replicable in similar contexts across the globe. The reason for choosing moderate over full was mentioned as "the programme is replicable, however, it requires some adaptation to the operating context." Regardless, some KIIs indicated a strong interest in conducting similar projects in different provinces, and international organizations such as the World Bank have shown interest in replicating the strategy used in Component 1. While the complexity of a project of this nature could limit its full replication, each component demonstrates a high potential for adaptability by international organizations and institutions within their specific areas. The Ministry of Agriculture has highlighted the FFS strategy as an effective teaching model, while the Ministry of Irrigation has expressed interest in Component 1 for its water management innovations.
Sustainability	Low	The majority of key informants believe that the project's results will be fully or moderately sustained beyond completion, particularly regarding the continuity of climate-resilient practices through the establishment of structures and the identification of funding channels. Farmers' associations and water management departments exhibit a more optimistic perspective compared to other stakeholders. However, challenges in achieving co-financing goals from provincial governments may indicate a lack of interest in continuing the project after completion, potentially limiting its sustainability. Additionally, there are specific concerns, particularly regarding Component 1. i. *Infrastructure and maintenance needs:* key informants highlighted critical sustainability considerations around the project's infrastructure. For example, weather stations require ongoing coordination with

Dimension	Score (low/medium/high)	Score explanation
		meteorological agencies, clear ownership responsibilities and integration into national data systems. Similarly, while some infrastructure like groundwater sensors aligns closely with departmental core functions and is expected to be maintained effectively, more complex instruments may face maintenance challenges. Instruments such as flux sensors, which are intricate and harder to repair, may risk becoming non-operational after a few years due to limited local expertise and resources. ii. *Capacity building and knowledge retention:* training and capacity building efforts have been extended to local academia, government bodies and other stakeholders. While approximately 40 to 50% of trained personnel are likely to apply the knowledge gained, there is a risk that the remaining recipients may not retain or utilize it effectively. The involvement of academia shows a potential for sustained use, particularly as educational institutions continue incorporating project tools into their teaching and research. iii. *Risk of vandalism and theft:* some sensors, especially those monitoring water usage, may face risks of vandalism as some individuals may wish to avoid detection of water withdrawals. This highlights the need for security measures to protect equipment that could be subject to intentional or accidental damage. For Component 2 and the awareness campaign in Component 3, it is essential to reinforce messaging within communities to prevent direct and indirect beneficiaries from abandoning climate-resilient agriculture and OFWM practices due to a lack of support and understanding by extensionists of these practices. In conclusion, while there is a solid foundation for sustainability through local ownership, capacity building efforts and successful community adoption, the project must address ongoing challenges related to maintenance responsibilities, financial resources, infrastructure durability and security concerns, along with reinforcing and expanding training to continue building local capacity.

Source: Authors' own elaboration.

4. Conclusions and recommendations

4.1 Conclusions

169. The interim evaluation of the project within the Indus Basin region underscores the urgent challenges posed by climate change and the critical need for enhanced resilience among local communities. The Evaluation Team conducted a comprehensive review of the project design and all the activities implemented from 2020 to 2024. The conclusions of the analysis are summarized here.

Relevance – successful

170. The design matches both the national climate change agenda and the needs of vulnerable farmers in the Indus Basin. Findings 1 to 3 confirm that:

i. Component 1 continues to build the technical capacity of government staff, while Component 2 strengthens the resilience of farming systems.

ii. The underlying TOC and barriers diagnosed at design remain valid, despite the 2022 floods and the COVID-19 pandemic shock.

iii. Districts, union councils and (most) villages were selected for their high exposure to droughts, floods, poverty and insecurity, ensuring that resources flow to the most at-risk populations.

iv. Baseline data show that beneficiaries fit the agreed upon targeting criteria and are, on average, poorer and more climate-exposed than the general population.

171. Although data gaps limited a full replication of the original MCDA, the evidence is strong enough to uphold a successful rating for relevance.

Effectiveness – partially successful

172. Project interventions clearly strengthen climate adaptation capacity, but evidence shows that knowledge has not yet been transformed into routine, resilient practice.

i. Institutional capacity (Component 1): training raised post-course test scores for 66 percent of participants. This is an appreciable gain but below the 75 percent logframe target. Less than half of survey responders report using the new tools in their day-to-day functions, such as: the AquaCrop model; field data collection tools for crop type mapping; soil salinity measurement instruments and groundwater depth techniques; geospatial or geographic information system applications for crop type mapping; water management (OFWM, FFS) module tools; groundwater modelling software; the PyWaPOR platform; the KoboToolbox for mobile data collection; water accounting frameworks and tools; and satellite remote sensing tools for evapotranspiration and basic hydrology. Usage remains occasional, indicating a need for refresher support and workplace coaching.

ii. Farmer-level change (Component 2): the CBFS and WOS initiatives have helped most participating farmers adopt at least one recommended technique, yet just 42 percent applied those practices during recent heatwaves, heavy rains, droughts or floods. Beneficiaries express high satisfaction and perceive yield improvements, while nearly nine out of ten respondents say they have fully integrated the recommended practices. The depth of adoption varies sharply by district – from just 53 percent in Dera Ghazi Khan to complete coverage in Lodhran and Muzaffargarh.

iii. Public outreach (Component 3): radio and social media campaigns have extended the project's reach nationwide. However, their effect on behaviour and the adoption of climate-resilient agriculture has not yet been quantified.

173. In sum, the project is successfully disseminating adaptation knowledge and catalysing initial behavioural shifts, but gaps in retention, application and impact measurement remain. These shortcomings warrant a partially successful rating and point to three priorities: a structured refresher training for complex topics; systematic follow up to track practice adoption over time; and a rigorous impact evaluation design to attribute observed results to project participation.

Efficiency – partially successful

174. The project has encountered delays in securing co-financing, which has affected progress and resource allocation. These delays, compounded by administrative challenges, have hindered the full utilization of available resources.

175. A financial analysis of the implementation has revealed disparities between expected and actual expenditures, indicating areas for improvement in resource allocation by the Accredited Entity. While spending on direct services to beneficiaries has gradually improved, ensuring adequate funding and an efficient use of resources will be vital for achieving the project's objectives moving forward.

176. The project's ability to adapt based on lessons learned has been a key factor in its successful implementation. Through continuous adjustments in response to financial constraints, stakeholder dynamics, procurement challenges and external disruptions like floods, the project has remained effective and responsive to local needs. The team's proactive approach to revising outdated training materials and finding alternative solutions for technical obstacles demonstrates a strong commitment to maintaining the project's relevance and impact. Overall, these adaptations highlight the value of flexible management and the importance of incorporating ongoing learning to navigate complex project environments successfully.

Coherence – successful

177. Evidence from the KIIs shows that the project is coherent with initiatives implemented by other actors that contribute to climate change adaptation and mitigation objectives. FAO's implementation team pointed out the "transaction cost" of coordination, which can sometimes be counterproductive due to lengthy negotiation processes that delay the start of activities. However, the project has already demonstrated a capacity to create successful synergies by offering the World Bank access to the ACWA Portal.

Country ownership – successful

178. The project's strong alignment with national policies and climate strategies has been a significant factor in its perceived success and effectiveness. The project has managed to work closely with multiple government institutions to integrate climate resilience priorities at both the district and federal levels. This collaboration has been reinforced by the regular involvement of government representatives in decision-making processes, which has ensured that project activities support and align with government policies.

179. The project has also established effective interagency coordination mechanisms, fully meeting the interim target for Outcome Indicator A5.0 in the project's logframe. Two interagency groups, one in Punjab and one in Sindh, have been created to facilitate coordination between the Department of Agriculture and the Department of Irrigation. In Punjab, the government has already begun

taking ownership by convening coordination meetings independently. This signals a shift towards institutional sustainability.

180. Additionally, the project has leveraged local expertise from universities and research institutions. However, there are challenges in fully adapting approaches to diverse regional contexts. Overall, the project's alignment with national frameworks, the establishment of institutional coordination platforms and its commitment to engaging local knowledge underscores its positive impact. Regardless, continued efforts are needed to ensure that these structures and partnerships are sustained beyond the project's lifecycle.

Gender equity and social cohesion – needs improvement

181. The design provides equal access, incorporates awareness raising on non-discrimination and fair wages, requires at least one female participant in government trainings and dedicates the FFS to women. However, female participation remains well below the logframe target, with only 28 percent of female direct beneficiaries as of 2024. The project must intensify efforts to enrol additional women and monitor barriers to their sustained participation.

182. Furthermore, the methodology currently adopted to count direct beneficiaries is likely to produce biased statistics, and hence an incorrect female ratio. The project team should revise it and ensure that it reliably captures the gender distribution of the project's beneficiaries.

183. Despite strong design intentions, the achievement of 54 percent of the interim target and uncertainty related to the female ratio statistics warrants this criterion a needs improvement rating.

Innovativeness – partially successful

184. Although the project is broadly viewed as innovative, a substantial share of stakeholders regard its innovations as only moderate, and a small minority perceives no innovation at all. These perceptions vary across institutions and districts. While early adoption at the farmer level is encouraging – with 75 percent of trained farmers applying climate-resilient agriculture and OFWM practices before completing their training, surpassing the interim target of 70 percent – this level of progress is not uniform across all areas. Lower adoption rates in some districts and a shortfall of approximately ten percentage points in government staff capacity improvements highlight ongoing institutional and contextual barriers. These gaps, if unaddressed, may limit the broader uptake and long-term impact of the project's innovative approaches.

Unexpected results – successful

185. So far, the unintended outcomes are predominantly positive and reinforce the project's objectives.

i. Institutionalization of technical knowledge: the Mehran University of Engineering and Technology has incorporated the Water Accounting Training Series into its curriculum and academic publications, extending project content to future professionals.

ii. Behavioural change among farmers: a marked shift from exclusive reliance on traditional practices towards an openness to research-based methods and modern technologies is fostering a broader adoption of climate-resilient agricultural practices.

iii. Enhanced social cohesion: stronger collaboration among farmers – and between farmers and water management institutions – is facilitating knowledge sharing, organic farming initiatives and collective resource management.

iv. A single, adverse externality has also emerged: heightened demand for laser levellers in Sindh has driven up rental prices, potentially impeding access for smallholders during critical sowing periods. A dedicated market assessment is recommended to quantify the scale of this constraint and to identify proportionate mitigation measures. Given the weight and likely durability of the positive institutional, behavioural and social outcomes, the overall performance under this criterion is assessed as successful.

Potential for a paradigm shift – partially successful

186. We assess the project's paradigm shift potential as partially successful. Co-financing delays and staff turnover have somewhat slowed progress towards mid-term targets and led to gaps in institutional memory. Nevertheless, over half of respondents, especially those in the livestock department, indicate notable gains in climate change awareness that extend beyond the project's immediate reach. These encouraging spillovers stem from Component 1 course materials, the FFS under Component 2 and radio outreach under Component 3. Although the project has not yet achieved its mid-term targets after more than four years, these results suggest the beginning of a broader change in attitudes and practices.

Scale – medium

187. More than 50 percent of participants report increased awareness and resilience to climate change within and beyond the communities directly served by the project. While this momentum shows promise, the project's indicators still fall short of expectations, and the intended target of beneficiaries remains unmet. The project has reached multiple districts by combining Component 1 trainings, the FFS and radio campaigns. However, it may need to broaden its outreach to align fully with its original scale objectives.

Replicability – medium

188. Feedback from the FAO Country Office and regional stakeholders suggests that each component could adapt reasonably well to similar contexts, provided teams tailor approaches to local conditions. The World Bank and the Asian Development Bank have shown interest in adopting the FFS strategy and Component 1's water management innovations in other provinces. Provincial ministries (agriculture and irrigation) also view the FFS and OFWM practices as promising models. At the same time, integrating multiple interventions remains relatively complex, and uncertainty around sustainable funding may limit full replication.

Sustainability – low

189. Most key informants believe that climate-resilient practices can continue after project closure, yet co-financing gaps and undefined maintenance plans reduce that optimism. Flux towers and weather stations, being technically sophisticated, may stop functioning in the absence of reliable funding or local expertise. Water monitoring sensors may remain vulnerable to vandalism or theft unless stakeholders establish co-management agreements. Although training efforts have reached academia and government bodies, only 40 to 50 percent of trained personnel may retain and apply new skills over the long term. Moreover, some extension staff currently lack sufficient support to champion climate-smart and OFWM practices, which could hinder sustained adoption once external inputs diminish.

Key conclusion: overall adaptation impact – partially successful

190. The project is well aligned with the Indus Basin's climate challenges and has strengthened institutional and farmer knowledge, yet this knowledge has not yet translated into routine, climate-resilient practice. Government officers understand how to interpret climate data, but many do not apply these tools consistently. This signals a need for ongoing refresher support. Farmers have begun adopting the promoted techniques, but only a portion use them during actual extreme weather events so the expected behaviour change remains incomplete. Radio and social media campaigns have extended the project's reach far beyond direct trainees, but their effect on practice has yet to be verified. Finally, persistent co-financing delays are slowing field activities and technology roll out, jeopardizing the timely delivery of project activities. Unless funding flows stabilize, a deeper analysis of barriers that prevent adoption in each component is conducted and follow-up support is intensified, the project is likely to realize only part of its intended adaptation impact.

4.2 Recommendations

191. The project presents substantial potential for driving positive change in climate resilience within the Indus Basin. The activities, targeting and governance structure have demonstrated effectiveness despite limitations. To fully utilize available resources and minimize uncertainty, it is essential to address ongoing challenges related to co-financing, strengthen integration with district-level institutions and international entities to enhance sustainability, and manage staff turnover, which has contributed to delays and a loss of critical institutional knowledge. By focusing on these areas, the project can increase its impact and ensure a sustainable future for vulnerable communities facing the challenges of climate change. Based on this, we suggest the following four recommendations to help unlock the project's full potential.

Recommendation 1. Request for extension and restructuring of the co-financing agreement.

Responsible: FAO implementation team, GCF and provincial governments (Punjab and Sindh)

Timeline for implementation: immediate

192. We recommend requesting an extension of the project timeline from 18 to 24 months, with the new completion date in March 2028 rather than March 2026. The project, initially planned to be implemented from March 2020 to March 2026, has faced several external challenges, including the COVID-19 pandemic and severe floods. Additionally, the mandatory requirement to receive co-financing in the United States dollars has financially constrained the project due to the significant devaluation of the Pakistan rupee against the United States dollar.

193. As of June 2024, the project has achieved less than 50 percent of the expected progress, despite only receiving 33 percent of the committed financial resources for this period. This indicates that the project has made notable advancements given the financial constraints, with progress in specific components as follows:

i. Component 1: 43.5 percent progress

ii. Component 2: reached 43 429 households, or 21.7 percent of the target of 200 000 households

iii. Component 3: 41 percent progress

194. However, the remaining project duration (one year and four months, representing 22 percent of the total project time) is insufficient to complete all of the planned activities – even with the full disbursement of the remaining funds.

195. In addition to the extension, we recommend addressing the co-financing challenges by restructuring the co-financing agreement between the GCF and the governments of Punjab and Sindh. Given the ongoing issues with currency devaluation, we suggest a more flexible co-financing strategy that is resilient to exchange rate fluctuations such as allowing national co-financers to meet their obligations in their local currency. Specifically, the revised agreement should allow for a mix of financial contributions and in-kind payments from the governments. Furthermore, some activities are currently funded from three different sources. We suggest having a single funding source for each activity to streamline the implementation process. This new agreement must be endorsed by all relevant stakeholders to ensure that the co-financing commitments are achievable for all parties, ensuring the project's successful completion.

Recommendation 2. Increase the visibility of the project's purpose, scope and approaches with local stakeholders.

Responsible: FAO implementation team with support from the provincial governments (Punjab and Sindh)

Timeline for implementation: medium term

196. The analysis of project coherence highlights that local stakeholders, especially local government officials, would appreciate a higher level of collaboration and coordination. This involves being assigned clear tasks and responsibilities from the FAO implementation team. For this reason, the Evaluation Team recommends:

i. Increasing the engagement of stakeholders through field visits, progress sharing discussions, and reflection sessions to update stakeholders about the project's journey and lessons learned: this will improve stakeholders' understanding of the project's scope, purpose and approaches, and will allow them to better contextualize how the FFS activities align within the government's climate change mitigation efforts. Moreover, showing more clearly the effectiveness of training activities on beneficiaries' increased resilience will help to shift the emphasis from in-kind assistance as the preferred approach through agricultural inputs and tools. This favours the adoption of more sustainable solutions, such as the introduction of climate-resilient agriculture and OFWM practices, which contribute to paradigm shifts.

ii. *Improving infrastructure management and ownership clarity:* to ensure the long-term functionality of critical infrastructure such as weather stations and groundwater sensors, establish clear maintenance and ownership responsibilities with local meteorological agencies and other relevant bodies. Integration into national data systems will also support sustainability as it links project infrastructure to ongoing government operations. To address potential maintenance challenges, especially for complex equipment, consider formalizing partnerships with local technical institutions and agencies that can provide expertise and resources to maintain these systems over time (advance the signing of a memorandum of understanding to define responsibilities between the government and institutions, ensuring the sustainability of investments in portals, meteorological stations and other assets once the project is completed).

iii. *Map and engage relevant stakeholders at all levels:* begin by systematically identifying and mapping relevant stakeholders across national, provincial, district and local levels. This includes government entities, research institutions, community-based organizations and local authorities, particularly those with roles in climate change, agriculture and water management.

- Develop a stakeholder matrix that defines roles, responsibilities and relevance to different components of the project.

- Prioritize the inclusion of local authorities, who are essential for long-term ownership and policy uptake.

iv. *Establish a multilevel information and coordination mechanism:* set up a communications strategy that ensures all stakeholders are regularly informed of project progress, lessons learned and coordination opportunities.

- Develop a quarterly project newsletter, brief progress reports, infographics, community radio messages or district-level coordination platforms (for example, WhatsApp groups). One or more of these optional tools can be selected based on relevance and capacity.
- Tailor communications products to different audiences, ensuring accessibility at the local level (for example, through translation, visual materials or in-person briefings, when necessary).
- Host annual coordination meetings to reinforce alignment and provide a platform for dialogue and feedback among stakeholders.

Recommendation 3. Enhance integration with existing climate actions to foster a paradigm shift.

Responsible: FAO implementation team

Timeline for implementation: short term

197. To address the identified need for stronger integration with existing climate actions and improve sustainability, the project should further enhance its alignment with national climate priorities – including the recently approved Climate Change Policy (Ministry of Climate Change, 2021). While most project activities already align with national priorities, especially in the agriculture and water sectors, a perception remains that integration could be strengthened.

198. Additionally, the project should improve its coordination with climate finance mechanisms and multilateral initiatives, particularly where other actors are implementing similar interventions. Organizations such as the Asian Development Bank, the World Bank, the GCF and the Global Environment Facility represent strategic partners that could enhance the project's visibility, coherence and potential for replication.

Key strategies for enhancing integration and sustainability

i. **Organize collaborative workshops and information sessions**
Facilitate regular multistakeholder events to showcase how project activities align with national and international climate frameworks. These sessions should also promote a shared understanding and buy-in from other institutions.

- Co-host sessions with ministries and development partners to build ownership and foster strategic synergies.
- Use these events to identify new opportunities for policy influence and operational partnerships.

ii. **Strengthen partnerships for replicability and sustainability**
Deepen collaboration with international agencies that are already active in the region.

- Use the project’s results to position it as a model intervention for scaling climate-resilient agriculture.
- Seek co-financing or technical support for the maintenance of key infrastructure, such as flux towers and water monitoring systems.

- Address risks (for example, vandalism or theft) by incorporating local ownership models and co-management agreements with communities and district-level institutions.

199. By implementing these strategies, the project will enhance its institutional anchoring, secure support from stakeholders at every level and increase the chances of replication, sustainability and policy influence. This inclusive approach can support a broader paradigm shift towards climate-resilient development in the Indus Basin and beyond.

Recommendation 4. Strengthen staff retention and knowledge preservation strategies to mitigate the impact of high turnover.

Responsible: FAO implementation team

Timeline for implementation: short term

200. High staff turnover has resulted in significant delays and the loss of institutional knowledge, which negatively impacts project continuity and efficiency. To ensure project sustainability, it is crucial to address staff retention and mitigate the loss of key knowledge every time there is staff attrition (see Finding 7).

201. The project should implement strategies to enhance staff retention by offering greater stability for key positions. Additionally, establishing robust knowledge management systems is crucial to ensure effective knowledge sharing, thorough handovers, and the use of centralized repositories where critical information is preserved and accessible to both current and incoming staff.

   i. Identify key staff roles. Prioritize the retention of staff in critical roles that are essential for the project's success.
   ii. Provide mitigation strategies.
      - *Enhanced contract terms:* offer longer-term contracts or renewable agreements to key staff in order to provide job security and reduce turnover. We suggest having a single source of funding for all project staff positions, rather than rely on three sources of funding (GCF, the Punjab and Sindh governments), as this would allow the project to offer greater stability in contract terms for key staff.
      - *Succession planning:* develop clear succession plans to prepare for any potential transitions. This includes identifying and training potential internal candidates to step into key roles when vacancies arise.
      - *Knowledge management systems:* enhance the existing knowledge management system by regularly reviewing the information it contains to identify any gaps. Ensure that key project information, decision logs and technical documentation are up to date. Implement a process to collect documentation from personnel at the time of their departure, and classify and identify relevant documents for future reference. Emphasize accessibility so that both current and future team members can easily retrieve and contribute valuable insights. This supports continuity and informed decision-making.

202. By implementing these retention and knowledge management strategies, the project can ensure continuity, reduce the loss of institutional knowledge and maintain momentum towards achieving its objectives.

Recommendation 5. Reassess and reinforce gender equity strategies for direct participation.

Responsible: FAO implementation team

Timeline for implementation: short term

203. To address the persistent gap between the current share of female direct beneficiaries (28 percent) and the established target (49 percent), the project should undertake a critical reassessment of its gender equity strategy, focusing on understanding and overcoming context-specific barriers to participation. Furthermore, the Evaluation Team suggests revising the current methodology to estimate the number of direct beneficiaries, and hence the beneficiaries' female ratio, since it is likely to produce a biased estimate.

Key actions

i. Conduct a gender barrier assessment.
   - Undertake a participatory assessment at the district level to identify practical, social, cultural or institutional barriers that may limit women's direct participation in the WOS and other field-level activities.
   - Consider including interviews or FGDs with both participating and non-participating women to gather diverse insights on obstacles and potential enabling factors.

ii. Evaluate the feasibility of overcoming identified barriers.
   - Analyse which barriers the project can realistically address within its operational scope and timeframe.
   - For barriers outside the project's control (for example, deep-rooted cultural constraints or regional safety concerns), engage with community leaders and local institutions to explore possible partnerships or mitigation strategies.

iii. Adjust the gender target if justified and contextually grounded.
   - Based on the results of the assessment, re-evaluate the direct beneficiary gender target using evidence from national or regional benchmarks on women's participation in agricultural extension services.
   - If maintaining the 49 percent target proves unrealistic given the local conditions, propose a revised but ambitious target grounded in documented experience from similar contexts in Pakistan.

iv. Revise the methodology that is currently adopted to count the number of direct beneficiaries, and hence the female beneficiaries' ratio.
   - Collect basic household information for each beneficiary enrolled in each project activity, such as household size and the number of male and female beneficiaries.
   - Estimate the number of direct beneficiaries and the share of females using this information rather than fixed assumptions, which are likely to produce biased results.

Recommendation 6. Strengthen post-training support and monitoring to improve knowledge retention and practice adoption.

Responsible: FAO implementation team

Timeline for implementation: medium term

204. While project interventions are associated with increased awareness and interest in climate-resilient practices, the current knowledge improvement rate (66 percent) and adoption rate (42 percent) fall short of the logframe targets. Moreover, inconsistent attendance in key districts

and limited evidence of routine application underscore the need for enhanced post-training support and adaptive monitoring systems.

205. To ensure that knowledge translates into practice, the project should reinforce its capacity development strategy by introducing structured mechanisms for identifying areas of practical relevance. This provides field-level accompaniment during the initial implementation of new practices and monitoring dropout risks in near real-time.

Key actions

i. Identify priority use cases during training (Component 1).
   - During training sessions for institutional staff, systematically document the specific activities and job functions where trainees expect to apply the new knowledge and tools.
   - Use this information to tailor follow-up support.

ii. Provide accompaniment during initial implementation (Components 1 and 2).
   - Establish a structured accompaniment mechanism where project staff or local facilitators follow up with beneficiaries the first time they apply the knowledge or practices learned.
   - This accompaniment could include on-site coaching, virtual check-ins or peer support groups to troubleshoot challenges and reinforce correct application.

iii. Introduce follow-up contact to monitor use and barriers.
   - After the initial use of new practices or tools, reach out to beneficiaries to determine whether they faced obstacles in applying what they learned.

iv. Digitalize FFS attendance monitoring and trigger alerts (Component 2).
   - Introduce a digital attendance tracking system to monitor FFS participation in near real-time.
   - Incorporate attendance data into the project's monitoring system and trigger an alert when a participant misses multiple consecutive sessions. Prompt a follow-up contact to:
     - understand the reason for the absence (for example, FFS content, delivery, logistics); and
     - provide encouragement and problem-solving support to re-engage the participant.

5. Key learnings

206. This section presents the key learnings gathered from this project, which we believe could be valuable for similar projects in the region. These insights stem from our findings, as well as the challenges encountered during the evaluation process.

207. It is critical to connect the information from the baseline survey with the project's monitoring data, such as the beneficiaries' enrolment list. This allows for verifying the correct targeting of each activity in order to measure the exposure to treatment for each household and the difference between short- and long-term impact. Hence, clear data collection protocols must be established at the start of the project to ensure that compatible unique identifiers at the household or individual level are included in each data collection tool.

208. Stakeholders remarked on the appropriateness of the project's design in responding effectively to a complex phenomenon whose causes and impacts are interdependent. By involving national and local institutions, academia and local communities, the project fosters synergies and integration across multiple levels, favouring a systemic approach to tackling climate challenges.

209. Delays in implementation can create risks in curriculum design, as some topics may become obsolete over time. Some activities had to be re-adapted because of a changed context or unforeseen barriers.

210. The low attendance rate under some FFS initiatives might be partially explained by dissatisfaction with the trainers' performance. It is important to monitor this in order to identify potential problems early enough to solve them.

211. All FFS modalities show a high level of satisfaction, making this approach an excellent tool for sharing information and knowledge. The FFS could be accompanied by complementary activities, for example, providing inputs and technology, or support to overcome barriers such as a lack of connectivity or internet access (particularly for the WOS, given its emphasis on helping women-led enterprises).

212. The climate-resilient agriculture and OFWM curricula could be enhanced by learning from local knowledge and establishing a bi-directional learning process.

213. The FFS modalities often follow an open-door policy. While it is not problematic per se if additional farmers attend classes, it is important to ensure that project resources are not diverted to farmers who were originally ineligible so as not to hinder project effectiveness or the fairness and transparency of targeting.

214. Well-designed capacity building raises knowledge, yet reinforcement is vital for adoption. Training scored high on satisfaction and knowledge gains, but adoption fell short of the logframe target, underscoring the value of refresher sessions and post-training coaching.

215. Beneficiaries reported improvements in farming skills and greater adoption of climate-resilient agriculture and OFWM practices. The FFS initiatives were effective in raising awareness about climate change and equipping participants with practical skills to mitigate its impacts. Female FGD participants reported that they acquired skills in not only agricultural production but also value-added activities such as preparing and selling by-products.

216. The complexities of coordinating with multiple stakeholders were acknowledged. The involvement of various government departments, each with its own dynamics, required ongoing

adaptations in strategy to maintain alignment and progress. However, greater harmonization and coordination can sometimes lengthen processes counterproductively.

217. Refining the specifications and scope of work in a procurement process can reduce the risk of receiving bid prices far beyond the budget.

218. In designing projects of this kind, the general equilibrium effects of interventions must be considered. Teaching the use of a specific type of tool, technology or practice can increase demand pressure, raising prices – particularly where the supply of such products is scarce.

219. To ensure targets are realistic, it is advisable to base assumptions on empirical evidence and use variables that can be measured early in implementation. For instance, the project aims to reach about 10 million farmers through awareness campaigns with a goal of 1 million adopting climate-resilient practices. However, adoption rates from radio campaigns vary widely depending on the complexity of the practices promoted, with simpler practices often seeing higher uptake (Agwu, Ekwueme and Anyanwu, 2008). Additionally, radio audience data may not fully represent unique farmer listeners each month. Expanding outreach methods to include SMS or smartphone applications, which have demonstrated higher adoption rates (Silvestri *et al.*, 2021; Giulivi *et al.*, 2023), could help the project meet its adoption goals. However, limited digital literacy may present challenges.

220. To prevent institutional knowledge gaps, complex methodological approaches such as the MCDA should be thoroughly documented and stored in shared repositories. This documentation should include detailed methodological reports outlining data sources, steps for constructing indicators, complete results (final scores for districts and union councils) and interpretations (how scores influenced selection). Additionally, including analytical codes for replicability and storing both raw and cleaned datasets is essential. Establishing clear handover processes and fostering knowledge-sharing practices within the team are also crucial to ensure that critical information is retained throughout the project's duration.

221. Projects focused on transferring knowledge have significant potential for spillovers. It is crucial to identify the possible channels for information diffusion and incorporate these into the project's M&E framework.

6. Dissemination and knowledge management plan

222. This report will be shared and discussed with a wide range of stakeholders. This is to ensure that the key findings and lessons learned from this interim evaluation report will inform the next implementation phase of the project, as well as contribute to existing evidence on the effectiveness of water management and agriculture practices. The aim is to enhance resilience and mitigate climate change impacts.

223. First, findings, lessons learned and recommendations will be presented to the FAO Pakistan Country Office in order to assess what has been achieved to date and what changes can be implemented to ensure that the project will succeed in reaching its planned goals. Moreover, the report will be discussed with the GCF board or portfolio manager assigned to the project. This is to update the main donor entity on the status of the project and provide feedback on hindrances experienced during the implementation in order to inform the design of other GCF-funded projects. Finally, the report will be presented at an FAO Office of Evaluation internal divisional meeting. This is to foster a peer-review feedback process and share adopted strategies and methodologies with colleagues, which may be useful for other evaluations of GCF-funded projects.

224. To ease the dissemination of key findings and lessons learned, a short version of the report will be prepared, accompanied by a digital presentation with key messages and relevant infographics. Both the report and presentation layout will be formatted with the help of an FAO Office of Evaluation communications specialist to ensure that the messages are conveyed in a clear way. The report will be published on the FAO Office of Evaluation web page.

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Appendix 1. People interviewed

Last name	First name	Category/role	Consultation method
		FAO	
Pham	Hang	Regional Office for Asia and the Pacific, Senior Resilience Officer	KII
Ren	Hui	Headquarters, Professional Officer, Office of Climate Change, Biodiversity and Environment	KII
		Partners	
Laguillo	Emilio	GCF Secretariat, Portfolio Management Specialist	KII
		Government (national, provincial, district, etc.)	
		National	
Ahmad	Bashir	Principal Scientific Officer, Climate Energy and Water Research Institute under the National Agricultural Research Centre	KII
Ariyaman	Jiro	FAO Country Office	KII
Barejena	Emelda	FAO Country Office, Project Manager	KII
Bari	Faizul	FAO Country Office	KII
Fatima	Breerah	Pakistan Council of Research in Water Resources	KII
Goheer	Arif	Global Change Impact Studies Centre	KII
Hashmi	Asma Jawad	Pakistan Meteorological Department	KII
Irshad	Aamir	FAO Country Office	KII
Rolle	Florence	FAO Representative	KII
Saifullah	Muhamamd	Muhammad Nawaz Shareef University of Agriculture Multan, Assistant Professor	KII
Soomro	Jalil Ahmed	Indus River System Authority	KII
		Provincial	
	Javed	Strategic Planning and Reform Unit, Punjab Irrigation Department	KII
Ahmad Bagnio	Mansoor	Planning and Progressive Officer, Agriculture Extension, Sindh	KII
Asghar	Saba Ali	Planning and Development Board, Punjab	KII
Das	Pritam	Sindh Irrigation and Drainage Authority	KII
Ejaz	Agha	Sindh Seed Corporation	KII
Habib	Shahid	Punjab Irrigation Department	KII
Hassan	Aleem ul	Pakistan Meteorological Department	KII
Hussain	Ghulam	Agricultural Mechanization Research Institute, Multan	KII
Hussain Dars	Ghulam	U.S.-Pakistan Center for Advanced Studies in Water, Mehran University of Engineering and Technology	KII
Jumani	Muneer	Director General, Agriculture Extension, Sindh, OFWM and Animal Husbandry	KII
Kachelo	Ayaz	Agriculture Extension, Sindh	KII
Kumar	Rajesh	Sindh Agriculture University, Tando Jam	KII
Murtaza Jamro	Ghulam	Sindh Agriculture University Tando Jam	KII
Mustafa Banbhan	Ghulam	Agriculture Research Sindh	KII
Qaisar Yasin	Hafiz Muhammad	Director General, Agriculture Extension, OFWM and Animal Husbandry in the respective provinces	KII
Sarfaraz	Sardar	Chief Meteorologist, Pakistan Meteorological Department Karachi	KII
Ullah	Hafiz Inam	Punjab Seed Corporation	KII
Wasim	Mirza	Crop Reporting Services Punjab	KII
Yusuf	Wasif	Irrigation Department Punjab, Lahore	KII
		Dera Ghazi Khan District	
		Female FGD, Noor Wala	FGD
		Male FGD, Muhammad Abad	FGD

Last name	First name	Category/role	Consultation method
Ahmad	Ishfaq	Divisional Director, OFWM	KII
Basit	Abdul	Deputy Director Livestock	KII
Hussain	Mahar Abid	Department of Agriculture, Extension Wing	KII
Muneer Shah	Syed Mubbashir	OFWM	KII
Saeed	Muhammad	Farmers' Association Member	KII
Yar Jhang	Safdar	Punjab Irrigated Agriculture Directorate Manager, Punjab Irrigation Department	KII
Muzaffargarh District			
		Female FGD, Village Basti Kalanjar Union Council Wan Pitafi	FGD
		Village Basti Arain Union Council Shah Jamal	FGD
Ashiq	Sardar	Farmers' Association	KII
Mehmood	Saif ul	Deputy Director, Agriculture Extension	KII
Saeed	Tariq	Deputy Director Livestock	KII
Shah	Safdar Ali	OFMW	KII
Toor	Mohsin	Irrigation Department	KII
Khanewal District			
		Female FGD, 95/10-R Union Council 127/10R	FGD
		Male FGD, Malikabad Union Council 171/10R	FGD
Khalid	Hamid	Department of Irrigation	KII
Latif	Abdul	Farmers' Association	KII
Raja	Waseem	Department of Water Management, OFWM	KII
Rehman	Habib – ur	Agriculture Extension	KII
Riaz	Malik	Water Users' Association	KII
Saleem	Rao	Water Users' Association	KII
Lodhran District			
		Female FGD, 289 WB Makhdom Wali	FGD
		Male FGD, Adda Mundhali	FGD
		FGD, TOT Lodhran (city)	FGD
Afridi	Abdul Majeed	Deputy Director Livestock, Department of Livestock, Dunyapur Office	KII
Ameen	Rana	Farmers' Association	KII
Farooqe	Imtiaz Hussain	Department of Water Management, OFWM	KII
Javed	Muhammad	Water Users' Association	KII
Khan	Dilshad Ali	Agriculture Extension Wing	KII
Khan	M. Arshad	Department of Irrigation	KII
Multan District			
		Female FGD, Bakian Wala	FGD
		Male FGD, Thahim Wala	FGD
Farhana		Water Management	KII
Gillani	Azwar Raza	Agriculture Extension Wing	KII
Hassan Khan	M. Mehboob	Department of Irrigation	KII
Khan	Qaiser	District Disaster Management Authority	KII
Umerkot District			
		Female FGD, Ali Muhammad Maha Village, Umerkot	FGD
		FGD, TOT, Sadaqie Kapri Village, Umerkot	FGD
Gill	Asif Iqbal	Farmers' Association, Umerkot	KII
Hussain	Shahid	Department of Water Management, OFWM, Umerkot	KII
Kachelo	Ayaz	Agriculture Extension, Umerkot	KII
Khoso	Imtiaz Ahmed	Sindh Rural Support Organization, Umerkot	KII
Mangrio	Qamaruddin	Department of Livestock, Umerkot	KII
Shah	Azizullah	Arid Zone Research Institute	KII
Sanghar District			
		Female FGD, Bago Wadadani Union Council Manik Thaheem	FGD
		Male FGD, Essa Khan Hingoro Union Council Kurkali	FGD
	Prem	Department of Irrigation	KII

Last name	First name	Category/role	Consultation method
Baig	Gulthar	Farmers' Association	KII
Khursheed		Department of Livestock	KII
Laghari	Abad Ali	OFWM Department	KII
Mehar	Sabar	Deputy Commissioner Office, District Disaster Management Authority	KII
Qadir	Ghulam	Additional Director, Agriculture Extension	KII
Rind	Wali Mohammad	FAO District Training Lead	KII
Baddin District			
		Female FGD, Pir Muhammad Detho Village	FGD
		Male FGD, Village Jaman Khoso Village	FGD
Akbar	Muhammad	FAO Working District Manager	KII
Nawaz	Ali	Agriculture Extension	KII
Rehman	Abdul	OFWM Department	KII

Appendix 2. Logical framework

The following logical framework has been updated to reflect the adjustments suggested by the MEL and implementation teams during the recent field mission. These changes, highlighted in light blue, address key recommendations to enhance the project's M&E processes and ensure alignment with on-the-ground realities.

Expected result	**Indicator**	**Means of verification**	**Baseline**	**Target**		**Assumptions**
				Interim (if applicable)	Final	
Fund-level impacts						
GCF core indicator	Number of direct and indirect beneficiaries	Baseline and Completion Surveys[1] 2017 Pakistan Population and Housing Census Multiple Indicator Cluster Surveys for Punjab and Sindh Training Report	Direct: 0 (including 0 women) Indirect: 0 (including 0 women)	Direct: 0.4 million (including 196 000 women) Indirect: 0[2] (including 0 women)	Direct: 1.3 million (including 636 000 women) Indirect: 16 million (including 7.9 million women)	Surveys to be implemented at start up and completion. Surveys will collect data to (*inter alia*) assess household resilience at baseline and completion using proven approaches such as FAO's Self-evaluation and Holistic Assessment of Climate Resilience of Farmers and Pastoralists and FAO's Resilience Index Measurement and Analysis, as well as insight from the United Kingdom of Great Britain and Northern Ireland-supported Building Resilience and Adaptation to Climate Extremes and Disasters programme. The interim target for direct beneficiaries is an estimate based on the number of agricultural households that are expected to be reached through project trainings by the end of Project Year 3, multiplied by the average number of people (6.3) living in each household in the eight districts targeted by the project. The total combined urban and rural population in the eight districts targeted by the project is about 21.5 million people. The total population used to calculate the proportion of beneficiaries refers to the total rural population of the eight districts targeted by the project, which is about 16 million people.
	Number of beneficiaries relative to total population	Baseline and Completion Surveys 2017 Pakistan Population and Housing Census Multiple Indicator Cluster Surveys for Punjab and Sindh Training Report	Direct: 0 (equivalent to 0% of total rural population in targeted districts) (including 0 women, equivalent to 0% of total rural population in targeted districts) Indirect: 0 (equivalent to 0% of total rural population in targeted districts) (including 0 women, equivalent to 0% of total districts rural population) Total rural population in targeted districts: 16 million	Direct: 0.4 million (equivalent to 3% of total rural population in targeted districts) (including 196 000 women, equivalent to 1.5% of total rural population in targeted districts) Indirect: 0 (equivalent to 0% of total districts rural population) (including 0 women, equivalent to 0% of total rural population in targeted districts) Total rural population in targeted districts: 16 million	Direct: 1.3 million (equivalent to 8% of total rural population in targeted districts) (including 636 000 women, equivalent to 4% of total rural population in targeted districts) Indirect: 16 million (equivalent to 100% of total districts rural population) (including 7.9 million women, equivalent to 49% of total rural population in targeted districts) Total rural population in targeted districts: 16 million	

Expected result	Indicator	Means of verification	Baseline	Target		Assumptions
				Interim (if applicable)	Final	
A1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions	A1.2 Number of males and females benefiting from the adoption of climate-resilient livelihood options (including agriculture, fisheries, tourism, etc.)	Baseline and Completion Surveys Agricultural Census[3]	Males = 0[4] Females = 0 Total = 0	Males = 0[5] Females = 0 Total = 0	Males = 664 000 Females = 636 000 Total = 1.3 million people in targeted districts benefiting from the adoption and use of climate-resilient agriculture and OFWM	Surveys to be implemented at start up and completion. Surveys will collect data to (*inter alia*) assess household resilience at baseline and completion using proven approaches such as FAO's Self-evaluation and Holistic Assessment of Climate Resilience of Farmers and Pastoralists and FAO's Resilience Index Measurement and Analysis, as well as insight from the United Kingdom of Great Britain and Northern Ireland-supported Building Resilience and Adaptation to Climate Extremes and Disasters programme.
A2.0 Increased resilience of health and well-being, and food and water security	A2.2 Number of food-secure households (in areas/periods at risk of climate change impacts)	Baseline and Completion Surveys National Nutrition Survey[6]	To be determined[7]	0 households8	200 000 households	All 1.3 million direct beneficiaries (who live in an estimated 200 000 households) reached by the project will be food secure by project completion. About 40% in Punjab and 28% in Sindh may be food secure at the time of project start up. These possible baseline values will be verified through the baseline survey administered during project inception.
Outcomes, outputs, activities and inputs at the project level						
A5.0 Strengthened institutional and regulatory systems for climate-responsive planning and development	A5.2 Number and level9 of effective coordination mechanisms	Institutions studies (including as part of Baseline and Completion Surveys) Reports and minutes from coordination mechanism meetings	Mechanism to facilitate coordination between federal and provincial authorities: Level 1 Mechanism to facilitate coordination between Department of Agriculture and Department of Irrigation in Punjab: Level 1 Mechanism to facilitate coordination between Department of Agriculture and Department of Irrigation in Sindh: Level 1	Mechanism to facilitate coordination between federal and provincial authorities: Level 2 Mechanism to facilitate coordination between Department of Agriculture and Department of Irrigation in Punjab: Level 2 Mechanism to facilitate coordination between Department of Agriculture and Department of Irrigation in Sindh: Level 2	Mechanism to facilitate coordination between federal and provincial authorities: Level 4 Mechanism to facilitate coordination between Department of Agriculture and Department of Irrigation in Punjab: Level 4 Mechanism to facilitate coordination between Department of Agriculture and Department of Irrigation in Sindh: Level 4	Mechanisms at Ministry of Climate Change and Environmental Coordination, Pakistan Meteorological Department, Agriculture Punjab, Irrigation Punjab, Agriculture Sindh, Irrigation Sindh made effective

Expected result	Indicator	Means of verification	Baseline	Target		Assumptions
				Interim (if applicable)	Final	
A6.0 Increased generation and use of climate information in decision-making	A6.2. Use of climate information products/services in decision-making in climate-sensitive sectors	Monitoring of canal flows and evapotranspiration -based water accounts Soil moisture balance **Project response:** survey to government departments (Departments of Agriculture and Irrigation from both provinces) and survey to farmers in the project target areas	Baseline level of *reliability* of water distribution (measured by average fluctuations in soil moisture over time in the selected canal command area of the selected canal) to be established during project inception **Project response:** both government departments and farmers use publicly available climate products and services, which exist at the time of initiation of the project with limited validation/calibration data on the ground in decision-making	*Reliability* of water distribution improved by 5% relative to baseline (i.e. reduced average fluctuations in soil moisture over time of 5%) within the selected canal command area of the selected canal **Project response:** both government departments and farmers use publicly available climate products and services, which exist at the time of initiation of the project with limited validation/calibration data on the ground in decision-making	*Reliability* of water distribution improved by 10% relative to baseline (i.e. reduced average fluctuations of soil moisture over time of 10%) within the selected canal command area of the selected canal **Project response:** 75% of government departments and 70% of surveyed farmers from the project target districts use project-supported or project-generated climate information products and services in decision-making; 75% of government departments confirm an increase in validation/calibration datasets for such products and services through project-supported or project-generated tools, instruments and training	One of the most important effects/results arising from the use of project-generated climate information (e.g. Component 1 outputs) will be changes in water distribution to ensure it is more responsive to the evolving climate-related needs and conditions experienced by farmers. Monitoring the 'reliability' of water distribution (as measured by changes in soil moisture over time and space) is among the best ways of assessing whether water distribution is adequately responding to farmers' evolving water needs in a changing climate. Commitments from the provincial irrigation/water management departments will not change. Change in water distribution can be attributable to the evapotranspiration monitoring and management system and are not excessively influenced by other factors (such as changes in river flow volumes). **Project response:** the assessment of soil moisture distribution over time and space is technically complicated and have uncertainty due to limitation in the available dataset and instruments (or cost to procure instruments). Therefore, we suggest changing it to more direct assessment increased generation and use of climate information. Survey to farmers and governments if they observe and use climate information generated from the project.
A7.0 Strengthened adaptive capacity and reduced exposure to climate threats	A7.2 Total geographic coverage of climate-related early warning systems and other risk reduction measures established/ strengthened	Project progress reports Pakistan Meteorological Department reports	1.2 million ha	5 million ha	5 million ha	The target for geographic coverage constitutes the total area in the eight project districts. The agrometeorological network managed by the Pakistan Meteorological Department is strengthened and provides adequate coverage in the eight targeted districts by the end of Project Year 6.

Expected result	Indicator	Means of verification	Baseline	Target		Assumptions
				Interim (if applicable)	Final	
A8.0 Strengthened awareness of climate change threats and risk reduction processes	A8.1 Number of males and females made aware of climate threats and related appropriate responses	Media/outreach Marketing survey Mobile phone-based feedback system Baseline and completion surveys (including knowledge, attitudes and practices survey)	Males = 0 Females = 0 Total = 0 residents in targeted districts	Males = 010 Females = 0 Total = 0 residents in targeted districts	Males = 5.1 million Female = 4.9 million Total = 10 million residents in target districts	The targeted population has access to the communication channels/tools used by the project. Assessment of how many made aware as result of project
Component 1. Enhancing information services for climate change adaptation in the water and agriculture sectors						
Irrigation/water management departments use a functional evapotranspiration-based water monitoring and management system to rationalize the distribution of water resources according to actual crop water requirements and government priorities	Change in awareness, knowledge and understanding of irrigation/water management department staff (Punjab and Sindh) in relation to current water resources, water-use patterns and water needs in the agriculture sectors in their respective provinces	Institution studies (including as part of Baseline and Completion Surveys) Assessments by project staff of irrigation/water management department staff's awareness, knowledge and understanding of water resources, water-use patterns and water needs in their respective provinces	0	75% of surveyed staff in the departments of irrigation/water management in Punjab and Sindh improve their assessment scores when surveyed at interim relative to their baseline assessments	100% of surveyed staff in the departments of irrigation/water management in Punjab and Sindh improve their assessment scores when surveyed at end-term relative to their baseline assessments	Commitments from the irrigation/water management departments will not change. Awareness, knowledge and understanding of current water resources, water-use patterns and water needs is currently low, which is a major barrier to more evidence-based and climate-responsive water planning and management. Demonstrable increases in awareness, knowledge and understanding among government staff are pre-requisites to improving water planning, management and distribution.
ACWA Portal accessed	Share of portal return visits by users in the Indus Basin in proportion to unique visitors	Site user statistics	0	20% per month	50% per month	Procurement of service provider will be carried out without any major problem.

Expected result	Indicator	Means of verification	Baseline	Target		Assumptions
				Interim (if applicable)	Final	
Component 2. Building on-farm resilience to climate change						
Extension workers, partner field staff and farmer facilitators are skilled in promoting climate-resilient agriculture and OFWM practices	Change in farmers' understanding of climate-resilient agriculture and OFWM practices as a result of trainings provided by extension workers, partner field staff and farmer facilitators	Pre- and post-training assessments by farmers participating in project trainings	0	80% of farmers trained by project-supported extension workers, partner field staff and farmer facilitators (1 064 by end of Project Year 3) score better on post-training assessments than on pre-training assessments	100% of farmers trained by project-supported extension workers, partner field staff and farmer facilitators (1 562 by end of Project Year 6) score better on post-training assessments than on pre-training assessments	The government makes field staff available to work on the project. There is a correct estimate of interested partners' field capacity in target districts. Trained staff do not transfer to other jobs.
Farmers are skilled in using climate-resilient agricultural practices	Proportion of farmers trained by the project who begin to apply climate-resilient agriculture and OFWM practices on their fields before the completion of their respective project trainings	Assessments by trainers of farmers' actions during (and at completion of) project trainings Randomized site visits to farmers' fields by project monitoring specialists	0	At least 70% of the targeted 35 200 farmers involved in trainings report that they have begun to apply project-promoted climate-resilient agriculture and OFWM practices before the completion of their trainings	At least 90% of the targeted 101 600 farmers involved in trainings report that they have begun to apply project-promoted climate-resilient agriculture and OFWM practices before the completion of their trainings	The final selection of project-promoted climate-resilient agriculture and OFWM practices are highly relevant to the cropping systems and conditions of targeted farmers. Targeted farmers continue to engage in project trainings for the full duration of these trainings (i.e. weekly sessions for the entire year or entire cropping season). Trainings are delivered in a form and manner that is accessible to, and relevant for, targeted farmers.
Component 3. Creating an enabling environment for continued transformation						
Heightened awareness, understanding and action by farmers throughout the project area with regard to climate change issues	Number of farmers reached through awareness-raising campaigns who have begun to apply at least one project-promoted climate-resilient agriculture and OFWM practice	Baseline and completion surveys (including knowledge, attitudes and practices survey) Mobile phone-based feedback system	0	0	1 million	By completion, the project expects to reach about 10 million farmers through awareness-raising campaigns. The project assumes that about 10% of these farmers will begin/try to adopt at least one project-promoted climate-resilient agriculture and OFWM practice. Adoption will be monitored using the mobile phone-based feedback system, through which farmer recipients will be asked to reply to messages and indicate their responses/actions by pushing numbers on their mobile phones. This system will also be used to refine/improve messaging.

Expected result	**Indicator**	**Means of verification**	**Baseline**	**Target**		**Assumptions**
				Interim (if applicable)	Final	
Relevant federal and provincial government staff capacity in place for use of climate information in policymaking	Change in trained staff’s capacity to utilize project-supported information systems, which will be measured by assessing their: (i) understanding of relevant climate information; (ii) knowledge of where to find this information; and (iii) knowledge of how to use this information in their work	Pre- and post-training assessments	0	70% of trained staff score better on post-training assessments than pre-training assessments with respect to all three criteria (i.e. understanding, finding and using information)	100% of trained staff score better on post-training assessments than pre-training assessments with respect to all three criteria (i.e. understanding, finding and using information)	Staff are willing and available to engage in learning events and undergo pre- and post-training assessments.
Farmers have access to and use services that enable them to adopt climate-resilient practices	Percent of targeted farmers to be reached through the structured extension activities (Component 2) who have diversified their use of financial services and/or value chain	Baseline and completion survey Project progress and training reports Pre- and post-training assessments	0	At least 30% of farmers trained under Component 2 by the end of Project Year 3 (around 10 000) have used at least one new financial or value chain service before the completion of their training	At least 30% of farmers trained under Component 2 by the end of Project Year 6 (around 30 000) have used at least one new financial or value chain service before the completion of their training	Financial service providers are willing to adapt their financial products to make them more relevant for farmers investing in climate change adaptation and to consider training by project as a risk mitigating factor.
	Proportion of union councils in which private service providers (input dealers, agrotechnicians, farm management consultants) provide specialized services to growing clientele of farmers adapting to climate change	Product catalogues of input dealers Specialized agrotechnician and consultant database Annual telephone survey among trained agrotechnicians and consultants on	0	At least 60% of union councils in which the project has provided farmer trainings (under Component 2) by the end of Project Year 3 contain at least one service provider (e.g. input dealer, agrotechnician, farm management consultant) delivering	At least 90% of union councils in which the project has provided farmer trainings (under Component 2) by the end of Project Year 6 contain at least one service provider (e.g. input dealer, agrotechnician, farm management consultant) delivering relevant climate	Input dealers are willing to stock climate change-tolerant varieties, even if there is initially low demand.

Expected result	Indicator	Means of verification	Baseline	Target		Assumptions
				Interim (if applicable)	Final	
		number of clients Project completion survey		relevant climate change adaptation support services to farmers	change adaptation support services to farmers	

Notes:

[1] Baseline and Completion Surveys will be conducted in Project Year 1 and Project Year 6 by an independent firm contracted by FAO.

[2] The project expects to have supported some beneficiaries to benefit from the adoption of climate-resilient livelihood options by interim, but this will not be measured. This is because the number of people benefiting from the adoption of practices is considered to be meaningfully measured through a household survey which, in the interest of an efficient use of resources, will not be commissioned as direct and indirect beneficiaries of the project will start to reach scale in Project Years 3 and 4. Therefore, an interim household survey would not provide an accurate indication of project progress.

[3] The most recent Agricultural Census was published in 2010. A follow-up agricultural census is expected to be prepared during the implementation period of this project, but the timeline is unknown.

[4] These baseline figures are estimates. FAO will verify these baseline figures using data from the baseline survey to be administered in Project Year 1, which itself will be triangulated using data from (*inter alia*) the agricultural census.

[5] The project expects to have supported some beneficiaries to benefit from the adoption of climate-resilient livelihood options by interim, but this will not be measured. This is because the number of people benefiting from the adoption of practices is considered to be meaningfully measured through a household survey which, in the interest of an efficient use of resources, will not be commissioned as direct and indirect beneficiaries of the project will start to reach scale in Project Years 3 and 4. Therefore, an interim household survey would not provide an accurate indication of project progress.

[6] The most recent National Nutrition Survey is from 2011. A follow-up national nutrition survey is currently underway. Data are being collected and analysed at the district level. The expected publication date for this new national nutrition survey is not confirmed but expected sometime in 2020 or 2021.

[7] A formal baseline value for the targeted districts will be set through the baseline survey, to be administered during Project Year 1.

[8] The project expects to have supported some households to become food secure by interim, but this will not be measured. This is because the number of food-secure households at interim is considered to be meaningfully measured through a household survey which, in the interest of an efficient use of resources, will not be commissioned as the direct and indirect benefits of the project will only begin to reach scale in Project Years 3 and 4. Therefore, an interim household survey would not provide an accurate indication of project progress.

[9] The level for each coordination mechanism is expressed on a scale of one to four. Each level refers to a different degree of effectiveness: 1 = no coordination mechanism; 2 = coordination mechanism in place; 3 = coordination mechanism in place, meeting regularly with appropriate representation (gender and decision-making authorities); and 4 = coordination mechanism in place, meeting regularly, with appropriate representation, with appropriate information flows, and monitoring of action items and issues raised.

[10] The project expects to have supported some individuals to increase awareness of climate threats and related appropriate responses by interim, but this will not be measured. This is because the number of individuals made aware of such threats and responses is considered to be meaningfully measured through a household survey which, in the interest of an efficient use of resources, will not be commissioned as direct and indirect benefits of the project will only begin to reach scale in Project Years 3 and 4, and thus an interim household survey would not provide an accurate indication of project progress.

Appendix 3. Evaluation matrix

Evaluation criteria	Evaluation question	Subquestions	Indicator	Data source and collection methods	Analysis procedure/triangulation	Data availability /reliability
Relevance	The extent to which the project design responds to beneficiaries' needs, policies and climate priorities	CriterionCriterion 1.1 How was the project designed to identify and respond to beneficiaries' needs? Criterion 1.2 To your knowledge, do you consider the project activities to fit the beneficiaries' needs? Why? Criterion 1.3 Is there anything else you think would be helpful to better support them? Criterion 1.4 How was the project designed to respond to the main policies from the Pakistan Government and other international institutions? Criterion 1.5 To your knowledge, do you consider the project activities to fit those policies? Why? Criterion 1.6 How was the project designed to identify climate priorities? Criterion 1.7 To your knowledge, do you consider the project activities to respond properly to climate priorities? Why?	Key informant views of the extent to which the project design incorporates mechanisms for identifying and addressing beneficiaries' needs Key informant views on the extent to which the project activities respond to climate change priorities	KII/FGD and literature review	An initial literature review on the main climate change priorities of the Indus Basin and the needs of its inhabitants in terms of mitigation strategies has been conducted, and evidence has been triangulated and complemented with insights from interviews with key stakeholders involved in project formulation and with beneficiaries	Strong
		Criterion 1.8 Are the activities developed under this project useful to help your household increase its resilience to climate change? Criterion 1.9 Is there anything else you think would be helpful to support you better?	Extent to which beneficiaries believe activities increased their resilience to climate change	FGD and literature review	An initial literature review on climate-resilient agriculture and OFWM practices effectiveness in increasing resilience has been conducted, and evidence has been compared with insights from FGDs with beneficiaries	Strong
	The responsiveness of the project to climate-related needs	Criterion 1.10 What specific climate-related risks has the project identified, and how are these integrated into its planning and implementation? Criterion 1.11 What agricultural adaptation practices and technologies are promoted by the project to mitigate climate impacts, and how are these practices tailored to local farming conditions?	Key informant views of the extent to which the project identifies climate-related risks Extent to which selected project implementation areas and beneficiaries are vulnerable to identified climate-related risks	KII/MCDA dataset, villages profiling database, beneficiaries' enrolment list, Baseline Household Survey and 2019/20 Social and Living Standard Measurement Survey	Replication of the MCDA performed by the FAO implementation team to select the project's districts and union councils, and validation of villages and beneficiaries selection according to target criteria Quantitative analysis triangulated with insights from key informants directly involved in project design	Medium

Evaluation criteria	Evaluation question	Subquestions	Indicator	Data source and collection methods	Analysis procedure/triangulation	Data availability /reliability
Effectiveness	The extent to which the project achieved its objectives	Criterion 2.1 Do you think climate-resilient agriculture and OFWM trainings are useful in helping your household mitigate some of the negative impacts of climate change? Criterion 2.2 As a result of the climate-resilient agriculture and OFWM trainings received as part of the project, has your household been able to respond better to climate change impacts?	Perceived usefulness of climate-resilient agriculture and OFWM trainings in mitigating household-level climate change impacts	FGD/KII/data from the Training Interim Evaluation report	We employed a multisource approach to thoroughly assess the effectiveness of each project component in achieving its specific objectives. For Component 1, we conducted descriptive statistics to quantify participants' perceptions of the training sessions, improvements in knowledge and the rate of adoption of recommended practices. In Component 2, we analysed responses from the FGDs, identifying common patterns, themes and shared experiences among participants to evaluate the project's impact on community engagement and knowledge sharing. For Component 3, we relied on the practical insights of the implementation team, using KIIs and reviewing other relevant documents shared by the team to assess operational challenges and successes. Additionally, we conducted a literature review to understand the expected results from the strategies employed by the project, providing an academic perspective on both the potential and limitations of these approaches. This review enriched our analysis by situating our findings within the broader context of similar interventions, allowing us to better assess the alignment between anticipated outcomes and actual project results. By triangulating these diverse sources of information – quantitative data, qualitative insights and academic literature – we aimed to enhance the reliability and depth of our evaluation across all components.	Strong

Evaluation criteria	Evaluation question	Subquestions	Indicator	Data source and collection methods	Analysis procedure/triangulation	Data availability /reliability
Efficiency	The extent to which the project delivers, or is likely to deliver, results in an economic and timely way	Criterion 4.1 Are the actual project costs aligned with the planned budgets?	Budget deviation percentage	Analysis of monitoring and financial data	Measures the difference between the actual project costs and the planned budget It to helps identify if the project is being conducted within the allocated budget, or if there are significant deviations.	Medium
		Criterion 4.2 How do the fixed and variable costs compare across different stages of implementation?	Fixed versus variable cost ratio	Analysis of monitoring and financial data	Compares fixed costs (e.g. infrastructure, salaries) to variable costs (e.g. materials, travel) at each stage of the project It helps to determine if there are stages where costs can be better managed or optimized.	
		Criterion 4.3 What percentage of administrative costs is allocated to start up, roll out, operations, management and evaluation?	Administrative cost breakdown	Analysis of monitoring and financial data	Provides a detailed breakdown of administrative costs into different categories, helping to identify areas where administrative expenses may be reduced or reallocated	
		Criterion 4.4 What is the administrative cost per activity-related expense?	Administrative cost per activity-related expense	Analysis of monitoring and financial data	Measures the administrative cost associated with each transfer to beneficiaries, helping to assess the efficiency of the transfer process	
	The degree to which resources have been optimized to maximize the impact of resources spent on climate adaptation and mitigation results	Criterion 4.5 What is the cost per beneficiary and household compared to the planned cost per stage and year?	Cost per beneficiary/household	Analysis of monitoring and financial data	The actual cost incurred per beneficiary or household and compares it to the planned cost, providing insights into the cost-effectiveness of the project	Medium
		Criterion 4.6 What percentage of the total project cost is transferred directly to beneficiaries?	Beneficiary transfer percentage	Analysis of monitoring and financial data	The proportion of the total project cost that is directly transferred to beneficiaries, helping to assess the direct impact of the project on the target population	
		Criterion 4.7 What is the average value of transfers to beneficiaries?	Average transfer value	Analysis of monitoring and financial data	Calculates the average amount of financial or resource transfers to beneficiaries, helping to evaluate the adequacy and effectiveness of the transfers	
		Criterion 4.8 How do currency exchange rates and inflation adjustments affect the project costs?	Exchange rate and inflation adjustment impact	Analysis of monitoring and financial data	Measures the impact of currency exchange rate fluctuations and inflation adjustments on the project costs, helping	

Evaluation criteria	Evaluation question	Subquestions	Indicator	Data source and collection methods	Analysis procedure/triangulation	Data availability /reliability
					to manage financial risks and ensure budget stability	
	To what extent did the project deal with issues and risks in implementation in an efficient manner?	Criterion 4.9 How were potential risks identified and assessed during the project's implementation phase? Criterion 4.10 Can you provide examples of specific issues or risks that arose during the project and explain how they were addressed? Criterion 4.11 What measures were put in place to monitor and mitigate risks throughout the project's lifecycle, and how effective were these measures?	The extent to which relevant lessons drawn were utilized to adaptively manage the project and enhance project implementation and decision-making processes	KIIs	We triangulated information from multiple stakeholders, with a particular focus on personnel involved directly in the implementation process. The KIIs were conducted with project managers from various stages of the project to capture perspectives from both the early phases and the current state of implementation.	Medium
	To what extent and how did the project apply adaptive management?	Criterion 4.12 Can you describe instances where the project plan was adjusted in response to new information or changing circumstances? Criterion 4.13 What mechanisms were in place to regularly review and adapt project strategies and activities?				
Coherence	The extent to which the project is coherent with the climate finance delivery of other multilateral entities	Criterion 5.1 What other multilateral entities are funding climate change projects in the region? Criterion 5.2 To what extent is the project compatible and/or does it complement other climate finance funding? Criterion 5.3 Does the project avoid creating parallel systems?	Key informant views of the extent the project is coherent with other climate change mitigation measures	KII and desk review	An initial desk review of other climate financing mechanisms active in the country and their strategies and objectives has been conducted, and evidence has been triangulated with insights from relevant key informants.	Medium
Gender equity and social cohesion	The extent to which the project ensures equal participation (men, women, youth, Indigenous Peoples and other	Criterion 6.1 What strategy was implemented to ensure equal participation of men, women, youth, Indigenous Peoples and other marginalized groups? Criterion 6.2 Was this strategy effective? What quality assurance was used to verify this?	Key informant and beneficiary views of the extent to which the project ensures equal participation	KII/FGD	Interviews with key informants directly involved with project design and implementation have been conducted to map the strategies adopted in order to ensure equal participation, and information has been triangulated with insights from beneficiaries.	Strong

Evaluation criteria	Evaluation question	Subquestions	Indicator	Data source and collection methods	Analysis procedure/triangulation	Data availability /reliability
	marginalized groups)	Criterion 6.3 Do you think all social groups have equal access to trainings? Why? Criterion 6.4 Could the project be more inclusive? If so, how?	Beneficiary views of the extent to which the project ensures equal access to trainings Share of female beneficiaries enrolled in the FFS	KII/FGD/beneficiaries' enrolment lists and monitoring data	The beneficiaries' enrolment list and implementation monitoring data have been analysed to estimate the share of female beneficiaries and compare it against the target. The results have been triangulated with insights from the KIIs and the beneficiaries' FGDs.	Medium
	The extent to which climate change impacts are differentiated by gender and/or other markers of difference	Criterion 6.5 Do you think there are some social groups more affected by climate change impacts than others? If so, which ones?	Beneficiaries and key informant views on groups most affected by climate change	KII/FGD	Analysis of KIIs and beneficiaries' views of gendered impact of climate change (FGD)	Medium
Country ownership	The extent to which the project is consistent with the existing national policies/climate strategies and capacity to deliver How well is country ownership reflected in the project's governance, coordination and consultation mechanisms or other consultations?	Criterion 7.1 What relevant national policies or climate strategies has the project identified, and how are these integrated into its planning and implementation? Criterion 7.2 To what extent does the project build and use local knowledge/capacity?	The extent to which the project is consistent with the existing national policies/climate strategies and capacity to deliver	KII/annual reports	We used a combination of KIIs and document analysis. The KIIs were conducted with both internal and external stakeholders to understand how the project integrates and builds upon local knowledge, ensuring consistency with national priorities. Additionally, we reviewed annual reports and other key documents to evaluate the project's relationship with government agencies and its responsiveness to policy frameworks.	Medium
Innovativeness	The extent to which the project creates opportunities for developing/adopting new technologies and adopts innovative solutions	Criterion 8.1 To what extent does the project introduce new technologies/solutions to improve government capacity to provide adequate support to vulnerable farmers? Criterion 8.2 Do you have knowledge about new technologies or innovative solutions used by beneficiaries that are different from the technologies and practices provided by the project?	Whether the project creates opportunities for developing/adopting new technologies and adopts innovative solutions	KII	We gathered insights directly from beneficiaries through the FGDs and those closely associated with them via the KIIs. In these discussions, we explored participants' views on project innovations and identified specific examples that they considered innovative.	Medium

Evaluation criteria	Evaluation question	Subquestions	Indicator	Data source and collection methods	Analysis procedure/triangulation	Data availability /reliability
		Criterion 8.3 Has this project introduced to you new technologies/solutions that you did not know before/did not have access to? Criterion 8.4 Do you have knowledge about new technologies or innovative solutions used by you or other beneficiaries that are different from the technologies and practices provided by the project?		FGD		
Unexpected results	The extent to which unforeseen and unintended outcomes, both positive and negative, which were not initially anticipated in the planning or articulated in the original TOC, were identified and documented	Criterion 9.1 Are there any positive or negative unintended results generated by the implementation of the project so far?	Identification and documentation of unforeseen and unintended outcomes during project implementation	KII	We employed a combination of KIIs and FGDs. During these sessions, we asked participants to share any outcomes they observed as a result of the project. We then categorized the responses into common themes based on frequency of mention. In the KIIs, we probed deeper into these categories to gather more detailed information and insights.	Strong
		Criterion 9.2 Did your participation in the project positively affect you in any different way than other participants? Criterion 9.3 Did your participation in the project negatively affect you in any different way than other participants?		FGD		
Paradigm shift, scale	To which degree there has been a significant increase in quantifiable results within and beyond the scope of the project/programme	Paradigm shift 1.1 Can you provide specific examples or data showing how the project has increased its quantifiable impact in mitigation and adaptation measures beyond the initial targets? Paradigm shift 1.2 How has the commitment or interest from existing project holders or new parties evolved since the project's inception? Can you provide specific instances or expressions of this increased commitment or interest? Paradigm shift 1.3 Are there any strategies developed within the project that cover larger target areas or populations? Please describe these strategies and their expected impacts. Paradigm shift 1.4 Have there been any results from the project that exceeded	The extent to which there has been a significant increase in quantifiable results within and beyond the scope of the project/programme	KII	We based our analysis on findings related to the project's effectiveness. We conducted KIIs to explore stakeholders' perceptions of the project's potential to exceed its original targets. This process involved triangulating insights from stakeholders at the district level with feedback from the project’s implementation team.	Medium

Evaluation criteria	Evaluation question	Subquestions	Indicator	Data source and collection methods	Analysis procedure/triangulation	Data availability /reliability
		initial expectations? If so, please provide details and data to illustrate these outcomes. Paradigm shift 1.5 Can you describe any significant expansions of the project that have occurred due to increased resource allocation from new or existing sources? Paradigm shift 1.6 Are there measurable and quantifiable results from the project that demonstrate a significant impact beyond the original scope? Please provide specific examples and data.				
Paradigm shift, replicability	To which degree key structural elements of a project/programme are exported elsewhere within the same sector and/or to other sectors, regions or countries	Paradigm shift 2.1 Are there examples of how the intervention models from this project are being considered or implemented in different geographical or sectoral settings? Please describe these examples in detail. Paradigm shift 2.2 Are there any new organizations planning or piloting similar intervention models influenced by this project? Provide details about these organizations and their planned interventions. Paradigm shift 2.3 Can you provide multiple examples of models similar to those used in this project being funded and implemented in other contexts? Describe how these models have been adapted to meet local contexts and needs.	The extent to which key structural elements of a project are exported elsewhere within the same sector and/or to other sectors, regions or countries	KII	We based our analysis on the KIIs. We triangulated information from stakeholders at the district level, federal representatives, the project implementation team and other relevant institutions.	Medium

Evaluation criteria	Evaluation question	Subquestions	Indicator	Data source and collection methods	Analysis procedure/triangulation	Data availability /reliability
Paradigm shift, sustainability	To which degree the results of a project/programme are sustained beyond completion, through the creation of a structural and/or financial base, as well as through climate-resilient practices	Paradigm shift 3.1 Are there institutional structures and behavioural norms in place to sustain climate mitigation and adaptation benefits without external funding? Why? Paradigm shift 3.2 Can good practice norms and institutional structures be observed across a range of stakeholders? Could you provide some examples? Paradigm shift 3.3 Are institutional structures and stakeholder groups capable of leading, facilitating and supporting interventions independently? Why? Paradigm shift 3.4 Is there evidence of further expansion and improvement in climate mitigation and adaptation benefits due to these structures and norms?	The extent to which the results of a project/programme are sustained beyond completion through the creation of a structural and/or financial base, as well as climate-resilient practices	KII	We based our analysis on the KIIs. We triangulated information from stakeholders at the district level, federal representatives, the project implementation team and other relevant institutions.	Medium
Adaptation targets	To what extent the project meets adaptation targets	Adaptation target 1 What are the expected adaptation benefits of the project? Adaptation target 2 How is a direct or an indirect beneficiary of the project defined?	The extent to which the project meets adaptation targets Adaptation Core Indicator 1 Adaptation Core Indicator 2 Adaptation Core Indicator 3	KII/annual reports	We engaged various stakeholders to gather their perspectives on the project's potential to achieve these targets. Through the KIIs, we sought to confirm the current status and progress of the project in relation to its adaptation goals. Additionally, we utilized validated information from the annual reports to support our findings and provide an assessment of the project's effectiveness in meeting its adaptation objectives.	Strong

Appendix 4. Data collection mission terms of reference

FAO Office of Evaluation technical mission for the interim report of the FP108 project in Pakistan

Mission objectives and activities

The main objective of the mission is to support the qualitative data collection of the interim evaluation for the FP108 project. The main output will therefore be a back-to-office report of the mission to Pakistan, a comprehensive document that outlines the activities and results from training sessions, FGDs to beneficiaries, and KIIs to government officials.

The mission is expected to undertake the following key activities while in Pakistan:

i. training sessions with the service provider collection team;
ii. discussion with the service provider collection team about the fieldwork plan;
iii. review instruments with the service provider collection team;
iv. KIIs to government officers;
v. pilot FGD in one district;
vi. work with the FAO team to detail the next implementation phase (project staff) and support the design of the endline quantitative impact evaluation (MEL team); and
vii. conduct a workshop to validate the TOC, targets and paradigm shift assumptions, ensuring they are realistic, complete and appropriate.

Key mission personnel

The mission team will be comprised of Jorge Castro, FAO Office of Evaluation responsible Officer for this evaluation, based in FAO Washington, DC.

Timeframe for the mission

The mission will be conducted at the beginning of September 2024 for a duration of about ten days. The mission will have field travel to the district of Multan, including selected communities that are participating in the project.

Day		Dates	Activities	Location
	Sun	8 September 2024	Arrival in Islamabad	
1	Mon	9 September 2024	Briefing with FAO Representative Florence Rolle (or Assistant FAO Representative if the FAO Representative is not present/available) Mandatory security briefing with Security Officer Amir Sultan Conversations with FAO MEL team Travel to GCF office in Multan by 13.00 latest, accompanied by FAO Pakistan M&E Specialist Asif Ali Shah	Islamabad Multan
2	Tue	10 September 2024	Briefing with Project Manager Emelda and key GCF staff Meeting with the service provider, preparation for training and pilots	Multan

Day		Dates	Activities	Location
3	Wed	11 September 2024	Training service provider Meeting with Project Manager Emelda Berejena and key GCF staff, validation TOC and paradigm shift assumptions	Multan
4	Thurs	12 September 2024	Pilot Interviews with government staff, Agriculture Extension Department, Director/Agriculture Extension Officers Meeting with the service provider, feedback and adjustments to the KII guide	Multan
5	Fri	13 September 2024	Agriculture Extension Department to OFWM Department and interview Deputy Director Meeting with GCF Project Manager Emelda Berejena and team to discuss progress on required information	Multan
6	Sat	14 September 2024	Conduct pilot FGDs in CBFS with male farmers, Bakain Wala Village Visit climate-resilient agriculture learning plots, Basti Boriyan Wala Village	Multan
7	Sun	15 September 2024	Conduct pilot FGDs in WOS with female farmers, 7 Faiz Village Visit to WOS, Thaheem Wala Village	Multan
8	Mon	16 September 2024	Feedback meeting to review the information provided by GCF Project Manager Emelda Berejena and team Leave to Islamabad in afternoon by 13.00 latest	Multan-Islamabad
9	Tue	17 September 2024	Debrief GCF Project Manager Emelda Berejena and team on project implementation	Islamabad
10	Wed	18 September 2024	Meetings with Operations and other units as needed, prepare for workshop with MEL team to validate targets and work on impact evaluation strategy Debrief with FAO Representative or Assistant FAO Representative Workshop with MEL team to validate targets and work on impact evaluation strategy	Islamabad
11	Thurs	19 September 2024	Departure from Islamabad and return to duty station	

Background

Initiated in March 2020, the project “Transforming the Indus Basin with Climate Resilient Agriculture and Water Management” (FP108) in Pakistan is set to conclude by March 2026, spanning a duration of six years. It is supported by a budget of USD 34 990 831 provided by the GCF.

The project’s objective is to increase resilience to climate change among the most vulnerable farmers in the Indus Basin and to strengthen the government’s capacity to support communities in adapting to climate change.

The project has three components.

i. Component 1: enhancing information services for climate change adaptation in the water and agriculture sectors. This component aims to build Pakistan's capacity in employing advanced technology to cope with climate change and address the impacts on agriculture and water management through better monitoring, analysis and dissemination of information on climate, water and agriculture.

ii. Component 2: building on-farm resilience to climate change. The purpose of this component is to enhance on-farm resilience to climate change by supporting farmers in acquiring skills on climate-resilient agriculture and OFWM, adopting technologies and engaging with stakeholders that provide services relevant to climate change adaptation in agriculture.

iii. Component 3: creating an enabling environment for continued transformation. This component seeks to cultivate an environment that is conducive to the sustained uptake of climate-resilient agriculture by farmers in the Indus Basin. It is essential to the broader process of transforming Indus Basin agriculture into a progressively more climate-resilient pathway in the future. It involves information dissemination and awareness campaigns by facilitating policy implementation by federal and provincial governments and developing services that enable farmers to adopt climate-resilient practices.

As part of the interim evaluation for the FP108 project, qualitative data will be collected through 74 KIIs and 16 FGDs in September 2024. This data collection will be conducted by a service provider. To ensure the quality of the data and set clear expectations for the data collection process, FAO will provide training for the service provider's data collection team before the data collection phase begins.

Training of the service provider and plans

Before commencing fieldwork, the midline data collection team, including the field and data manager, field supervisors and facilitators, will participate in a two-day "facilitators' training" workshop conducted by the Evaluation Team of the FAO Office of Evaluation. This training aims to ensure that these parties comprehend project objectives and research questions. It will also introduce qualitative methods and participatory tools, refine skills through simulated sessions, and address fieldwork logistics, report writing and ethical community engagement.

The training will provide facilitators with a comprehensive overview of the project under evaluation, including its objectives, progress, encountered shortcomings and future plans. They will be briefed on the background and context of the study areas and, if relevant, possibly some information on the baseline data collection process that took place in May and June 2022. Additionally, facilitators will be introduced to the key evaluation questions and hypotheses and their connection to the project's designated research areas such as relevance, effectiveness, impact, coherence, gender equity and social inclusion, country ownership, innovativeness and unexpected results.

Facilitators will be thoroughly familiarized with the TOC and research questions to minimize overreliance on the question guide. The training will stimulate dialogue among facilitators to prompt critical reflection on the project's TOC. Additionally, the roles and responsibilities of all stakeholders participating in the data collection process will be clearly defined during this training session.

Facilitators will be introduced to the primary qualitative methods to be utilized: FGDs and KIIs. There will be concise discussions to illustrate how these methods complement each other. The training will also enhance facilitators' proficiency with these tools through a hands-on learning approach. For instance, simulated FGDs and KIIs will provide them with the opportunity to refine interviewing and facilitation skills and become familiar with the tools.

The training will provide facilitators with an overview of the fieldwork roadmap, outlining the sequence of the data collection process in each research area. Additionally, guidance will be offered on the daily team debriefing process, allowing fieldwork teams to collectively review findings, analyses and working hypotheses from the day's activities. Furthermore, the training will instruct fieldwork teams on the process of drafting district reports, which must be submitted to the country team leader within a week after fieldwork completion. These reports will be reviewed and contribute to the primary report. Moreover, the training will address the structure of debriefings and their integration into the main report writing process.

Facilitators will also discuss negotiating community entry, securing consent, and maintaining respect and confidentiality. After the training, the fieldwork instruments will be revised, if necessary, to integrate feedback from the stakeholders who attended the training session.

Topics to cover in training sessions:

i. background of project
ii. project objectives
iii. project components
iv. hypotheses, research questions and TOC
v. key evaluation hypotheses and questions
vi. sampling
vii. reaching out to participants
    - KII outreach process
    - FGD outreach process
viii. informed consent
ix. conduct and ethical considerations
x. alternative methods to collect FGDs and KIIs
xi. approval for phone or video interviews
xii. detailed note taking
xiii. systematic recording and audio permissions
xiv. defining protocols for daily debriefs
xv. oversight and progress reporting
xvi. FGD standard steps
xvii. daily team debrief
xviii. qualitative data analysis strategies
xix. KII prioritization

Additionally, during the time in Pakistan, the KIIs with the FAO team (Country Office and Regional Office) will be conducted. An FGD pilot is expected to be realized in one of the districts covered by the project. After the pilot, the travelling officer will conduct a debriefing with the service provider concerning the outcomes of the test FGD and will conduct a third "refresher" training day. A second pilot will be conducted in the same district, but in a village different from the first pilot.

The mission is planned to be conducted in September 2024.

9 September 2024

Appendix 5. Details on secondary sources

Financial analysis: we used official financial reports for 2020, 2021, 2022 and 2023. For each budget item, we extracted the total expenditure per year and accumulated it through each reporting period. We used the original project budget as the primary benchmark to assess whether the project's expenditures deviated significantly from expectations each year. To evaluate the project's cost-effectiveness, we used the number of beneficiaries reported in the annual reports. We used the descriptions of each budget item from the funding proposal to classify them according to the types of analyses performed in this report (see Appendix 11).

Baseline Household Survey: this survey includes a sample of 2 245 households interviewed between May and June 2022 across the eight project districts. To assess the state of food security and resilience of the targeted rural agricultural households to climate change, the baseline study includes households from both treatment and comparison groups. The questionnaire covers 14 sections, collecting information on households' demographic composition, adaptive capacity, assets, social safety nets, access to basic services, food security, shocks, training and assistance received, livelihoods and income. All the information collected is at the household level and one knowledgeable respondent per household – the household head in most cases (82 percent) – was selected to participate in the interview. The respondent is not necessarily a beneficiary of any project activity. Appendix 6 details the process used to match the baseline survey data with the beneficiaries list, ensuring comparability with participants confirmed to have engaged in the programme. We then conducted a comparative analysis among three groups: already treated households; not-yet-treated households; and comparison households. Using one-way analysis of variance (ANOVA), we tested for statistically significant differences across these groups in a range of baseline variables, including targeting criteria, demographics, food security, resilience, coping strategies, shocks, livelihoods, expenditures and training participation.

Beneficiaries' enrolment list: this registry collects information on 27 985 individuals enrolled in one of the project's activities between December 2020 and November 2021 (first and second year of project implementation). The dataset contains beneficiaries' personal data (identification and phone number), general demographic information (name age, gender, disability), and geographic location and the type of activity attended. No household-level information has been recorded in the beneficiaries' list, such as household identification, besides the beneficiaries' father name. This database was matched with baseline survey data to identify individuals who had already received project treatment.

Training interim learning assessment survey: conducted by the MEL team of the Pakistan Country Office, this survey aimed to assess the impact of previous trainings conducted by FAO under Component 1, focusing on three key aspects: 1) satisfaction and reaction; 2) knowledge acquisition and learning; and 3) adoption and behaviour change. For most training sessions, participants completed both pre- and post-surveys to gauge their knowledge of relevant topics. In the training interim evaluation survey, participants were asked the same technical questions as in the pre-survey (baseline) to evaluate knowledge improvement and the extent to which this knowledge was adopted in their professional practices. The Evaluation Team conducted an independent analysis using raw data from this survey, with the full analysis available in Appendix 12. The Training Interim Evaluation Survey was administered to 191 participants from the Departments of Irrigation, Water Management and Agriculture in the Punjab and Sindh Provinces, yielding 91 responses (with 97 entries in total, as six individuals responded twice), representing an approximate 47.6 percent response rate.

Learning assessment of the FFS: there are three learning assessments – Sindh 2023, Punjab 2023 and the combined Punjab and Sindh 2024 – each conducted by the MEL team of the Pakistan Country Office to evaluate farmers' reaction and satisfaction, knowledge acquisition and practice adoption under Component 2. The assessment focused on three levels of evaluation following the Kirkpatrick model: reaction and satisfaction; knowledge acquisition; and practice adoption. In all three, the Country Office calculated target sample sizes using a 95 percent confidence level, a 5 percent margin of error, and the estimated prevalence of food insecurity, drawing each sampling frame from the CBFS and the WOS participants who had completed their curriculum by the assessment year. Interviews were conducted in person (with a structured questionnaire and semi-structured questions), and every respondent was a smallholder (1 to 5 acres) cultivating rice–wheat or cotton–wheat.

In Sindh 2023, where 750 men in 30 CBFS initiatives and 720 women in 24 WOS initiatives had been trained across Badin, Sanghar and Umerkot during 2022, the calculation produced a 128-farmer target (63 women, 65 men). The team ultimately interviewed 132 smallholders: 56 women and 76 men with 70 percent of interviews by telephone and 30 percent face-to-face, adding extra men in the field to offset women's limited phone access. In Punjab 2023, the frame comprised 2 465 trained farmers (men and women) across 94 field schools in Multan, Khanewal, Lodhran, Muzaffargarh and Dera Ghazi Khan during 2022 and 2021. The target was 300 farmers (100 women, 200 men), and enumerators completed 310 interviews (90 women and 220 men). Finally, the combined Punjab and Sindh 2024 assessment covered all five Punjab districts (Multan, Khanewal, Lodhran, Muzaffargarh, Dera Ghazi Khan) plus Badin, Umerkot and Sanghar in Sindh, where 11 910 farmers in 488 CBFS and WOS initiatives had been trained in 2023 and 2024. The Country Office targeted 900 farmers (200 women, 700 men), and the team interviewed 907: 177 women (20 percent) and 730 men (80 percent). In 2024, respondents were also stratified by programme type (CBFS 53 percent, WOS 20 percent, climate-resilient agriculture demonstration 17 percent, adaptive research 10 percent) and by district, with no more than five respondents per FFS. Because each sample was drawn from the pool of trained CBFS and WOS participants rather than all smallholders, findings reflect the learning outcomes and practice adoption of beneficiaries rather than the broader farming population. The Evaluation Team conducted an independent analysis of the raw survey data, including only participants in the CBFS and WOS initiatives and employing post-stratification to align with the distribution of the beneficiaries list. Full results are available in Appendix 14.

The MCDA database: this database was developed by the FAO Pakistan Country Office to prioritize union councils for this project. This dataset includes historical information on drought risk, flood frequency, locust prevalence and land cover for each union council, drawing from multiple data sources: FAO and Space and Upper Atmosphere Research Commission's 2013 land cover data, the Pakistan Meteorological Department's Drought Hazard Index, flood data from 2011 and 2012 collected by the Moderate Resolution Imaging Spectroradiometer and the United Nations Satellite Centre, and FAO's locust monitoring data. The Evaluation Team used these data sources to verify and validate that the selected union councils align with the identified needs by replicating the analysis conducted by the FAO Pakistan Country Office. The complete analysis can be found in Annex 1 attached to this document.

Village profiling database: this registry includes 154 villages targeted from October 2022 to July 2024, where the CBFS or WOS initiatives have been established or will be established in the future. The survey was administered to one key informant per village, and it collects information on the number of households, general socioeconomic conditions of the farmers, infrastructure and most common agricultural practices. This information was used to verify how well selected villages fit the target criteria by comparing results with the project's technical reports and information provided by the FAO Pakistan Country Office. The complete analysis can be found in Annex 1 attached to this document.

2019 and 2020 Social and Living Standards Measurement Survey: the survey was conducted by the Pakistan Bureau of Statistics on a nationally representative sample of 195 000 households and collects information on eight different sectors, namely education, information and communications technology, health, disability, migration, housing conditions, household satisfaction, and food security. A subsample of 61 009 households who live in rural areas in project implementation districts was used to assess if and how selected beneficiaries differ from the rest of the population by comparing official statistics with the baseline household survey results.

Appendix 6. Analysis of baseline survey data and beneficiaries' registry

In March 2024, the FAO Office of Evaluation, supported by the Agrifood Economics and Policy Division, started working on the research design for the interim evaluation report of the project "Transforming the Indus Basin with Climate Resilient Agriculture and Water Management". The project is implemented by the FAO Pakistan Country Office, with the financial and technical support of the GCF and the Government of Pakistan.

Originally, it was foreseen to use both quantitative and qualitative tools of analysis. The former would entail a rigorous impact evaluation using: a) a baseline survey commissioned in 2022 by the MEL team of FAO Pakistan; and b) a 24-month follow-up panel survey to be conducted between June and July 2024. The impact evaluation would be complemented by the monitoring data, including the activities performed over the project's life and the costs incurred. Further, in the spirit of a multi- or mixed-methods approach to evaluation, a literature review, FDGs and KIIs would have been conducted to provide a deeper understanding of the social and political context within which the project operates, the organizational processes, behaviour and motivations, and to explain why, how and for whom intended and unintended outcomes were achieved (or not achieved).

The Evaluation Team analysed two main datasets: a baseline household survey conducted between May and June 2022, and the list of beneficiaries enrolled between 2020 and 2021 (before baseline data collection). Furthermore, available annual reports have been reviewed to assess programme implementation and the progress of activities, and the FAO Pakistan Country Office has been consulted to clarify doubts or address inconsistencies. To apply a robust impact evaluation strategy, we need to connect all information from the baseline to each participant in each activity of the programme. This is relevant because:

i. It allows us to verify the correct focalization of each activity and determine if the people who received the treatment are those who should receive it.

ii. It connects information from the baseline with treatment that could be useful in terms of having a measure of exposure of each household to each treatment, considering variables such as the number of members of the household (provided by the baseline survey) and the number of households in treatments (obtained from the list of participants). For example, if a household participated with two or more members in the CBFS, it could have more exposure than a household with the same number of members but only one member participating in the CBFS.

iii. It connects both databases, which allows us to know the exact moment in which each household was treated. This also allows for measuring the difference in impacts of the treatment over time (for example, short- versus long-term effects).

iv. It allows us to have more information about other members of the household who were not interviewed in the baseline survey, adding additional contact information to find them in follow-up surveys.

The team carried out several checks on the available datasets and, in light of the serious technical issues identified, concluded that it is not possible at this stage to conduct an impact evaluation of the project. The full report with a detailed description of the datasets and analysis of the findings is available upon request. The following is a summary of the main issues identified:

i. The lack of unique and reliable beneficiary and household identifiers due to a consistent presence of missing and duplicated values does not allow to satisfactorily merge the baseline household survey with the beneficiaries' list.

ii. There were challenges in identifying the same respondents for the follow-up survey due to a lack of reliable personal identification, Global Positioning System coordinates and a clear list of villages and locations where the baseline was conducted.

iii. The two-year gap between the implementation of activities and the baseline data collection, together with the delivery of the government's agricultural inputs' package to the same beneficiaries, raises concerns about potential biases and comparability of the treatment and comparison group. This is because the treated group may have already received treatment directly or indirectly.

iv. There was uncertainty regarding the correct identification of treatment and comparison groups due to contradictions and discrepancies among different variables. This was then followed by a lack of clarity regarding the implementation strategy.

v. Modifications of the baseline household dataset, with the ex-post addition of several critical variables such as personal identification and treatment status jeopardizes the reliability of the data.

Appendix 7. Baseline balance analysis

The FAO Office of Evaluation team conducted a baseline study on the baseline dataset merged with the beneficiaries' list to understand the general sociodemographic characteristics of the sample interviewed, test the effectiveness of the targeting methodology, and check whether there are any significant differences between the treatment and comparison groups. Such balance checks are critical to first estimate the relevance of the project based on the correct identification of beneficiaries according to targeting criteria, and second, to ensure the statistical comparability between the groups for any subsequent analysis. When reading the findings of a baseline balance analysis, it is important to take into account the issues identified and explained in the technical memorandum on the analysis of baseline survey data and beneficiaries registry (see Appendix 6).

Of the 2 245 households sampled at baseline, 30 percent belong to the comparison group (650 observations) and 70 percent to the treatment group (1 595 observations). Furthermore, of the sampled households from treated areas, 60 percent are from the GCF's active project areas (973 observations) and 40 percent from non-active areas (622 observations). Classification of the treatment households in two subgroups was necessary due to the baseline data collection happening after the first wave of beneficiaries' enrolment and implementation in 2020 and 2021. It was therefore important to distinguish treatment areas where activities had started at the time of data collection (active areas) from treatment areas where activities had not started yet (non-active areas).

Finally, interviewed households at baseline have been classified according to their beneficiary status in three categories: FAO beneficiary in active areas; non-beneficiary in active areas; and non-beneficiary in non-active and control areas. As a result, households can be classified into four main categories by combining their treatment status, GCF status and beneficiary category.

i. FAO beneficiaries in active treatment areas: 393 (17.5 percent)

ii. Non-beneficiary in active treatment areas: 580 (25.8 percent)

iii. Non-beneficiary in non-active treatment areas: 622 (27.7 percent)

iv. Non-beneficiary in control areas: 650 (28.9 percent)

After merging the household baseline survey with the beneficiaries' list,[11] additional discrepancies emerge. First, only 957 observations in the household baseline survey have a unique and not duplicated identifier,[12] of which only 329 observations were successfully merged with the beneficiaries' list.[13] Second, among those merged are many observations in the GCF non-active areas and classified as non-beneficiary who have been recorded on the beneficiaries' list and enrolled in trainings. Similarly, the classification of those who received the government's input package (Agripackage) is not consistent with the 160 observations recorded as FAO beneficiaries and 74 observations recorded as non-beneficiaries.[14] Further details on matching baseline and beneficiary data are available in the technical memorandum on the analysis of baseline survey data and beneficiaries registry (see Appendix 6).

[11] This ensures that household treatment status is confirmed by the project's administrative data and is not only based on respondents' self-reporting.

[12] There were 1 288 observations with a missing or repeated not duplicated identifier dropped from the initial sample: 876 from treatment and 412 from the control group.

[13] The sample includes four observations that reported other family members' not duplicated identifier at baseline, but it found perfect correspondence on the beneficiaries list.

[14] Of the 74 non-beneficiaries, 69 are non-beneficiary in active areas and five are non-beneficiary in non-active or control area.

For these reasons, the FAO Office of Evaluation team decided to build two new treatment groups to be used for the analysis:

i. already treated households at baseline (329 observations), so those that are successfully matched between the baseline household survey and the beneficiaries' list (Variable T1); and

ii. treatment households that have not received treatment at the time of the baseline data collection (192 observations), so unmatched household in the GCF non-active areas (Variable T2).

Both of these groups will be compared against the remaining non-beneficiary households in comparison areas (238 observations) with a unique not duplicated identifier (Variable C). As a result, the total sample size is reduced from 2 245 to 759 observations.

It is important to highlight that among the already treated households, 71 percent received the government input package, 13 percent are enrolled in the WOS, 11 percent are enrolled in the CBFS and 5 percent participated in demonstration plots[15] (see Appendix table 1). Hence, when analysing the results from the balance analysis and the possible differences between the already treated households and the comparison group, we should remember that most of the treated households only received agricultural inputs and did not receive any training as part of the project (they might have received trainings on similar topics but not as beneficiaries of the project under evaluation).[16]

Appendix table 1. Type of treatment received by already treated households' group (T1)

	Frequency	***Percent***
Agripackage 10 million	234	71.12%
CBFS	36	10.94%
Demonstration plots	15	4.56%
WOS	44	13.37%
Total	329	100%

Source: Self-elaborated using household baseline survey data.
(Reduced sample: 759 households).

Methodology

To check that the three analysed groups, that is, already treated households (T1), not yet treated households (T2) and comparison households (C) are comparable in terms of the targeting criteria, outcome variables and observed characteristics underwent a one-way ANOVA. The ANOVA is used to determine whether there are any statistically significant differences between the mean of three or more groups, such us the two treatments and one control group of the analysed programme. Specifically, we test the null hypothesis:

$$(1)\ H_0{:}\mu T1=\mu T2=\mu C$$

where μT1, μT2 and μC are the means for the T1 group (already treated at baseline), the T2 group (not yet treated at baseline) and C (comparison group). The ANOVA uses F-tests to statistically test the equality of means. The F statistics are based on the ratio of the between-groups variability (numerator) and the within-group variability (denominator). If the ANOVA returns a statistically significant result, we accept the alternative hypothesis that there are at least two group means that are statistically different from each

[15] FAO Pakistan clarifies that beneficiaries recorded under demonstration plots are actually part of the CBFS or the WOS, so they should not be analysed as a separate activity.

[16] As per the project design, beneficiaries can only be enrolled in one of the project activities. If they received the input package, then they should not be enrolled in the CBFS or the WOS.

other. As a robustness check in addition to the ANOVA and to identify which groups have different means in case of a statistically significant result, we also conducted T-tests of mean difference between: a) the already treated and the comparison groups (T1-C); and b) the not yet treated and the comparison groups (T2-C):

$$(2^a)\ H_0: \mu T1 = \mu C$$

$$(2^b)\ H_0: \mu T2 = \mu C$$

T-tests are carried out by regressing the baseline indicator on the treatment dummy, including a clustered standard error at village level:

$$(3)\ Y = \alpha + \beta X_1 + \mu$$

where Y is the variable of interest for which the T-test is conducted, X_1 is the treatment dummy for either T1 or T2 compared to C and μ is the standard error clustered at the village level.

In this evaluation we are faced with the issue of multiple comparisons. The issue arises when the same null hypothesis is tested for multiple outcomes or across multiple treatment groups. A classical hypothesis test assesses statistical significance by calculating the probability under a null hypothesis of obtaining estimates as large as, or larger than, the observed estimate. When multiple tests are conducted, however, classical p-values are incorrect as they no longer reflect the true probability under the null. A Type I error occurs when a researcher wrongly concludes that there is a statistically significant difference, when in reality there is not. The Type I error rate is usually set to 0.05, meaning that researchers are willing to commit a Type I error 5 percent of the time. Nevertheless, in the world of multiple comparisons, this simple testing framework is insufficient, and a Type I error rate is called a family-wise error rate. The family-wise error rate is the probability of incorrectly rejecting even one null hypothesis in a hypothesis sequence. To control for the family-wise error rate, we employ the Holm-Sidak correction.[17]

Summary of findings

A baseline balance analysis has been conducted for a wide range of variables, such as: targeting criteria; households' demographic characteristics; food security; resilience capacity; coping strategies; shocks; livelihoods; expenditure; and trainings received. The aim of such an analysis is to assess the relevance of the project based on the correct identification of beneficiaries according to target criteria, and to ensure the statistical comparability between the groups. The complete balance analysis report, with detailed analysis and display of results, is available upon request. Below are summarized the main findings:

a) project relevance based on correct targeting of beneficiaries

According to project documents and information provided by the FAO Pakistan Country Office, farmers must satisfy a list of eligibility criteria to be enrolled in as a beneficiary. Nevertheless, the FAO Office of Evaluation team did not find evidence on the use of precise indicators with an established cut-off point to guide the selection. Moreover, information to assess correct targeting is lacking for many of these criteria, hindering the capacity of the FAO Office of Evaluation team to fully assess the correct execution of the targeting.

While no statistically significant differences were found among the three analysed groups in terms of observable characteristics available in the survey that align best with the target criteria (for example,

[17] The procedure behind the Hold-Sidak test is to first find all the p-values for all the individual tests performed and rank them from smallest to largest. We compare the smallest to $\alpha = \alpha_T/k$ where α_T is the Type I error rate. If we fail to reject the null hypothesis for the first step, then we stop there. If we reject it, then we compare the next smallest to $\alpha = \alpha_T/(k-1)$. Again, we stop here if we fail to reject the null hypothesis. If we do reject it, we continue on and use $\alpha = \alpha_T/(k-2)$.

household head with secondary education, food security, resilience capacity, adoption of coping strategies), the enrolment of not smallholder households or households that did not cultivate any agricultural land in the previous agricultural season might suggest some cases of inclusion error. Similarly, there are few observations enrolled in the CBFS that do not grow any of the required crops covered by the curriculum. Finally, no eligibility criteria for the government's agricultural input package, which accounts alone for 71 percent of already treated households, were specified.

b) statistical comparability of analysed groups:

The three groups have been tested across a wide range of indicators and different statistical tests were performed for robustness. Overall, no major significant differences were observed, suggesting that the three groups are quite balanced in terms of main socioeconomic characteristics – despite the vague targeting procedure followed and the start of implementation in some areas.

Some key findings to highlight are that already treated households (T1) are more likely to live in Sindh Province, especially in the Muzaffargarh District. This suggests that these areas were prioritized for implementation in the first two years of the project. Based on the analysed socioeconomic variables, Sindh Province is indeed more vulnerable than Punjab, with households being more food insecure (both in terms of food consumption score and Food Insecurity Experience Scale), showing lower levels of resilience capacity (measured in terms of Resilience Capacity Index), higher rates of adoption of negative coping strategies and higher food expenditure share. However, no information to confirm this assumption on the adopted prioritization strategy was found in the project's monitoring documents, nor was it provided by the FAO Pakistan Country Office.

Moreover, already treated households (T1) are more likely to have received trainings (both in the previous 12 or 24 months) and to have adopted climate-resilient agriculture practices in the previous 24 months compared to the comparison group. While these results might suggest a positive effect of the project on the treated, it should be remembered that only 29 percent of those already treated were enrolled in the CBFS and the WOS (the remaining 71 percent received the input package). Also, a lack of clarity in terms of which trainings out of the questionnaire list should be considered as project activities and whether training sessions on topics similar to the CBFS and the WOS curricula were conducted in the project areas involving non-beneficiaries suggest that clarifications from the FAO Pakistan Country Office and additional analysis are needed before drawing any conclusions on project effectiveness.

Appendix 8. Funding proposal review

Description

In September 2024, the FAO Office of Evaluation team organized a series of activities to validate key elements of the original funding proposal. These elements included: 1) the TOC; 2) paradigm shift assumptions; and 3) targets in the logical framework. The validation process assessed whether each aspect was realistic, comprehensive and applicable to the actual project conditions.

The implementation team was responsible for validating the TOC and paradigm shift assumptions, while the MEL team evaluated the targets in the logical framework.

Theory of change

Following this process, the TOC was validated, confirming that the barriers and activities outlined in the funding proposal remain applicable to the context of Pakistan – particularly the farming communities around the Indus River Basin.

Paradigm shift assumptions

In the case of the paradigm shift, the implementation team identified two major assumptions that should be incorporated to ensure that the project achieves the expected paradigm shift:

i. **Climate uncertainty**
Since the project focuses on building resilience to climate change, it must address the inherent uncertainty of climate impacts. Extreme weather events, such as droughts or floods, may occur more frequently or with greater intensity than anticipated, potentially overwhelming the project's mitigation efforts.

ii. **Political and governance instability**
Political changes or instability at the national or provincial levels can disrupt the continuity of project implementation. Shifts in government priorities or leadership may lead to delays, budget cuts or changes in focus, which could compromise the project's long-term vision.

Logical framework

The analysis of the logical framework revealed three types of issues with the original activity targets in the funding proposal.

i. **Missing link between budget assumptions and targets**
In some cases, the number of activities included in the budget does not align with the targets in the logical framework. We recommend adjusting the targets to match the budgeted amounts.

ii. **Disconnection between activities and indicators**
Some indicators reference units that differ from those used for the activities they are meant to measure. We recommend adjusting the indicators to reflect the actual units used for the corresponding activities.

iii. **Incorrect assumptions**
Some assumptions used to set the targets were based on inaccurate information or were not specific to the context of Pakistan. During implementation, the team identified challenges such as digital literacy, access to radios and cell phones, the reach of radio campaigns, adaptation rates and lack of motivation. With support from the MEL team, the logical framework will be revised to adjust the targets based on real data and technical evidence from similar projects, tailoring them to this specific project.

The following list presents the indicators for activities that have been adjusted based on suggestions from the MEL and implementation teams during the recent field mission. These adjustments ensure that the indicators are better aligned with the activities, implementation process and budget. Additionally, it highlights indicators that require attention for potential further adjustments.

Appendix table 2. Logical framework adjustments proposed by the MEL team

Indicator/or item description	**Current target/ number/ status**	**Punjab targets**	**Sindh targets**	**Proposed changes**	**Reasons {why}**
Component 2					
Activity 2.2.2 TOT on climate-resilient agriculture and OFWM practices	2 170	1 356	814	Total should be 2 170, but when adding the numbers in the implementation plan, it is 2 144 if considering four years of implementation and 2 970 if five years of implementation	Inconsistency between the implementation plan, the budget, the good agricultural practices (GAPs) and the narration in implementation of training for 12 farmer facilitators, 192 WOS facilitators, 144 government extension workers and 162 partner/private sector field staff completed by the end of Project Year 2; if these rounds are repeated until Project Year 6 = 480 farmer facilitators, the 960 WOS, 720 extension staff and 810 partner/private sector = 2 970 total
TOT 440 non-governmental organizations/faith-based organisations	440	275	165		In GAP the number of partner/private sector field staff trained Target: 650
TOT of 320 WOS facilitators (extension workers, partner field staff and farmer facilitators)	320	200	120	The GAP shows 320 and are extension workers, partner field staff and farmer facilitators, but in the implementation plan it says 192 by Project Year 2 and another round for each project year will give a total of 960 in five years.	The breakdown should be as given in the GAP: 240 WOS farmer facilitators and 80 WOS partner facilitators
Number of female WOS trainers/extension workers contracted and trained *Target: 320*					Not clear if the contracting is by Rural Support Programme Networks or directly by the project. There is no budget line for that.

Indicator/or item description	Current target/ number/ status	Punjab targets	Sindh targets	Proposed changes	Reasons {why}
Number of farmer facilitators	240				It is not clearly given in the implementation plan, except the indicator in GAP: farmer facilitator-led WOS initiatives established and operated.
Number of partner staff WOS	80	50	30		Not clearly spelled out but recommend having as given in the GAP: 240 WOS farmer facilitators and 80 WOS partner facilitators
WOS open and field days	75 000 women farmers participate in field days			Stick to the 24 000 women	The 75 000 is too high considering the cultural restrictions for women to go out.
Provision of small ruminants: 960 small ruminants distributed to WOS	960	600	360	Indicator should be small ruminants provision to 960 WOS	This means at least one small ruminant per WOS
Provision of backyard poultry to women *Target: 960 poultry distributed to WOS*	960	600	360	Indicator should be poultry provision to 960 WOS	This means at least one bird per WOS
WOS by FAO staff	80	50	30	The budget only shows the Rural Support Programme Networks. The narration only emphasizes the Rural Support Programme Networks. It is only in the GAP that the number of WOS by farmer facilitators is given and then by interpretation it means 640 WOS are by partners.	To breakdown the number of WOS initiatives as WOS by FAO staff, by farmer facilitators and by the Rural Support Programme Networks
WOS by farmer facilitators (GAP)	240	150	90		
WOS by partner	640	400	240		
2.3.3 Number of farmers trained on partner demonstration plots	1 980 plots 62 000 farmer	38 750	23 250	In the budget, this activity is budgeted under Activity 2.3.1 and must be corrected to Activity 2.3.3.	There is a mismatch when reporting because the physical progress narration and the budget report do not correspond.
Letter of agreement with government (GCF = 36+ Punjab = 450 + Sindh = 234)	720 plots 18 000 farmers	11 250 450 plots	6 750 270 plots	The allocation of the funds does not match the target per district. The funding is (GCF = 36 +Punjab = 450 + Sindh = 234)	The financing source should be one. These letter of agreements should be financed by the co-funds and each source of funds equal

Indicator/or item description	Current target/ number/ status	Punjab targets	Sindh targets	Proposed changes	Reasons {why}
					to the target number for that province.
Letter of agreement with non-governmental organizations, community- based organizations/producer organizations and partner projects (GCF = 38 Punjab = 475 + Sindh = 247)	760 plots 19 000 farmers	475 plot 11 875 farmers	285 plots 7 125 farmer	The allocation of the funds does not match the target per district. The funding is (GCF = 38 Punjab = 475 + Sindh = 247)	The financing source should be one. These should be financed by the co-funds and each source of funds equal to the target number for that province.
Private sector (GCF = 40 + Punjab = 305 + Sindh =155)	*500 plots 25 000 farmers*	0	0	One source of funds	The number of farmers trained per plot is 50, yet for other plots it is 25. These should be financed by the grant funds.
Activity 2.3.4 Field days at CBFS, WOS and demonstration plots	**101 600**	**63 500**	**38 100**	Number to be equal to the total number of plots in Activities 2.3.1, 2.3.2 and 2.3.3	The budget is only for 624: one field day yet each CBFS is two seasons of training. The budget for 624 is small. It is not clear as to how the other field days should be catered. The total number of beneficiaries adds to more than 200 000 (101 600 +101 600). There is inconsistency between the logframe, the activity numbers in the project proposal narration and the implementation plan. The figure is 250 000 in the narration.
Field days at WOS	24 000	15 000	9 000	Field days at WOS	24 000
WOS open and field days (GAP)	75 000women farmers participate in field days				The 75 000 is too high considering the cultural restrictions for women to go out.
SMS/voice mass broadcasting on climate-resilient agriculture for women	*30% of broadcasting targets women*				Female access to mobiles is limited. Most women use male household phones.
Provision of information and communications technology	*100% of WOS established are equipped with a tablet*			At least 96 WOS established, or at least 280 WOS farmer	The budget is very small and for only 296.

Indicator/or item description	Current target/ number/ status	Punjab targets	Sindh targets	Proposed changes	Reasons {why}
equipment for WOS	*and a projector*			facilitators are equipped with a tablet	

Source: Authors' own elaboration.

In Appendix 2, you can find the updated version of the logical framework, with the targets and indicators that have been adapted and highlighted, reflecting adjustments made due to the three types of issues identified.

In a second stage, the Evaluation Team conducted another revision of the logical framework while assessing the project's performance rate at interim (see Subsection 3.8 and Appendix 15). While doing so, the Evaluation Team identified some additional concerns in the core indicators and in the outcome and output targets. This made it challenging at times for both the project team to effectively monitor the indicators and the Evaluation Team to verify the achievement rates at interim reported in the annual performance reports.

The project team had already introduced one change to the expected outcome A6.0 (increased generation and use of climate information in decision-making). The project team identified an issue with the indicator A6.2 (use of climate information products and services in decision-making in climate-sensitive sectors) and its selected means of verification, for instance, measuring the level of reliability of water distribution through average fluctuations in soil moisture (percentage). While effective monitoring of soil moisture for water distribution is an example of using climate information in decision-making, the project team considered this indicator too challenging to measure reliably due to the lack of existing databases and costly tools. The project team instead suggested capturing if and to what extent the beneficiaries are making use of the evidence generated by the project through a survey.

The following summarizes additional changes suggested by the Evaluation Team, which we believe would further the project's performance monitoring system (see Appendix table 3). While some of them require only minor adjustments to be integrated into the current monitoring system, others imply a more thorough revision of the assumptions or interim and final targets. The Evaluation Team is aware that it might not be feasible to implement all of the suggested changes at this stage of the project. Nevertheless, we considered it important to document them as valuable lessons learned.

A. Adaptation Core Indicator 1. Direct beneficiaries (unit: number of individuals and percent)

i. The interim target for direct beneficiaries is an estimate based on the number of agricultural households that are expected to be reached through project trainings by the end of Project Year 3 multiplied by the average number of people (6.5).

ii. The project also aims to reach a 49 percent share of female direct beneficiaries.

iii. The current monitoring system counts the number of direct beneficiaries with the following method.

- *Male direct beneficiaries:* by assuming that each FFS enrols 25 farmers, the total number of FFS initiatives established each year is multiplied by 25 to get the total number of male beneficiaries enrolled. This number is then multiplied by the average household size of 6.5 to get the estimate of the total number of male beneficiaries reached.
- *Female direct beneficiaries:* by assuming that each WOS enrols 30 farmers, the total number of WOS initiatives established each year is multiplied by 30 to get the total number of female

beneficiaries enrolled. This number is then multiplied by the average household size of 6.5 to get the estimate of the total number of female beneficiaries reached.

- The share of female beneficiaries is estimated based on the total number of male and female beneficiaries.

Key issues and recommendations

i. The current method to estimate the number of male and female direct beneficiaries:
   - is based on the assumption of 6.5 household members for each household.
   - does not reflect a realistic household composition – all household members of the FFS beneficiaries are counted as male, and all household members of the WOS beneficiaries are counted as female.
   - is based on the assumption that every FFS enrols exactly 25 farmers and every WOS enrols exactly 30 women.

The Evaluation Team recommends collecting basic household composition information when enrolling the direct beneficiaries, such as household size and number of male and female members to allow for an exact counting of total direct beneficiaries disaggregated by sex. Furthermore, beneficiary's registries with the exact number of men and women enrolled per school should be collected in a digitalized format and used to count the number of farmer beneficiaries.

ii. While the target of a 49 percent share of direct female beneficiaries is ambitious and commendable, it might not be fully realistic due to the gender dynamics rooted in Pakistani society – especially among the rural population. An evidence-based review of the current target is advised to ensure that the logical framework has achievable goals, which would otherwise give the impression of the project's underperformance.

B. Adaptation Core Indicator 2. Indirect beneficiaries (unit: number of individuals and percent)

i. The current number of indirect beneficiaries is based on data from the Pakistan Broadcasting Corporation and refers to the average number of listeners in the project areas, which will be reached by media campaign.

Key issues and recommendations

The current method assumes that the project will reach every possible listener in the project areas without verifying whether this assumption is correct. The Evaluation Team recommends triangulating the existing data with additional monitoring data, such as through a phone survey of a sample of the targeted population, to ensure that the reported numbers are in line with the project's achievements.

C. A2.0 Increased resilience of health and well-being, and food and water security: number of food-secure households

i. The indicator has a baseline value in percentage, defined as the share of food-secure households. However, the interim and final targets are expressed in the total number of food-secure households.

Key issues and recommendations

i. The baseline value and targets are not directly comparable.

ii. The success rate of this indicator is influenced by the methodology used to estimate the total number of direct beneficiaries, which builds on a set of assumptions that might not hold.

iii. The Evaluation Team suggests choosing an indicator whose success rate is not influenced by the methodology adopted to count direct beneficiaries.

The Evaluation Team advises to standardize the baseline value and the targets, and to express the targets in percentage rather than number of households. Furthermore, the Evaluation Team suggests revising the targets based on existing evidence of the impacts of the adoption of climate-resilient agriculture and OFWM practices on food security rates.

D. A5.0 Strengthened institutional and regulatory systems for climate-responsive planning and development: number and level of effective coordination mechanisms

i. There are three types of mechanism: i) mechanism to facilitate coordination between federal and provincial authorities; ii) mechanism to facilitate coordination between the Department of Agriculture and the Department of Irrigation in Punjab; and iii) mechanism to facilitate coordination between the Department of Agriculture and the Department of Irrigation in Sindh.

ii. The level for each coordination mechanism is expressed on a scale from one to four. Each level refers to a different degree of effectiveness:

- 1 = no coordination mechanism
- 2 = coordination mechanism in place
- 3 = coordination mechanism in place, meeting regularly with appropriate representation (gender and decision-making authorities)
- 4 = coordination mechanism in place, meeting regularly, with appropriate representation, with appropriate information flows and monitoring of action items or issues raised

iii. The project team conducted an institutional capacity assessment to identify existing gaps that prevent the coordination mechanism to effectively mainstream climate change considerations into sectoral policies. Building on the assessment learnings, an internal FAO policy and coordination workshop was held in October 2024, which further refined recommendations for enhancing coordination frameworks. Finally, two provincial workshops were organized to establish taskforces at both the federal and provincial levels.

Key issues and recommendations

i. With the current selected indicator, it is not clear whether the unit of measure reported in the 2024 Annual Performance Report, both for the baseline value and the interim and final targets, is the number of coordination mechanisms established, or their level. The Evaluation Team advises clarifying which unit is the measuring and monitoring indicator.

ii. Supportive evidence in the form of reports and workshop summaries has been provided to justify the reported project's achievements as of 2024. Nevertheless, the Evaluation Team believes that the link between the activities conducted and how they translated into the baseline and interim values could be strengthened. For example, the Evaluation Team suggests building on the four-level effectiveness scale chosen to classify coordination mechanisms and identify a set of criteria or objectives to be achieved in order to be awarded a specific level. The evidence coming from project activities, such as workshops and assessments, should be used to identify the achievement or not of such objectives, and therefore justify more clearly how the effectiveness level of each coordination mechanism was assessed.

E. A8.0 Strengthened awareness of climate change threats and risk reduction processes: number of males and females made aware of climate threats and the related appropriate response (number of persons)

i. The indicator uses data from the Pakistan Broadcasting Corporation of average number listeners in the project areas and assumes that every listener was reached by the project's media campaign.

Key issues and recommendations

i. The assumption that every average listener was reached by the project's media campaign is not triangulated and validated with any other project monitoring data.

ii. Currently, this indicator reports the share of population reached by media campaigns, not a change in their level of awareness.

By exploiting the baseline household survey conducted at the start of the project, the Evaluation Team recommends surveying a representative subsample of the respondents and reporting changes in awareness against the baseline values. Such a survey should be conducted regularly, not just at the end of the project, as initially intended. This will allow for monitoring the progress of the project without relying on unverifiable data and for measuring changes in awareness.

F. Component 1. Change in trained staff's capacity to utilize project-supported information systems, which will be measured by assessing their: i) understanding of relevant climate information; ii) knowledge of where to find this information; and iii) knowledge of how to use this information in their work

i. Pre- and post-training assessments have been conducted with all the trained staff to assess changes in the three selected indicators.

Key issues and recommendations

i. While the selected monitoring method and sampling strategy is appropriate, the response rate was around 47 percent. The project team should ensure that an adequate response rate is reached for the results to be valid. For example, beneficiaries could be contacted by phone to remind them to complete the assessment.

G. Component 2. Change in farmers' understanding of climate-resilient agriculture and OFWM practices as a result of trainings provided by extension workers, partner field staff and farmer facilitators

i. While it was initially planned to conduct both pre- and post-training assessments with the FFS beneficiaries, the 2024 Annual Performance Report mentions that only post-training assessments were conducted at the end of each training cycle.

Key issues and recommendations

i. The lack of pre-assessment data does not allow for monitoring any changes in beneficiaries' understanding of climate-resilient agriculture and OFWM, but only to record a snapshot of the level of the trained population. The current estimation methodology does not satisfactorily report to the selected indicator. As a result, the Evaluation Team advises to ensure that pre- and post-training assessment are conducted with every cohort of beneficiaries in the second half of the project.

ii. When conducting the pre- and post-training assessments, the monitoring team should ensure that:

- The sample targeted by the assessments is representative of the trained population.
- The response rates are appropriate.

H. Component 2. Proportion of farmers trained by the project who begin to apply climate-resilient agriculture and OFWM practices on their fields before the completion of their respective project trainings

i. The logical framework mentions that this indicator will be monitored through: i) assessments by farmers' trainers during (and at completion of) project trainings; and ii) randomized site visits to farmers' fields by project monitoring specialists.

Key issues and recommendations

i. It is not clear how trainers had been assessing how many farmers apply climate-resilient agriculture and OFWM practices before the completion of the survey, and how this information is recorded. The Evaluation Team recommends monitoring this indicator through the pre- and post-assessments conducted with farmers (see Paragraph G).

ii. Project monitoring specialists' randomization of field visits should be documented. The selection of sites should be justified and collected data should be attached to the annual performance report as evidence.

In conclusion, the Evaluation Team suggests conducting a more thorough review of the logical framework to capitalize on the lessons learned in the first half of the project. A mapping exercise should be conducted for every indicator to ensure that:

i. the selected indicators are relevant and measurable;

ii. the selected methodology to monitor each indicator is clearly documented and justified;

iii. data sources for each indicator are clearly established to feed annual performance reporting; and

iv. monitoring data are clean and updated periodically.

The Evaluation Team believes that the implementation of these recommendations will ease the annual reporting efforts of the Country Office and increase the project's transparency and accountability.

Appendix table 3. Analysis of the logical framework by the Evaluation Team

Expected result	Indicator	Assumption	Methodology	Baseline	Target		Key issues	Recommendations
					Interim target	Final target		
Adaptation Core Indicator 1	Direct beneficiaries of the GCF-funded project/programme	Average household size of 6.5	The total number of beneficiaries enrolled in each activity is multiplied by the average household size to estimate the total number of direct beneficiaries.	0	400 000	1.3 million	Not every household in Pakistan has 6.5 members, and the project might be overestimating or underestimating the number of direct beneficiaries reached.	Collect household's size information when enrolling each beneficiary to have a precise estimate of the total number of beneficiaries reached.
	% Female		Each household member of male beneficiary is counted as "male", and each household member of female beneficiary is counted as "female".	0%	49%	49%	The estimation does not reflect the real household composition nor the real number of female beneficiaries, but rather the number of WOS initiatives opened relative to the total number of schools.	Collect household's composition information (i.e. number of males and females per household) when enrolling each beneficiary to have a precise sex disaggregated data.
							The target of a 49% share of direct female beneficiaries might not be realistic due to the gender dynamics rooted in Pakistani society.	An evidence-based review of the current target is advised to ensure that the logical framework has achievable goals.
Adaptation Core Indicator 2	Indirect beneficiaries of the GCF-funded project/programme		Data from the Pakistan Broadcasting Corporation on the average number of listeners in the	0	0	16 million	It is assumed that every possible listener will be reached by the project in the targeted areas.	Triangulate the Pakistan Broadcasting Corporation with an additional data source to verify if the assumption is correct.

Expected result	Indicator	Assumption	Methodology	Baseline	Target		Key issues	Recommendations
					Interim target	Final target		
			project areas are used to estimate indirect beneficiaries.					
	% Female			0%	49%	49%		
Adaptation Core Indicator 3	Number of total beneficiaries relative to total population		Government official statistics of % of rural population in project areas	0%	0%	8% of total rural population in project areas		
	% Female		Government official statistics of % of rural female population in project areas	0%	0%	4% of total rural female population		
A1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions	A1.2 Number of males and females benefiting from the adoption of climate-resilient livelihood options (including agriculture, fisheries, tourism, etc.)		Baseline and Completion Surveys	0	0	1.3 million people (664 000 male and 636 000 female)		
A2.0 Increased resilience of health and well-being, and food and water security	A2.2 Number of food-secure households (in areas/periods at risk of climate change impacts)		Baseline and Completion Surveys	65% of surveyed households are food secure	0	200 000 households	Mismatched between final target, expressed in number of households and baseline value expressed in percentage	Adopt the same unit of measure consistently across targets and indicator
							Targets are based on the expected number of direct beneficiaries, so on the assumptions set to make the estimation.	Set the targets in percentage rather than number of households, and conducted a literature review of existing evidence to select a realistic value.

Expected result	Indicator	Assumption	Methodology	Baseline	Target		Key issues	Recommendations
					Interim target	Final target		
Outcomes that contribute to fund-level impacts								
A5.0 Strengthened institutional and regulatory systems for climate-responsive planning and development	A5.2 Number and level of effective coordination mechanisms		Three types of mechanisms across four different levels of effectiveness	Mechanism to facilitate coordination between federal and provincial authorities: Level 1 Mechanism to facilitate coordination between the Departments of Agriculture and Irrigation in Punjab: Level 1 Mechanism to facilitate coordination between the Departments of Agriculture and Irrigation in Sindh: Level 1	Mechanism to facilitate coordination between federal and provincial authorities: Level 2 Mechanism to facilitate coordination between the Departments of Agriculture and Irrigation in Punjab: Level 2 Mechanism to facilitate coordination between the Departments of Agriculture and Irrigation in Sindh: Level 2	Mechanism to facilitate coordination between federal and provincial authorities: Level 4 Mechanism to facilitate coordination between the Departments of Agriculture and Irrigation in Punjab: Level 4 Mechanism to facilitate coordination between the Departments. of Agriculture and Irrigation	It is not clear if the performance is assessed against the number of coordination mechanisms established, or their level, or both. Despite evidence of assessments and workshops has been shared, the link between activities conducted and results achieved could be strengthened.	Clarify which unit(s) of measurement is used to monitor the indicator. Refine the way in which the evidence collected through assessments and workshops inform the value attributed to the indicator.
A6.0 Increased generation and use of climate information in decision-making	A6.2. Use of climate information products/services in decision-making in climate-sensitive sectors		Survey with government staff and farmers	Not applicable	Not applicable	75% of government staff and 70% of farmers		
A7.0 Strengthened adaptive capacity and reduced exposure to climate threats	A7.2 Total geographic coverage of climate-related early warning systems and other risk reduction measures	Each weather station covers a radius of 25 km, and their coverage does not overlap.	Total number of weather stations is multiplied by their coverage in kilometres, and then	1.2 million ha	5 million ha	5 million ha	Based on the provided numbers by the project team, neither the baseline value (five stations) nor the	Revise the calculation performed and correct the reported values.

Expected result	Indicator	Assumption	Methodology	Baseline	Target		Key issues	Recommendations
					Interim target	Final target		
	established/ strengthened (ha)		transformed into hectares				interim target (seven) have been calculated correctly.	
A8.0 Strenghtened awareness of climate change threats and risk reduction processes	A8.1 Number of males and females made aware of climate threats and related appropriate responses	Based on the Pakistan Broadcasting Corporation of the average number of listeners in the project areas, it is assumed that the campaign reaches everyone in the targeted area.	Based on the Pakistan Broadcasting Corporation data, the average number of listeners in the project areas counted as beneficiaries reached	0	650 000	10 million	The assumption that every listener was reached by the project media campaign is weak and not properly documented.	Conduct a survey with a representative sample to estimate a realistic number of population reached by the awareness campaign.
							Currently, the indicator measures the share of population reached the by awareness campaign, not changes in their awareness.	Report against the values collected with the baseline household survey. By selecting a subsample, conduct periodic surveys to monitor the indicator.
Outputs that contribute to outcomes								
Component 1. Enhancing information services for climate change adaptation in the water and agriculture sectors								
Irrigation/water management departments use a functional evapotranspiration-based water monitoring and management system to rationalize the distribution of water resources according to actual crop water requirements and government priorities	Change in awareness, knowledge and understanding of irrigation/water management department staff (in Punjab and Sindh) in relation to current water resources, water-use patterns and water needs in the agriculture sectors in their respective provinces		Pre- and-post assessment with beneficiaries trained	0	75%	100%	Response rate is low (46%)	Contact beneficiaries by phone to remind them to complete the assessment. The indicator refers to three aspects – awareness, knowledge and understanding – but should focus on a single aspect based on how it is measured.
ACWA Portal accessed	Share of portal return visits by users in the		Site user statistics	0%	20%	50%	Portal not active; assessed during the final evaluation	

Expected result	Indicator	Assumption	Methodology	Baseline	Target		Key issues	Recommendations
					Interim target	Final target		
	Indus Basin in proportion to unique visitors (%)							
Component 2. Building on-farm resilience to climate change								
Extension workers, partner field staff and farmer facilitators are skilled in promoting climate-resilient agriculture and OFWM practices	Change in farmer understanding of climate-resilient agriculture and OFWM practices as a result of trainings provided by extension workers, partner field staff and farmer facilitators		Pre- and post-assessment with beneficiaries trained	0%	80%	100%	Only post-assessments have been conducted, so the indicator cannot measure change reliably.	Ensure that both pre and post-assessments are conducted for all future cohorts of beneficiaries.
Farmers are skilled in using climate-resilient agricultural practices	Proportion of farmers trained by the project who begin to apply climate-resilient agriculture and OFWM practices on their fields before the completion of their respective project trainings		Assessments by trainers of farmers' actions during (and at completion of) project trainings Randomized site visits to farmers' fields by project monitoring specialists	0%	70%	90%	The methodology used by the trainers to assess the extent to which farmers adopt climate-resilient agriculture and OFWM practices before the end of the training is unclear.	Instead of conducting a different assessment, incorporate a measurement of this indicator in the pre- and post-assessments conducted with beneficiaries.
							Randomized field visits undocumented	Project monitoring specialists randomized field visits should be documented. The selection of sites should be justified and the data collected should be attached to the annual performance report as evidence.
Component 3. Creating an enabling environment for continued transformation								
Heightened awareness, understanding and action by farmers throughout the	Number of farmers reached through awareness-raising campaigns who have begun to apply at least		Baseline and Completion Surveys (including knowledge, attitudes and practices survey)	0	0	1 million	Will be assessed during the final evaluation	

Expected result	Indicator	Assumption	Methodology	Baseline	Target		Key issues	Recommendations
					Interim target	Final target		
project area with regard to climate change issues	one project-promoted climate-resilient agriculture and OFWM practice		Mobile phone-based feedback system					
Relevant federal and provincial government staff capacity in place for use of climate information in policymaking	Change in trained staff's capacity to utilize project-supported information systems, which will be measured by assessing their: i) understanding of relevant climate information; ii) knowledge of where to find this information; and iii) knowledge of how to use this information in their work (%)		Pre- and post-training assessments	0	70%	100%	Response rate is low (46%)	Contact beneficiaries by phone to remind them to complete the assessment. The indicator refers to three aspects –awareness, knowledge and understanding – but should focus on a single aspect based on how it is measured.
Farmers have access to and use services that enable them to adopt climate-resilient practices	Percent of targeted farmers to be reached through the structured extension activities (Component 2) who have diversified their use of financial services and/or value chain		Baseline and Completion Surveys Project progress and training reports Pre- and post-training assessments	0	30%	30%	Will be assessed during the final evaluation	
	Proportion of union councils in which private service providers (input dealers, agrotechnicians, farm management consultants) provide specialized services to a growing clientele of farmers adapting to climate change		Product catalogues of input dealers Specialized agrotechnician and consultant database Annual telephone survey among trained agrotechnicians and consultants on number of clients Project completion survey	0	60%	90%		

Appendix 9. Impact evaluation plan for final evaluation

For the final evaluation of the "Transforming the Indus Basin with Climate Resilient Agriculture and Water Management" project, the Evaluation Team will assess the impact of the CBFS on farmer resilience, which is a central activity under Component 2 of the project. Although this component also includes the WOS, we will focus solely on the CBFS due to the higher willingness of villages to participate compared to the WOS. The impact evaluation strategy depends on our ability to enrol villages that will be randomly selected to determine the order of participation. The goal of Component 2 is to transfer climate-resilient agriculture and OFWM techniques through various strategies, with FFS being the primary mechanism for engaging farmers at the village level.

General process of establishing a CBFS

i. Prioritization of areas: the project identifies provinces, districts and union councils for intervention based on a combination of geographic information system data and government endorsements. The methodology employed includes a two-stage MCDA conducted by the FAO Pakistan Country Office and validated by the Government of Pakistan. Geospatial analysis was also carried out to identify the relevant areas.

ii. Annual village selection: each year, the project, in coordination with the government and in concordance with some criteria (priority given to villages with larger populations; avoidance of duplication of different activities), determines which villages will receive treatment.

iii. Village introduction and willingness assessment: the project is introduced to selected villages, and the willingness of the village to participate is evaluated.

iv. Village profile and farmer selection: the project team gathers a village profile and requests a list of 25 potential farmer candidates from the village committee. This was done at the time of the climate-resilient Agripackage distribution. Later, however, the FAO team shared criteria and presented the willingness and interest among farmers who were selected for a year-long training under the CBFS.

v. Beneficiary screening: the M&E team reviews the candidates to ensure that they meet the project's beneficiary criteria. This activity is done for a counter check regarding transparency and accountability.

vi. Curriculum design: using the village profile, the project designs a curriculum customized to the specific needs of that village.

vii. Farm selection to establish the learning plot in the CBFS: the host farmers were selected from the registered farmers after agreeing on the given criteria for the provision of a piece of land for a learning plot.

viii. Provision of materials: the implementation team provides pedagogical materials and inputs for demonstration plots on selected farms.

ix. Farmer meetings: farmers meet weekly and biweekly for one year to follow the curriculum that is specific to their village.

Impact evaluation strategy

Based on internal discussions with the GCF project team in Pakistan, we have identified the prioritized union councils where the FFS has not been established, nor the CBFS or the WOS. Although the enrolment and establishment of the CBFS are typically completed within the same year, we have received confirmation that the early identification of villages and farmers for future participation is possible. This creates an opportunity to conduct an impact evaluation through a randomized controlled trial phase-in approach, with randomization happening at the cluster level (village). According to this strategy, the control group will consist of villages randomly assigned to the delayed entry group, whose farmers will be enrolled in the CBFS the following year.

Given that the project experienced significant delays in its implementation, the impact evaluation strategy is based on the recommendation to request a two-year extension of the current project's end date (1 March 2026). To evaluate the project, we aim to collect data in four rounds.

Stages	**CBFS participants 2025**	**CBFS participants 2026**	**CBFS participants 2027**
Baseline survey (before beginning of the Kharif season)			
Kharif season 2025 (from April to November)			
Rabi season 2025 (from November to March)			
Second round data collection			
Kharif season 2026 (from April to November)			
Rabi season 2026 (from November to March)			
Third round data collection			
Kharif season 2027 (from April to November)			
Rabi season 2027 (from November to March)			
Final round data collection			

Pending selection	Selected	CBFS in progress	CBFS completed

All data collection must be completed before the respective CBFS becomes operational in each village. Since the classes are designed to cover the Kharif and Rabi seasons, surveys must be conducted prior to the Kharif season each year. For instance, if a village is scheduled to begin its CBFS in 2025, data will be collected before the classes start that year and again in 2026, after the group completes the curriculum. An additional round of data collection one year later will help to assess whether the project's impact is sustainable over time.

The evaluation strategy for this project relies on the selection of villages to participate in the project. To ensure a rigorous design, we will require a list of at least 180 villages over the next three years, allowing us to randomize which villages will participate each year.

The strategy involves selecting triplets[18] of nearby villages and randomly assigning one to participate in 2025, another for delayed entry in 2026 and a third to participate in 2027. Each village assigned to delayed entry in 2026 and 2027 will be used as control. This approach will allow us to maintain a control group each year with characteristics similar to those of the treatment group. The selection of villages will follow the same criteria originally used by the project to determine participation, ensuring that villages are close enough to be comparable but far enough apart to prevent the transfer of knowledge from the CBFS between villages.

[18] Depending on the duration and the expected number of future cohorts of participants, a comparison between a single treatment and a control group may be conducted. In such cases, pairs may be used in place of triplets.

Given the project's significant spillover potential, we aim to measure the impact of the CBFS on farmers within the same village who were not directly involved. To do this, we will identify farmers who meet the same criteria but are not direct participants in the project. The FAO Office of Evaluation will conduct a census in the prioritized villages selected by the project team before participants are chosen. This census will generate a list of eligible farmers for each village. From this list, the village committee will select 25 farmers to participate in the project. Additionally, the complete list will help us to identify a second comparison group: farmers who meet the project's criteria but whose only connection is their presence in a village with a CBFS. The changes in this comparison group's characteristics will help to measure the spillover effects generated by the CBFS. The project team is welcome to suggest any vulnerable variables that should be collected during this characterization process.

Evaluation concerns: potential biases

i. Prioritization bias: since provinces, districts and union councils are prioritized based on specific criteria, the evaluation variables may show differences compared to non-prioritized areas. This includes differences in observable factors such as geographic conditions and infrastructure, as well as impact evaluation variables due to project design. The strategy will use just villages in the prioritized union councils, which means that both the control and treatment groups will share similar characteristics.

ii. Village-level selection bias: villages have the autonomy to choose whether to participate. This can lead to self-selection bias, where villages that are more motivated or have greater resources may be more likely to join. This leads to unobservable differences between participant and non-participant villages. The strategy will use just villages that show interest in the project.

iii. Farmer-level selection criteria bias: the farmer is selected based on specific criteria. As a result, the farmers who join the CBFS might not represent the average farmer in the area. This leads to differences in observable characteristics (for example, farm size, wealth, education) compared to non-selected farmers. The strategy will collect information from farmers that meet the given criteria.

Analysis

To measure climate resilience in an agricultural context, the literature suggests using various indicators that focus on different dimensions such as social, economic, ecological and institutional factors (Srinivasa Rao *et al.*, 2019). In Appendix table 4 we provide a list of indicators to measure climate resilience.

Appendix table 4. Climate resilience indicators

Type	Indicator	Definition	References
Ecological	Crop biodiversity	The summation of the square of acreage share across crops grown in the region (Simpson Diversity Index, which is reciprocal of the Herfindahl index)	European Commission Joint Research Centre, Institute for Environment and Sustainability (2015) Belcher, Boehm and Fulton (2004) Marchettini *et al.* (2003)
	Pesticide usage	The quantity of pesticides applied per unit area (ha)	Zahm *et al.* (2008) Zhen and Routray (2003) Halberg (2012)
	Cropping intensity	The ratio between gross cropped areas divided by net sown area in a year (%)	Gómez-Limón and Riesgo (2009)
	Fertilizer usage	The extent of fertilizer use/unit area i.e. intensity or optimum usage	López-Ridaura *et al.* (2005) Zhen and Routray (2003)
	Agriculture waste utilization	Ratio of crop and/or animal by-products that are used up or recycled in agriculture itself	Bos *et al.* (2007)

Type	Indicator	Definition	References
	Fertilizer use efficiency	Yield response of fertilizers	Belcher, Boehm and Fulton (2004)
Economic	Gross value added from crops	The gross value addition in monetary terms from various crop enterprises calculated per ha/year	Belcher, Boehm and Fulton (2004)
	Non-farm income	Earnings of members of agricultural household from non-farm sources	López-Ridaura *et al.* (2005) Zhen and Routray (2003) Belcher, Boehm and Fulton (2004)
	Per capita food supply	Proportion of population with secure food supply by self or government support	Zhen and Routray (2003) Herendeen and Wildermuth (2002)
	Poverty rate	Share of population defined as poor (below poverty line) (%)	European Commission Joint Research Centre, Institute for Environment and Sustainability (2015) Spangenberg (2002) Yli-Viikari, Risku-Norja and Aakkula (2012) Morse *et al.* (2001)
Social	Human development index	Composite measure of life expectancy, education and per capita income	Fernandes and Woodhouse (2008)
	Adoption of improved practices	Indicates the adoption of available technologies that will improve agricultural/farm productivity	Kareemulla, Venkattakumar and Samuel (2017)
Institutional	Access to extension services	Proportion of farmers having access to or availing extension services	Belcher, Boehm and Fulton (2004)
	Farm credit	Institutional and other sources of credit disbursed or availed per unit area	Belcher, Boehm and Fulton (2004)

Source: Adapted from Srinivasa Rao *et al.*, (2019).

In addition, we will evaluate the Food Insecurity Experience Scale, which is an experience-based measure of food security. The Food Insecurity Experience Scale collects self-reported information on food-related behaviours and experiences related to resource constraints, generating a statistical scale that classifies households as moderately or severely food insecure. We will also assess the food consumption score, which measures household dietary diversity and food consumption frequency across nine food groups, assigning a score from 0 to 112 based on nutritional value. Other indicators may be included based on the unintended results of this interim report.

Estimation strategy

We are primarily interested in the average treatment effect on the treated, that is, the ATT of the CBFS activities, β_{ATT}, on a range of outcomes that we will describe later in the appendix. We estimate this measure of impact from the following analysis of covariance, ANCOVA, regression (McKenzie, 2012):

$$Y_{ij,t} = \beta_{ATT} T_{ij} + \theta Y_{ij,t_0} + \alpha_{dt} + \varepsilon_{ij,t} \qquad (1)$$

where $Y_{i,t}$ and Y_{ij,t_0} represent the outcome of interest for beneficiary i in cluster j and year t and t_0 (the baseline), respectively. The variable T_{ij} is a dummy variable that indicates when individual i receives the treatment (CBFS). This variable takes the value of 0 during the first year for each individual and changes to 1 in the year they receive the treatment and for all subsequent periods. We include a set of district fixed effects α_{dt}, (required because the probability of assignment to treatment varies by strata), and ε_{it} is an individual clustered error term.[19]

Power calculation

Based on the proposed impact evaluation strategy, power analysis has been conducted to estimate the Minimum Detectable Effect (MDE) for both the treatment group compared to the control group, and the treatment group compared to the spillover group. Different scenarios have been simulated to test how the number of clusters and cluster size affect the MDE.

Throughout all the scenarios tested, significance level α and power of the test β equal to 0.05 and 0.8 respectively have been assumed and kept constant. The MDE has been estimated for eight outcome variables including the resilience capacity index, the food consumption score, the Food Insecurity Experience Scale and coping strategies, which have been standardized to ensure comparability in terms of the estimated MDE.[20] Mean difference between groups compared, as well as the intracluster correlation coefficient,[21] has been estimated using the baseline survey of the project.

Appendix figure 1 shows the relationship between the number of clusters and the MDE between treatment and control groups for each of the eight outcome variables. Five different scenarios have been tested, with the number of clusters increasing from 40 (20 for treatment and 20 for control group) to 120 (60 each). The cluster size is 25, and it is kept constant and equal across groups considering that it is a project requirement that 25 farmers are enrolled in each village. As expected, increasing the number of clusters decreases the MDE, with the main difference being between 40 and 60 clusters (-0.09 equivalent to a reduction of 18 percent in the MDE), after which each addition of 20 clusters reduces the MDE proportionally less.[22] This is shown by the progressive reduction in inclination of the curves in the graph (see Appendix tables 5 and 6 for full table).

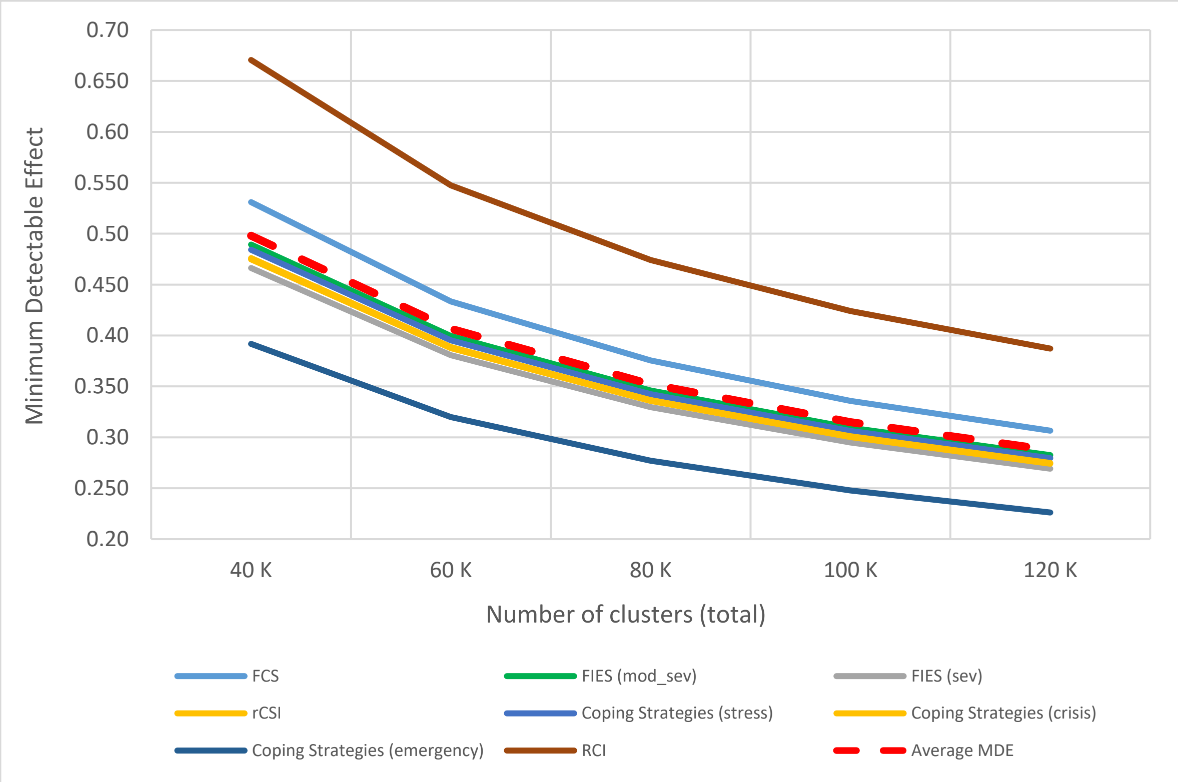
[19] Robustness analysis will be conducted by using the simple difference at the follow up between treatment and control units or a difference-in-difference estimation approach. Under randomization, we expect the point estimates to be virtually identical across the three models, but ANCOVA is expected to be more efficient for those outcomes with low autocorrelation. In case of relevant baseline imbalances, we will use the same ANCOVA equation, while including a list of control variables.

[20] Since the eight outcome variables analysed are measured at different scales, with some being continuous and some binaries, they have been normalized through a z-score standardization ($z = \frac{x-mean}{std.dev}$) before performing a power analysis to ensure comparability of the estimated MDE across them.

[21] Intracluster correlation coefficients were calculated with an ANOVA model by regressing the outcome indicators of interest on the treatment status and controlling for village (cluster) using the Stata loneway command. The selected outcome indicators are the food consumption score, the Food Insecurity Experience Scale (both moderate and severe prevalence), the resilience capacity index, a reduced coping strategy index and livelihood coping strategies. Two observations in the treatment group were dropped due to missing village names, which makes it impossible to attribute them to a cluster.

[22] This is estimated on the average MDE across the eight outcome variables by number of clusters.

Appendix figure 1. Minimum Detectable Effect of outcome variables by total number of clusters



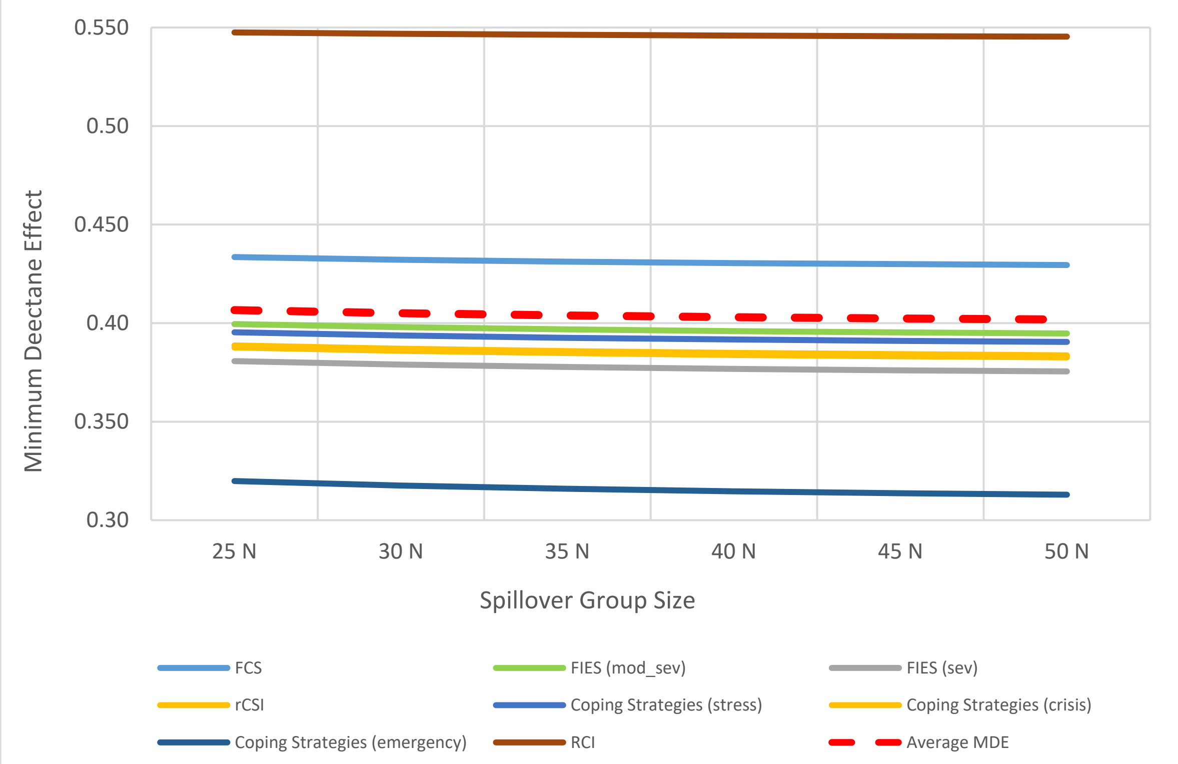
Note: Calculations were done using the baseline dataset collected for the project in May 2022. Significance level α and power of the test β are equal to 0.05 and 0.8. We use 25 observations per cluster, and equal number of clusters between treatment and control groups. The MDE analysis was performed on a longitudinal design with one baseline and one follow up. Calculations were carried out with power command in Stata accounting for a cluster randomized design,[23] and an intracluster correlation coefficient was estimated with an ANOVA model in Stata on standardized outcome variables. Explanation of legend: food consumption score; Food Insecurity Experience Scale, moderate or severe; Food Insecurity Experience Scale, severe; reduced coping strategy index; livelihood coping strategies (stress, crisis or emergency); and resilience capacity index. The average MDE is the average MDE across all eight variables by number of clusters.

Appendix figure 2 shows the relationship between the cluster size and the MDE between treatment and spillover groups, assuming a sample with 60 clusters (30 for each group). The cluster size of the treatment has been kept constant at 25, as per the project design, while the cluster size of the spillover group varies from 25 to 50. Again, an increase in cluster size decreases the MDE, but the difference after doubling the size is minimal across all eight outcome variables analysed, with an average reduction in the MDE of -0.005,[24] as shown by the almost flat curves in the graph (see Appendix table 5 for full table).

[23] More details on Stata power command for cluster randomized designs are available here: pss-2powertwomeanscluster.pdf (stata.com).

[24] This is estimated on the average MDE across the eight outcome variables by spillover group size.

Appendix figure 2. Minimum Detectable Effect of outcome variables by spillover group size



Note: Calculations were done using the baseline dataset collected for the project in May 2022. Significance level α and power of the test β are equal to 0.05 and 0.8. Sample with 60 clusters in total, 30 for each group. The cluster size of 25 observations were constant for the treatment group, while it increases by five observations until 50 for the spillover group. The MDE analysis was performed on a longitudinal design with one baseline and one follow up. Calculations were carried out with power command in Stata accounting for a cluster randomized design,[25] and an intracluster correlation coefficient was estimated with an ANOVA model in Stata on standardized outcome variables. Explanation of legend: food consumption score; Food Insecurity Experience Scale, moderate or severe; Food Insecurity Experience Scale, severe; reduced coping strategy index; livelihood coping strategies (stress, crisis or emergency); and resilience capacity index. The average MDE is the average MDE across all eight variables by Spillover group size.

In summary, the power analysis shows that the size of the spillover group does not majorly affect the MDE, so increasing the cluster size for the spillover group will increase the power of the model without excessively reducing the MDE. In contrast, variations in the number of clusters have a stronger impact, with almost a 20 percent reduction in the MDE when moving from 40 to 60 clusters. In this case, considering that the analysis assumes a standard power level at 0.8 and significance level at 0.05, there are no reasons to increase the total number of clusters beyond 40 to reach a satisfactory balance between the power of the model, the MDE and the sample size. Assuming we keep the size of the spillover group equal to the treatment group (25 observations per cluster), this approach results in a sample of 1 500 farmers overall per year (500 farmers for each group).[26]

[25] More details on the Stata power command for cluster randomized designs are available here: pss-2powertwomeanscluster.pdf (stata.com).

[26] This involves the total sample estimated on a model with 40 total clusters: 20 for each group and 25 observations for each cluster. This results in a sample of 1 000 farmers per year when comparing treatment and control, and 1 000 farmers per year when comparing treatment and spillover. Nevertheless, observations in the treatment group will be the same, so the total sample is 1 500 farmers per year.

Power calculation tables

Appendix table 5. Minimum Detectable Effect by total number of clusters

	40 K	60 K	80 K	100 K	120 K
Food consumption score	0.531	0.434	0.375	0.336	0.307
Food Insecurity Experience Scale (moderately_severe)	0.489	0.40	0.346	0.309	0.283
Food Insecurity Experience Scale (severe)	0.466	0.381	0.330	0.295	0.269
Reduced coping strategy index	0.475	0.388	0.336	0.30	0.274
Coping strategies (stress)	0.484	0.395	0.342	0.306	0.280
Coping strategies (crisis)	0.476	0.389	0.337	0.301	0.275
Coping strategies (emergency)	0.392	0.320	0.277	0.248	0.226
Resilience capacity index	0.671	0.548	0.474	0.424	0.387
Average MDE	0.498	0.407	0.352	0.315	0.288
Average MDE difference:		-0.09	-0.05	-0.04	-0.03
		(-18.35%)	(-13.40%)	(-10.56%)	(-8.71%)

Note: The average MDE is estimated as the average MDE for all eight outcome variables by total number of clusters. The average difference is estimated by subtracting the 60 K average MDE to the 40 K average MDE and repeating the same for the subsequent models. The average MDE percentage change is estimated in parentheses.

Appendix table 6. Minimum Detectable Effect by spillover group size

	25 N	30 N	35 N	40 N	45 N	50 N
Food consumption score	0.434	0.432	0.431	0.430	0.430	0.429
Food Insecurity Experience Scale (moderately_severe)	0.40	0.398	0.397	0.396	0.395	0.395
Food Insecurity Experience Scale (severe)	0.381	0.379	0.378	0.377	0.376	0.376
Reduced coping strategy index	0.388	0.386	0.385	0.384	0.383	0.383
Coping strategies (stress)	0.395	0.394	0.393	0.392	0.391	0.390
Coping strategies (crisis)	0.389	0.387	0.386	0.385	0.384	0.384
Coping strategies (emergency)	0.320	0.318	0.316	0.315	0.314	0.313
Resilience capacity index	0.548	0.547	0.546	0.546	0.546	0.545
Average MDE	0.407	0.405	0.404	0.403	0.402	0.402
Average MDE difference		-0.002	-0.001	-0.001	-0.001	-0.001
		(-0.39%)	(-0.28%)	(-0.21%)	(-0.16%)	(-0.13%)

Note: The model is with 60 total clusters, 30 for each group. The treatment group size is kept constant at 25 observations. The average MDE is estimated as the average MDE for all eight outcome variables by Spillover group size. The average difference is estimated by subtracting the 30 N average MDE to the 25 N average MDE and repeating the same for the subsequent models. The average MDE percentage change is estimated in parentheses.

Appendix 10. Focus group discussion validation survey

To complement the qualitative data collection, all participants of the 16 FGDs have been profiled through a short questionnaire. Information collected through this survey will better contextualize the results from the FGDs. While post-stratification weights[27] have been estimated and applied, it is important to highlight that the sample analysed is not random. Results cannot be generalized for the whole population of beneficiaries. Rather, they provide an insight on project implementation and help to identify trends and possible concerns that are worth exploring more in depth and monitoring in the next project phase.

Out of 174 participants in the FGDs, 120 (69 percent) are from Punjab and 54 (31 percent) are from Sindh (see Appendix table 8 for full disaggregation by geographic location). Among those interviewed, 48 percent were or are enrolled in the WOS, 40 percent in the CBFS and 12 percent participated in the TOT sessions. The majority of participants are farmers (90 percent), but there are four public employees who participated in the TOT sessions, ten unemployed women who enrolled in the WOS and three independent workers. Further, 68 percent of the interviewed beneficiaries do not live in the same village where the school is, and 57 percent of them have already completed all of the activities. This includes all respondents who were enrolled in 2021 and 2022, and 41 percent and 48 percent of those enrolled in 2023 and 2024, respectively.

In terms of attendance, a willingness to participate in all sessions for the whole duration of the module is one of the eligibility criteria. Attendance for the CBFS is biweekly, while it has been reduced to one session per week for the WOS. Among respondents who already completed all of the planned activities, 71 percent of beneficiaries of the CBFS and 81 percent of beneficiaries of the WOS attended classes once a week or more, while there are no beneficiaries for the TOT. For those who have not completed the activities, the attendance rate is lower with only 57 percent of the CBFS beneficiaries and 36 percent of the WOS who attended sessions at least weekly. For the TOT, 57 percent have attended one activity per year, and 43 percent once quarterly so far. Issues with a low attendance rate seem to relate to the place of implementation, rather than the specific activity. Indeed, in Dera Ghazi Khan (100 percent), Multan (94 percent), Muzaffargarh (100 percent), Badin (100 percent) and Sanghar (100 percent), nearly all beneficiaries of the CBFS and the WOS attended at least once a week. In contrast, 100 percent of the CBFS or the WOS beneficiaries in Khanewal and Umerkot attended quarterly, and 95 percent of beneficiaries in Lodhran attended once per year[28] (see Appendix table 7).

These results suggest that the project might have encountered some implementation issues in Khanewal, Lodhran and Umerkot, so a more in-depth review of the status of activities and attendance rate in these three areas is suggested. Indeed, a low attendance rate will have repercussions on the project's effectiveness, so it is important to identify and address any problem as soon as possible.

[27] Post-stratification weights used for the analysis reflect the beneficiary distribution by district and school type (CBFS and WOS) based on the most updated beneficiaries' list received by the Evaluation Team.

[28] Statistics include only the CBFS and the WOS beneficiaries who started activities between 25 March 2021 and 27 June 2024. Twenty-four observations who started activities after 14 September have been excluded to avoid biases since their attendance start date coincided with the FGD date. This suggests that they are beneficiaries of newly established schools who just started attending classes.

Appendix table 7. Attendance rate by district

	Dera Ghazi Khan	Khanewal	Lodhran	Multan	Muzaffargarh	Badin	Sanghar	Umerkot (Only WOS)
Weekly or more	100%			93.78%	100%	100%	100%	
Monthly				6.22%				
Each other month								
Quarterly		100%	4.93%					100%
Yearly			95.07%					

Note: Statistics include only the CBFS and WOS beneficiaries who started activities between 25 March 2021 and 27 June 2024. Twenty-four observations who started activates after 14 September have been excluded to avoid biases since their attendance start date coincided with the FGD date. This suggests that they are beneficiaries of newly established schools who just started attending classes.

Source: Self-elaborated by authors using data from the FGD validation questionnaire.

Overall, respondents are satisfied with trainers' performance, especially respondents who have not completed the activities.[29] Among those who already completed activities, 87 percent are satisfied with the trainers' skills in session facilitation, 78 percent agree that trainers answered satisfactorily to questions, 80 percent think that trainers managed sessions according to plan and 65 percent think that the trainers adopted adequate teaching techniques. Moreover, there are only three respondents who gave negative feedback on trainers' performance, while the rest is neutral. When disaggregating by school type, most beneficiaries of the WOS and the TOT are satisfied with trainer performance. Among the CBFS[30] respondents, 81 percent are satisfied with trainers' skills in session facilitation, 68 percent think that trainers answered satisfactorily to questions, 72 percent agree that trainers managed sessions according to plan and 51 percent think that trainers adopted adequate teaching techniques. Finally, the Khanewal District exhibited some of the lowest trainer satisfaction ratings, with 14 percent of respondents who think that trainers do not have adequate skills in facilitation, 7 percent do not believe that trainers answered satisfactorily to questions, and 56 percent do not have an opinion on the trainers' management performance and adequacy of teaching techniques. The low attendance rate observed in this district might partially explain the higher dissatisfaction in this area for trainers' performance.

Satisfaction with school activities and infrastructure is rated on a scale from one to five and is overall positive. In fact, 68 percent are satisfied with school infrastructure, 86 percent think activities are well organized, 84 percent consider activities engaging and 82 percent consider activities to be relevant.[31] When comparing different school types, the CBFS beneficiaries are slightly below the average for every category, but there is only one response across all of the categories rated below three, indicating that the averages are skewed by a higher number of neutral rather dissatisfied respondents.

Finally, when asked about additional comments, some farmers expressed interest in expanding the curriculum by adding more topics, for example, livestock management, periodic plan refresher sessions and training for more beneficiaries, such us educated girls. Others requested the provision of agriculture tools and inputs like seeds or kitchen gardening kits, or financial support to be able to access them in the

[29] All beneficiaries who have not completed the activities agree or strongly agree that trainers have adequate skills in session facilitation, leadership, the management of curriculum and teaching strategies.

[30] Only one respondent expressed dissatisfaction with trainer capacity to respond satisfactorily to students' questions, while the rest did not express a positive or negative opinion.

[31] Satisfaction with school activities and infrastructure was rated from one (very bad) to five (very good). Statistics report the percentage of answers as rated four or above.

markets. The provision of clean drinking water was also mentioned. Only one CBFS beneficiary commented that the training did not deliver what was expected.

Additional tables

Appendix table 8. FGD participants by geographic location

Province	District	Union council	Village	School type	Number of beneficiaries
Punjab	Dera Ghazi Khan	Kot Chutta	Muhammad abad	CBFS	11
Punjab	Dera Ghazi Khan	Kot Chutta	Noor Wala	WOS	12
Punjab	Khanewal	127/10R	95/10R	WOS	9
Punjab	Khanewal	171/10R	Malikabad	CBFS	8
Punjab	Lodhran	Lodhran City	Lodhran City	TOT	12
Punjab	Lodhran	Lodhran	Adda Mundhali	CBFS	12
Punjab	Lodhran	Makhdom Wali	289 WB	WOS	12
Punjab	Multan	Khokharan	Bakain wala	CBFS	10
Punjab	Multan	Makhdoom Rashid	Thahim wala	WOS	12
Punjab	Muzaffargarh	Wan Pitafi	Basti Kalanjar	WOS	10
Punjab	Muzaffargarh	Shah Jamal	Basti Arain	CBFS	12
Sindh	Badin	Saeed Pur	Jaman Khoso	CBFS	8
Sindh	Badin	Saeed Pur	Pir Muhammad Detho	WOS	8
Sindh	Sanghar	Manik Thaheem	Bago Wadadani	WOS	8
Sindh	Sanghar	Kurkali	Essa Hingoro	CBFS	9
Sindh	Umerkot	Atta Muhammad Palli	Ali Muhammad Mahar	WOS	12
Sindh	Umerkot	Bustan	Sadique Kapri	TOT (farmer facilitators)	9

Source: Self-elaborated by authors using data from the FGD validation questionnaire.

Appendix table 9. Attendance rate by status of completion of activities and school type

	Once a week or more (%)		Once per month (%)		Once each other month (%)		Quarterly (%)		Once a year (%)	
	Completed activities	Activities ongoing	Completed activities	Activities ongoing	Completed activities	Activities ongoing	Completed activities	Activities ongoing	Complete d activities	Activities ongoing
CBFS	71%	57%	0%	0%	2%	0%	19%	6%	8%	37%
WOS	81%	36%	2%	0%	0%	0%	17%	37%	0%	27%
TOT	-	0%	-	0%	-	0%	-	43%	-	57%

Source: Self-elaborated by authors using data from the FGD validation questionnaire.

Appendix 11. Financial analysis

Indicators and data sources

The following analysis was conducted using official financial reports for 2020, 2021, 2022, 2023 and 2024. For each budget item, we extracted the total expenditure per year and accumulated it through each reporting period. We used the original project budget as the primary benchmark to assess whether the project's expenditures deviated significantly from expectations each year. To evaluate the project's cost-effectiveness, we used the number of beneficiaries reported in the annual reports. We used the descriptions of each budget item from the funding proposal to classify them according to the types of analyses performed in this report.

Before conducting the analysis, we need to establish a clear set of definitions for the terms we use throughout the process.

i. Administrative cost breakdown: the purpose of this classification is to differentiate between initial set-up costs, ongoing management expenses and operational costs, specifically focusing on project management costs. This breakdown was created using the descriptions of the budget items to capture the different stages of a project's lifecycle. By doing so, we can facilitate better tracking and management of expenditures throughout the project. This approach helps us to assess whether the project is proceeding as planned, identify any deviations and make necessary recommendations to realign with the original plan. Here is a clarification on the criteria used for the classification.

   - Start up: this includes initial costs associated with setting up the project, such as acquiring essential equipment and materials needed for the beginning phases. This encompasses items like communication equipment, computers, printers, furniture and stationery.
   - Management: this category covers costs related to overseeing and managing the project, including salaries for key management roles and expenses for important reports. It includes positions such as provincial coordinators, a national operations officer and costs for progress and terminal reports.
   - Operation: this includes ongoing operational costs associated with implementing the project, such as expenses for surveys, security and procurement, as well as materials and knowledge-sharing products used during the project's execution. This category covers roles like facilitators and procurement officers, along with tangible items and services necessary for daily functioning.

ii. Fixed costs are those that remain constant regardless of the number of beneficiaries, including categories such as: analyses and studies; contracts for project operation; curricula and knowledge products; drivers; equipment; furniture; maintenance costs (for example, vehicles, web pages, data repository); office maintenance; office rental; reports; software systems; websites and online data repositories; full-term project staff; stationery; vehicles; and working groups.

iii. Variable costs are defined as expenses that fluctuate based on the number of beneficiaries reached, including items such as: agricultural inputs; agrometeorological stations; awareness activities; contracts related to activities; data collections; daily subsistence allowance; equipment for the FFS and demonstration farms; field days and demonstration plot activities; letter of agreement arrangements; meetings; workshops and events; printing; short-term staff and facilitators; trainings; travels; vehicle running costs; water accounting; groundwater monitoring; and hydrological activities.

iv. Direct services: this includes expenditures like agricultural inputs; agrometeorological stations; awareness activities; curricula and knowledge products; equipment for the FFS and demonstration farms; field days and demonstration plot activities; printing materials; water accounting;

groundwater monitoring and hydrological activities; trainings; analyses and studies; and contracts to build district-level capacity. Non-direct service items included costs such as: drivers; daily subsistence allowance; furniture; office maintenance; staff salaries; and stationery.

To assess if the project has been implemented efficiently, we used the following indicators:

i. *Budget realization rate, that is, BRR*: this indicator measures the extent to which resources allocated to each budget item are used. It is given by the ratio of the cumulative expenditures made until year *Y* (numerator) and the total approved budget until year *Y* (denominator).

$$BRR_Y = \frac{\sum_{y=2021}^{Y} expenditure_y}{\sum_{y=2021}^{Y} budget_y}$$

ii. *Utilization rate*: this indicator is like the budget realization rate. It measures the extent to which resources are utilized based on the actual funds received until year *Y*, and not on those indicated in the budget.

$$UR_Y = \frac{\sum_{y=2021}^{Y} expenditure_y}{\sum_{y=2021}^{Y} funds\ received_y}$$

iii. *Administrative costs for direct services, that is, ACDS*: this is a variation of the traditional cost-transfer ratio used for cash or in-kind transfer programmes. Here, we use the project's administrative costs as a proxy for delivery costs. Additionally, we estimated all expenditures related to direct services, inputs or products provided to beneficiaries, including farmers and government institutions, as transfers to beneficiaries.

$$\mathrm{ACDS}_Y = \frac{\text{Administrative } expenditure_y}{\text{Direct Services } expenditure_y}$$

iv. *Average cost per beneficiary, that is, ACB*: this indicator shows the average cost of the project per beneficiary household in year *y*.

$$\mathrm{ACB}_Y = \frac{expenditure_y}{\text{beneficiary households}_y}$$

Additionally, we simulated the cost to reach the beneficiary target (the project has a target of 200 000 households as direct beneficiaries) by assuming the original expected average cost per beneficiary for the whole project. The expected final cost, that is, the EFC, is calculated using the following formula:

$$EFC = \left(200{,}000 - \sum_{y=2021}^{2024} \text{beneficiary households}_y\right) * \mathrm{ACB} + \sum_{y=2021}^{2024} expenditure_y$$

The analysis also includes calculations for inflation in Pakistan since 2020 to measure the loss of purchasing power and changes in the exchange rate since 2020, given that the resources from the GCF are disbursed in United States dollars. For these calculations, we used the World Bank’s World Development Indicators (World Bank, 2025b).

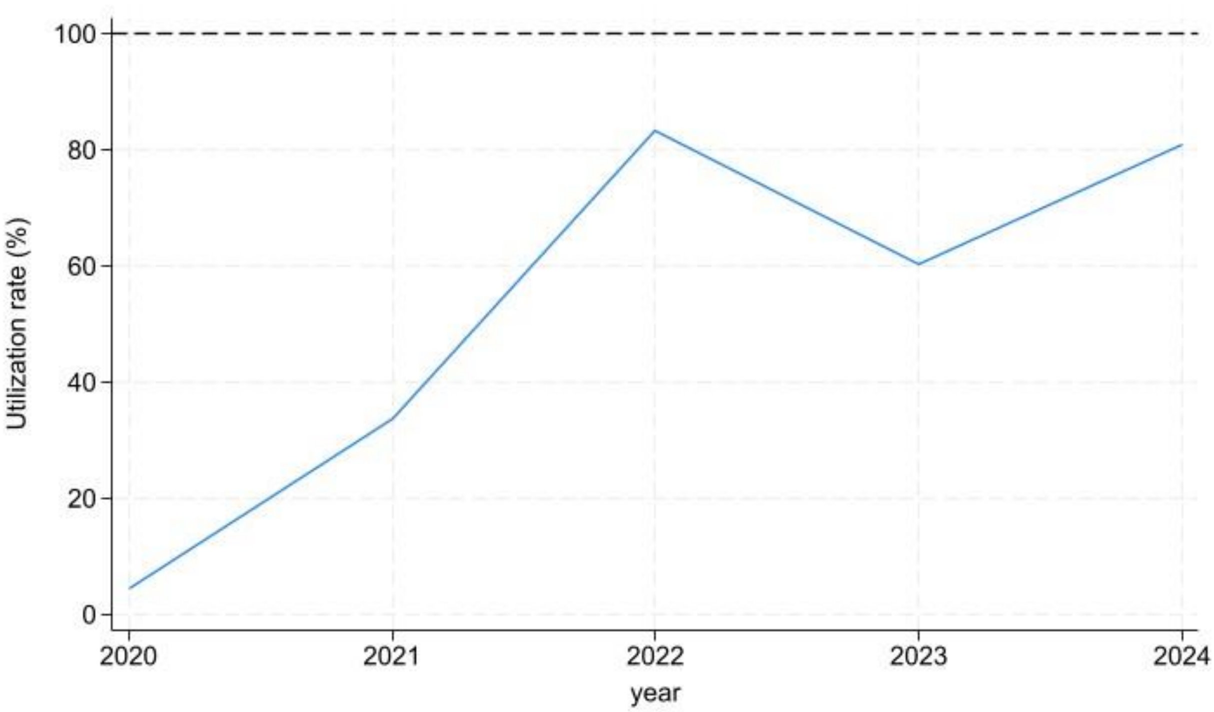
Results

Appendix table 10. Co-finance details

	GCF			Punjab			Sindh		
Contract signature date	March 2020			May 2023			July 2021		
Funds received	**Planned**	**Received**	**Outstanding**	**Planned**	**Received**	**Outstanding**	**Planned**	**Received**	**Outstandin g**
Year 1 (2020)	6 371 836	6 371 836	-	1 282 070	-	1 282 070	877 730	-	877 730
Year 2 (2021)	4 916 295	-	4 916 295	1 364 470	-	1 364 470	748 730	-	748 730
Year 3 (2022)	7 566 467	-	7 566 467	1 303 592	-	1 303 592	775 926	163 725	612 201
Year 4 (2023)	5 914 818	4 916 295	998 523	1 380 970	1 022 020	358 950	747 854	469 458	278 396
Year 5 (2024)	5 475 312	-	5 475 312	1 314 742	389 790	924 952	743 650	90 516	653 134
Overall	30 244 728	11 288 131	18 956 597	6 645 845	1 411 810	5 234 035	3 893 889	723 699	3 170 190
% outstanding			63			79			81
Exchange rate 1 USD to PKR				136.29	280		159	280	
Grand total (project until 2024)	**Planned**	**Received**	**Outstanding**	**Outstanding %**					
	40 784 462	13 423 640	27 360 822	67					

Source: Information provided by the project implementation team.

Appendix figure 3. Utilization rate of funds received by year



Source: Authors' calculations based on financial annual reports from 2020 to 2024.

Appendix figure 4. Comparison of administrative cost breakdown: planned budget versus actual expenditure by year

Source: Authors' calculations based on financial annual reports from 2020 to 2024.

Appendix table 11. Comparison of expended versus expected administrative costs for direct services to beneficiaries (from 2020 to 2024) as a share of direct services expenditures

Year	Actual administrative cost (%)	Expected administrative cost (%)	Difference
2020	32.708	0.097	32.611
2021	0.813	0.084	0.729
2022	0.349	0.089	0.260
2023	0.166	0.175	-0.009
2024	0.848	0.220	0.629

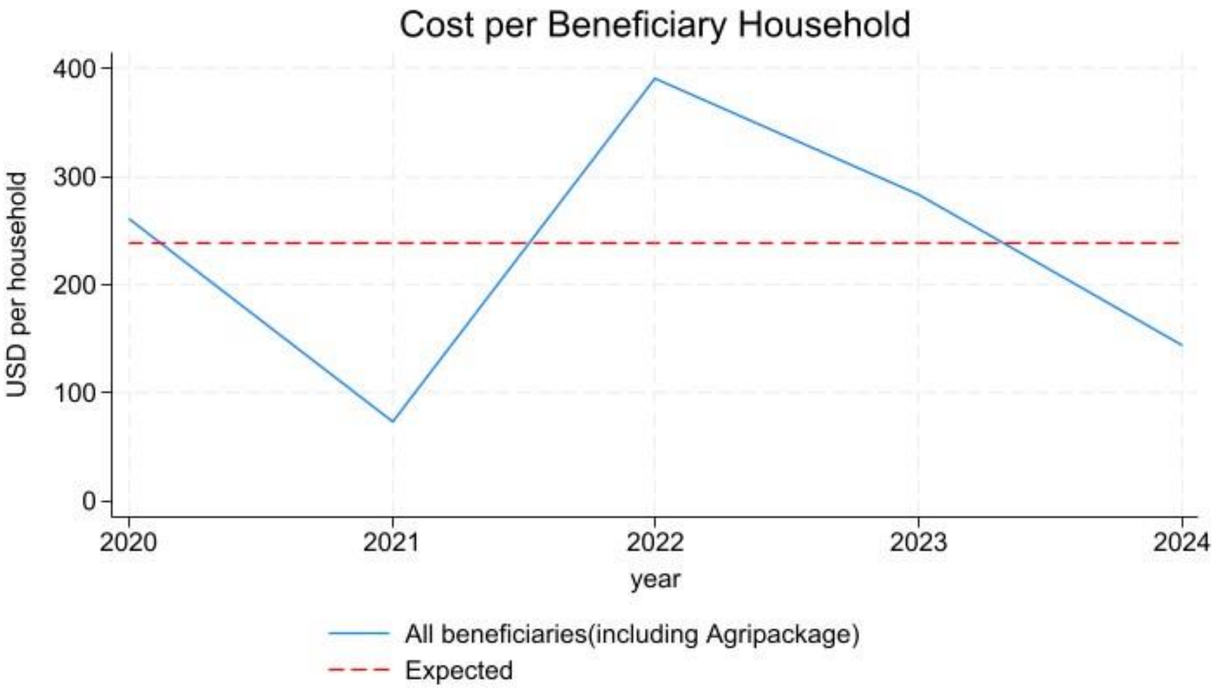
Source: Authors' calculations based on financial annual reports from 2020 to 2024.

Appendix table 12. Number and share of target beneficiaries by year

	2020	2021	2022	2023	2024	Total
Including Agripackage						
# beneficiaries	1 075	24 949	6 981	8 239	21 374	62 618
% target beneficiaries	0.538%	12.475%	3.491%	4.120%	10.687%	31.309%
Excluding Agripackage						
# beneficiaries	1 075	1 125	3 160	8 239	21 374	34 973
% target beneficiaries	0.538%	0.563%	1.580%	4.120%	10.687%	17.487%

Source: Authors' calculations based on annual reports from 2020 to 2024.

Appendix figure 5. Average cost per beneficiary by year



Source: Authors' calculations based on financial annual reports from 2020 to 2024.

Appendix table 13. Cumulative price changes since 2019 for prioritized crops, alternative crops and agricultural inputs

Category	Name	2020	2021	2022	2023	2024
Prioritized crops	Rice	17%	25%	72%	147%	130%
	Sugar crops	13%	38%	53%	119%	142%
	Wheat	25%	43%	130%	195%	90%
Alternative crops	Maize	13%	18%	74%	54%	102%
	Other oil seeds	17%	82%	130%	120%	127%
	Pulses	2%	26%	83%	120%	149%
	Sorghum/jowar	40%	45%	82%	100%	105%
	Vegetables	-27%	-24%	23%	67%	57%
Inputs	Cottonseeds	13%	18%	33%	40%	64%
	Fertilizers	-9%	32%	81%	142%	153%
	Insecticides	0%	0%	0%	36%	57%
	Pesticides	27%	32%	40%	67%	111%
	Transport costs index (rural areas)	-3%	19%	71%	128%	120%

Note: All changes are with respect to the respective index price for December 2019.

Source: Pakistan Bureau of Statistics. 2025. Consumer Price Index [query]. In: *pbs.gov.pk*. Islamabad. [Cited 24 September 2025]. https://www.pbs.gov.pk/cpi?page=0

Appendix 12. Training interim evaluation survey analysis

The Training Interim Evaluation Survey comprises 15 datasets, each representing a training under Component 1 of the project. These trainings engaged 191 participants from the Punjab and Sindh provincial Departments of Irrigation, Water Management and Agriculture. Each training session featured a set of technical questions aligned with the specific topics and objectives covered. Since participants could attend multiple trainings, the learning assessment and adoption rate calculations ensure that each participant is counted only once per training. Initially, the dataset contained 97 records from 61 participants, with six participants responding twice to the same training but with differing answers. To avoid bias, we removed only the duplicate responses for those specific trainings where a participant had responded twice, while retaining single responses from the same participants in other trainings. The analysis proceeded with the remaining 56 participants, responsible for a total of 85 responses.

The 15 targeted trainings were:

i. Using Climate Information and Crop Productivity Models for Climate Change Adaptation and Planning

ii. Field Data Collection for Crop Type Mapping

iii. Training of Government Staff and FFS Facilitators on FFS Training Modules in Soil Salinity, Groundwater Depth Measurements and Sampling

iv. Revealing the Advantages of Crop Type Mapping and Geospatial Application Through Result Sharing

v. Training of OFWM, Agriculture Extension Staff and FFS Facilitators on the Water Module

vi. Groundwater Modelling

vii. Introduction to Monitoring Evapotranspiration with PyWaPOR

viii. One-day Training Session on the Kobo Toolbox Field Survey, Focusing on Data Collection and Field Activities

ix. 2022 Water Account Training, 2023 Water Account Training, 2024 January Water Account Training and 2024 March Water Account Training

x. Satellite Remote Sensing for Estimating Actual Evapotranspiration Course 3: Evapotranspiration and Basic Hydrology

For the first part of the analysis, we conducted a descriptive review of six general training evaluation questions covering the following areas: i) the training was very helpful to me; ii) the length of the training was appropriate; iii) the presenter was clear on the objectives of the training iv) the time allocated for the presentation was appropriate; v) the exercise sessions were helpful and contributed to my practical knowledge; and vi) I will be able to transfer the knowledge gained to colleagues in my institution. Each question was rated on a five-point Likert scale, from strongly disagree to strongly agree, with an option to abstain.

For the second analysis, assessing knowledge improvement through pre- and post-training technical tests, we included 53 records with pre-test scores. The analysis involved calculating the difference between each participant's pre- and post-test scores. A positive difference indicated knowledge improvement, and we counted those records as showing improvement.

The final analysis evaluated the extent to which participants successfully applied the practices and knowledge shared during the trainings. Each training covered multiple topics and held different expectations regarding the use of the taught practices. The survey inquired about both the adoption and frequency of use of specific practices, with each training varying from one to four practices. Only participants who indicated they had adopted a particular practice were asked about their frequency of use, with options ranging from never (1) to always (5). We calculated the average adoption and frequency of use per training, weighing each practice equally (for example, 25 percent each if four practices were covered). For trainings with only one practice, that practice represented the total adoption rate. Since the survey recorded frequency only for adopters, we calculated both the average frequency for adopters and the overall average frequency for all participants, assuming that non-adopters "never" used the practice.

Appendix 13. Ethical standards

Before the qualitative data collection process began, we had conducted a training session with the service provider where we provided a checklist outlining the following ethical standards:

i. Facilitators must be clear about their roles.

ii. Facilitators must obtain informed consent from all participants.

iii. Schedule FGDs and interviews at convenient times and places for respondents, such as after work hours.

iv. Ensure participant safety, including a safe environment, at least two facilitators and the involvement of local stakeholders, if possible. Respond to inquiries openly and maintain confidentiality throughout.

v. Adhere to FAO's ethical standards procedure for research, evaluation, data collection and analysis (UN, 2024).

vi. Set clear ground rules at the beginning of the FGD to guide participants on how to interact respectfully with one another and maintain confidentiality.

vii. Village members and participants should not feel disrespected or belittled by any actions, words or questions during your presence in their village. Always show respect.

viii. Avoid creating expectations among village members or participants during the data collection process.

ix. Participants should not feel pressured, whether directly or indirectly, to participate in the data collection – either from facilitators or individuals assisting in participant recruitment, such as village heads or community leaders.

x. Foster a respectful environment where participants feel comfortable expressing their opinions without fear of judgment or reprisal.

xi. Recognize participant vulnerability and ensure respectful conduct, addressing power imbalances.

xii. Address any conflicts or disagreements that may arise during the discussion in a constructive and respectful manner.

xiii. Strive for balanced participation among all participants, including quieter or less vocal individuals, to gather diverse viewpoints.

xiv. Be culturally sensitive and respectful of participants' cultural beliefs, practices and values when framing questions and interpreting responses.

xv. Remain flexible in your approach to accommodate unexpected developments or changes in the discussion flow while still staying focused on the research objectives.

xvi. Provide closure at the end of the discussion, allowing participants to share any final thoughts or feedback, and express appreciation for their contributions.

xvii. Encourage participants to express a diverse range of perspectives, opinions and experiences related to the research topic.

xviii. Practice active listening techniques to demonstrate empathy and understanding towards participants' contributions, fostering a supportive atmosphere.

To respect cultural norms, the APEX Consulting Group included women interviewers on the team to conduct FGDs with female participants, ensuring respondents feel comfortable and actively participate in the discussions. Additionally, local enumerators from the target areas have been hired to facilitate the process by asking questions and probing in local languages. In the training manual, the Evaluation Team included definitions of key technical terms such as climate change, the impact of climate change, resilience, climate-resilient agriculture and others. This list was expanded during the training to ensure that all interviewers ask questions with a consistent understanding, particularly when using local languages.

Appendix 14. Learning assessment of the Farmer Field School

There are three learning assessments – Sindh 2023, Punjab 2023, and the combined Punjab and Sindh 2024 – each conducted by the MEL team of the FAO Pakistan Country Office to evaluate farmers' reaction and satisfaction, knowledge acquisition and practice adoption under Component 2. The assessment focused on three levels of evaluation following the Kirkpatrick Model: reaction and satisfaction; knowledge acquisition; and practice adoption.

Sample-size adequacy in learning assessment

To ensure that the mid-term learning assessment was adequately powered to estimate the prevalence of key learning outcomes with 95 percent confidence and a ±5 percent margin of error (assuming a prevalence of 65 percent), we first computed the standard infinite-population sample size (Cochran, 1977):

$$n_0 = Z^2 \cdot p \cdot (1 - p) / e^2$$

where Z = 1.96 (for 95 percent CI), p = 0.65 (estimated prevalence) and e = 0.05 (margin of error).

Next, because each beneficiary group had a known finite size (N), we applied the finite-population correction (Kish, 1995):

$$n = n_0 / [1 + (n_0 - 1) / N]$$

This adjustment reduces the required sample size when *N* is not extremely large. We compared required versus actual sample sizes at four levels: for the total beneficiary population, separately by province (Punjab and Sindh), by school type (CBFS and WOS) and for each province × school-type combination.

This table summarizes for each stratum the total population (N), the corrected required sample size (n) and the actual number of survey respondents[32] used in the learning assessment of 2023.

Stratum	**Population (N)**	**Required (n)**	**Actual (n)**
All beneficiaries	3 955	321	449
CBFS (all provinces)	2 125	300	277
WOS (all provinces)	1 830	294	144
Punjab (all school types)	2 485	307	306
Sindh (all school types)	1 470	283	143
Punjab and CBFS	1 375	279	202
Punjab and WOS	1 110	266	90
Sindh and CBFS	750	239	75
Sindh and WOS	720	236	54

The final sample used for the calculations is smaller than the database received from the Country Office because 32 surveys were removed for belonging to districts outside the prioritized districts, and three duplicate cases (identical name and not duplicated identifier) were dropped – retaining only the most recent entry in each duplicate pair. This ensures that the analysis is based solely on valid, non-duplicated responses that meet our study criteria.

A comparison to actual sample counts shows that while the overall sample (449 respondents out of 3 955 beneficiaries) exceeded the required minimum (n = 321), several subgroup strata did not reach their minimums. Specifically, the WOS overall, Sindh overall and all province × SchoolType cells fell below their corrected thresholds. These subgroup estimates will consequently have larger margins of error and should be interpreted with caution.

[32] We do not have information on how many individuals were approached versus how many completed the survey, so we cannot confirm how representative the sample is.

For the learning assessment of 2024, we have the following results:

Stratum	Population (N)	Required	Actual (n)
All beneficiaries	9 805	338	661
CBFS (all provinces)	7 025	333	484
WOS (all provinces)	2 780	311	177
Punjab (all school types)	7 400	334	487
Sindh (all school types)	2 405	305	174
Punjab and CBFS	5 100	327	340
Punjab and WOS	2 300	304	147
Sindh and CBFS	1 925	296	144
Sindh and WOS	480	203	30

In this case, two duplicate records and 245 surveys conducted outside of the FFS activities were removed to ensure a fair comparison with the 2023 exercise. After these exclusions, the 2024 survey remains representative of the total beneficiary population, just as in the 2023 learning assessment. Additionally, the sample is representative for all CBFS beneficiaries, for Punjab province and for the Punjab × CBFS subgroup.

With the information from all learning assessments, we conducted a review of: the participants' general perception of the FFS; the relationship between class frequency and perception; the tangible outcomes that beneficiaries perceived as a result of their participation; the average adoption of practices; difficulties and challenges in implementation; what beneficiaries value most about the FFS; and the use of the FFS learnings to mitigate impacts from extreme weather events. All analyses are weighted using post-stratification, with each sample unit's weight calculated based on the CBFS and the WOS beneficiary lists provided by the Country Office. This ensures that each district is counted according to its actual distribution of beneficiaries.

Results

Satisfaction with the Farmer Field School

Overall satisfaction with FFS training was strong in both years but improved further in 2024, as most districts reported higher excellent ratings and lower good ratings compared to 2023. In Punjab, "excellent" climbed from 55 percent to 74 percent – notably in Lodhran, Multan and Muzaffargarh – while Dera Ghazi Khan held steady around the mid-40s. Although Khanewal's "excellent" share dropped from 89 percent to 54 percent, this was balanced by a rise in "good" responses. In Sindh, "excellent" edged up from 69 percent to 72 percent overall, despite slight dips in Sanghar and Umerkot offset by gains in "good." "Poor" remained negligible both years. Thus, while both 2023 and 2024 saw generally high positive ratings, 2024 demonstrates an overall uptick in top-tier satisfaction.

Appendix table 14. How do you perceive the overall Farmer Field School training approach to capacitate farmers in addressing climate change effects?

District/province	2023			2024		
	Poor	**Good**	**Excellent**	**Poor**	**Good**	**Excellent**
Dera Ghazi Khan	0%	54%	46%	0%	53%	47%
Khanewal	0%	11%	89%	0%	46%	54%
Lodhran	0%	30%	70%	0%	18%	82%
Multan	2%	86%	11%	0%	6%	94%
Muzaffargarh	0%	36%	64%	0%	21%	79%
Punjab	**0%**	**45%**	**55%**	**0%**	**26%**	**74%**
Badin	0%	60%	40%	0%	27%	73%
Sanghar	2%	9%	89%	2%	23%	74%
Umerkot	2%	19%	79%	0%	31%	69%
Sindh	**1%**	**29%**	**69%**	**1%**	**27%**	**72%**

Source: Authors' own elaboration.

Satisfaction and attendance

Spearman's rho (ρ) is a non-parametric measure of rank correlation. Instead of comparing actual numeric values, it assesses how well the relationship between two variables can be described using a monotonic function. Each variable's observations are converted to ranks (from lowest to highest), and ρ quantifies how closely those ranks align. A ρ of +1 indicates a perfect increasing monotonic relationship – meaning that as one variable's rank goes up, the other's rank also goes up without exception. A ρ of –1 indicates a perfect decreasing monotonic relationship – higher ranks in one correspond exactly to lower ranks in the other. A ρ of 0 suggests no monotonic relationship: observing higher values of one variable does not consistently correspond to higher or lower values of the other.

In Sindh, the Spearman's rank-order correlation between class intensity and participant satisfaction strengthened markedly from 0.1967 in 2023 to 0.3397 in 2024. Both values are positive, indicating that farmers who attended more FFS sessions tended to report higher satisfaction levels. In 2024, that relationship became noticeably stronger. In contrast, Punjab shows a weak negative correlation in both years (-0.1073 in 2023 and -0.1179 in 2024). This suggests that, in Punjab, there is no clear tendency for greater attendance to be associated with higher satisfaction. In fact, the slight negative sign implies that farmers who attended more sessions reported marginally lower satisfaction, but the magnitude is very small in both years. Overall, Sindh's positive and increasing correlation points to a growing link between consistent participation and positive FFS outcomes, while Punjab's small negative correlations indicate that satisfaction there may depend on factors beyond just class frequency.

Appendix table 15. Correlation between intensity of classes and satisfaction with the Farmer Field Schools

Spearman's rho	2023	2024
Sindh	0.1967	0.3397
Punjab	-0.1073	-0.1179

Source: Authors' own elaboration.

In 2023, when participants could only select one favourite aspect, "learning through practical sessions" ranked highest in Punjab (50 percent) and was still the top choice in Sindh (13 percent), followed by "learning within groups" (24 percent Punjab and 61 percent Sindh), "learning with innovation" (20 percent Punjab and 22 percent Sindh), then "peer-to-peer learning" (6 percent Punjab and 3 percent Sindh), with "other" nearly negligible. In 2024, with multiple selections allowed, "learning through practical sessions" remained most valued: 79 percent in Punjab and 47 percent in Sindh. This was closely followed by "learning within groups" (71 percent Punjab and 66 percent Sindh), then "learning with innovation" (52 percent Punjab and 40 percent Sindh). Notably, "peer-to-peer learning" jumped to 40 percent in both provinces.

Appendix table 16. Most valued aspects of the Farmer Field School training

	2023		2024*	
Answers	Punjab	Sindh	Punjab	Sindh
Learning within groups	24%	61%	71%	66%
Learning with innovation	20%	22%	52%	40%
Peer-to-peer learning	6%	3%	40%	40%
Learning through practical sessions	50%	13%	79%	47%
Other	0%	2%	4%	1%

* In 2024, respondents could select multiple options.

Tangible outcomes

In 2023, beneficiaries in Sindh consistently reported higher shares of almost every tangible outcome compared to those in Punjab. For example, nearly half of Sindh farmers (48.2 percent) saw increased yields versus fewer than one in five in Punjab (17.7 percent). Likewise, improvements in household food access were more common in Sindh (81.0 percent) than in Punjab (68.9 percent). Gains in productive assets (61.0 percent versus 37.3 percent), reduced pesticide use (77.4 percent versus 35.2 percent), and knowledge and awareness increases (83.2 percent versus 29.9 percent) were all markedly higher in Sindh. More specialized skills, such as improved analytical and record keeping skills (63.7 percent versus 5.0 percent) and innovation and experimentation (61.9 percent versus 8.2 percent) – were rarely cited in Punjab but prevalent in Sindh. Access to agricultural information and climate-forecasting (54.6 percent versus 5.1 percent) and cost savings leading to higher profit (48.0 percent versus 7.0 percent) also followed this pattern. Adding new income sources (57.8 percent versus 17.0 percent) and establishing market linkages (29.2 percent versus 17.3 percent) were more frequently mentioned by Sindh participants. In the 2024 survey, fewer outcome options were offered, and almost every participant in both provinces reported experiencing all of the listed benefits.

Appendix table 17. Proportion of farmers reporting tangible outcomes from Farmer Field School participation

	2023	
Outcomes	Punjab	Sindh
Yield increased	17.7%	48.2%
Household food access and availability increase	68.9%	81.0%
Increased productive assets	37.3%	61.0%
Reduced pesticide use	35.2%	77.4%
Knowledge/awareness increase	29.9%	83.2%
Improved analytical/record keeping skills	5.0%	63.7%
Innovation and experimentation increase	8.2%	61.9%
Access to agri-info and climate forecasting	5.1%	54.6%
Reduced input cost and increased profit	7.0%	48.0%
Added sources of income	17.0%	57.8%
Market access/linkage established	17.3%	29.2%
Other outcomes	0.0%	2.0%

Source: Authors' own elaboration.

Adoption of practices

In 2023, district-level adoption of the recommended FFS practices varied widely: Dera Ghazi Khan had an average adoption rate of just 7.7 percent with 26.4 percent of farmers not adopting any practices, while Khanewal led with 54.5 percent average adoption and zero non-adopters. Lodhran, Multan, Muzaffargarh, Badin, Sanghar and Umerkot all exhibited moderate uptake, ranging between 14 percent (Muzaffargarh) and 24.4 percent (Umerkot), with no farmers completely abstaining in those districts. Province-wide, Punjab's average adoption was 20.9 percent (6.4 percent non-adopters), compared to Sindh's 23.7 percent (0 percent non-adopters), indicating that Sindh farmers were slightly ahead in practice uptake during the first assessment.

By 2024, nearly all non-adopters had vanished: Dera Ghazi Khan went from 26 percent non-adoption to full uptake, and only 1 percent of Khanewal farmers remained non-adopters. Every other district maintained 0 percent non-adoption. More strikingly, average adoption rates in districts with initially low uptake soared – Dera Ghazi Khan jumped from 7.7 percent to 28.1 percent, Lodhran from 18.6 percent to 38.2 percent and Multan from 17.5 percent to 32.6 percent. Even Muzaffargarh doubled its share (14.0 percent to 28.8 percent). Districts that began with relatively high adoption in 2023 (for example, Khanewal and Umerkot) remained strong, keeping averages in the mid- to high-20 percent range. Provincially, Punjab's average adoption climbed from 20.9 percent to 37.6 percent with non-adoption dropping to 0.3 percent, reflecting the most rapid expansion. Sindh, already at 23.7 percent adoption with full participation, saw a slight dip to 22.4 percent in 2024 but retained universal practice uptake. Overall, the dramatic reduction in non-adopters and the substantial increases in average adoption across most districts underscore that the FFS training in 2024 successfully encouraged virtually all participants to implement at least one recommended practices.

Appendix table 18. District-level practice adoption metrics (2023 versus 2024)

District	2023			2024		
	Mean # practices adopted	Mean adoption %	% No adoption	Mean # practices adopted	Mean adoption %	% No adoption
Dera Ghazi Khan	2.2	7.7 %	26.4 %	7.9	28.1 %	0.0 %
Khanewal	15.3	54.5 %	0.0 %	13.5	48.1 %	1.0 %
Lodhran	5.2	18.6 %	0.0 %	10.7	38.2 %	0.0 %
Multan	4.9	17.5 %	0.0 %	9.1	32.6 %	0.0 %
Muzaffargarh	3.9	14.0 %	0.0 %	8.1	28.8 %	0.0 %
Badin	6.3	22.6 %	0.0 %	6.0	21.5 %	0.0 %
Sanghar	6.8	24.2 %	0.0 %	5.6	20.0 %	0.0 %
Umerkot	6.8	24.4 %	0.0 %	7.2	25.8 %	0.0 %

Source: Authors' own elaboration.

In 2023, only a small share of Punjab farmers (2.4 percent) reported difficulties in implementing climate-resilient agriculture or OFWM practices, whereas nearly a quarter of Sindh respondents (22.7 percent) faced such challenges. Overall, 6.8 percent of all participants reported obstacles that year. By 2024, this pattern reversed: the proportion of Punjab farmers reporting challenges jumped to 20.3 percent, while Sindh's share fell to just 0.7 percent, bringing the combined total to 12.4 percent.

Extreme weather events

In 2023, just over half of all respondents (54.4 percent) reported that, when faced with extreme weather, they had applied at least one FFS-taught practice: 68.7 percent of Sindh farmers versus 41.4 percent in Punjab. By 2024, the question was split into two parts: first, whether farmers had experienced extreme weather (35.1 percent overall, 49.5 percent in Punjab, 14.0 percent in Sindh), and second, among those who did experience extremes, whether they applied any FFS techniques. Of those exposed in 2024, nearly all Punjab farmers (95 percent) used their FFS training to mitigate impacts, while no Sindh farmers in that subgroup reported applying techniques. Overall, 80 percent of all farmers who experienced extremes in 2024 drew on FFS methods. Direct year-to-year comparisons must be made cautiously because the 2023 survey asked directly whether farmers facing extremes had applied techniques, whereas the 2024 survey first queried exposure to extremes and then applied practices.

Appendix 15. Methodology to assess the logical framework's achievements against the interim targets

To assess the rate of achievement of the project's interim adaptation targets, the Evaluation Team compared the project monitoring data of the 2024 Annual Performance Review with the interim targets set in the logical framework.

The rate of achievement of each indicator has been classified as:

i. Fully Satisfactory: more than 100 percent of interim target achieved

ii. Satisfactory: from 100 to 80 percent of interim target achieved

iii. Partially Satisfactory: from 80 to 40 percent of interim target achieved

iv. Unsatisfactory: from 40 to 0 percent of interim target achieved

Furthermore, where possible, the Evaluation Team validated the indicators reported in the 2024 Annual Performance Review by conducting an independent analysis of the project's monitoring data collected by the MEL team. At the time of writing this report, it was not possible for the Evaluation Team to replicate the analysis of most indicators either due to the format in which data had been collected and stored, or due to a lack of appropriate information to verify them. Appendix table 19 summarizes the results of this validation exercise, highlights the issues identified by the Evaluation Team and provides independent estimations, where possible.

Appendix table 19. Validation of the logical framework's achievements against interim targets

Expected results	Indicator	2024 Annual Report (cumulative value)	Revised by Evaluation Team 2024 (cumulative value)	Interim target	Key issues
Adaptation Core Indicator 1	Direct beneficiaries of the GCF-funded project/programme	407 128	-	400 000	Provided data of direct beneficiaries at individual level is updated until 2022. With these data, the total number of direct beneficiaries was estimated at 230 640. It was not possible to verify the 2024 annual report value.
					Current household size data for each beneficiary enrolled are not collected, so it is not possible to verify the assumption of 6.5 household members per beneficiary.
	% Female	28%	-	49%	With the provided beneficiaries' data updated until 2022, the share of female beneficiaries is 40% (inclusive of Agripackage). Nevertheless, it is not possible to verify data of the 2024 annual report.
					Current number of male and female members in beneficiary households is not collected. It is not possible to verify if the actual number of female beneficiaries is correct.
Adaptation Core Indicator 2	Indirect beneficiaries of the GCF-funded project/programme	6 579 402	-	8 000 000	No formal assessment was conducted. The estimation is based on Pakistan Broadcasting Corporation data on the average number of listeners in the project areas and added to the number of direct beneficiaries.
	% Female	49%	-	49%	
Adaptation Core Indicator 3	Number of total beneficiaries relative to total population	2.5%	-	3%	No formal assessment was conducted. The proportion of the rural population in the project areas derived from official national statistics and were applied to the total number of beneficiaries.
	% Female	0.69%	-	1.5%	
Outcomes that contribute to Fund-level impacts					
A5.0 Strengthened institutional and regulatory systems for climate-responsive planning and development	A5.2 Number and level of effective coordination mechanisms	2	-	2	There is no formal assessment in place. Results come from the component lead's own personal analysis of the project's achievements. Nevertheless, an institutional capacity assessment of the federal and provincial department was conducted, and two policy coordination workshops were held in 2024. A summary and reports have been shared with the Evaluation Team to substantiate the project's achievement.
A6.0 Increased generation and use of	Level of reliability of water distribution measured by	2.9	-	5	The method of assessment is under review by the MEL team due to: i) high uncertainty in satellite-based data; ii) difficult to isolate

Expected results	Indicator	2024 Annual Report (cumulative value)	Revised by Evaluation Team 2024 (cumulative value)	Interim target	Key issues
climate information in decision-making	average fluctuations in soil moisture (%)				impact of project activities from other natural/human impacts. A survey-based method is considered more appropriate. The Evaluation Team is considering the feasibility of a spatial impact evaluation for the final evaluation to report in this indicator.
A7.0 Strengthened adaptive capacity and reduced exposure to climate threats	A7.2 Total geographic coverage of climate-related early warning systems and other risk reduction measures established/strengthened (ha)	2 572 750	2 159 845	5 000 000	Based on the information reported, a total of 12 weather stations are operational, five at baseline and seven more have been established by the project. Nevertheless, the Evaluation Team could verify the presence of only 11 stations through Global Positioning System data. Each station has a coverage of 25 km radius. Total coverage (ha) for 11 stations is: 2 159 845. There is a review of the number of stations and/or hectares covered.
A8.0 Strengthened awareness of climate change threats and risk reduction processes	A8.1 Number of males and females made aware of climate threats and related appropriate responses	407 128	-	650 000	No formal assessment was conducted. The estimation is based on Pakistan Broadcasting Corporation data on the average number of listeners in the project areas.
Outputs that contribute to outcomes					
Component 1. Enhancing information services for climate change adaptation in the water and agriculture sectors					
Irrigation/water management departments use a functional evapotranspiration-based water monitoring and management system to rationalize the distribution of water resources according to actual crop water requirements and government priorities	Change in awareness, knowledge and understanding of irrigation/water management department staff (in Punjab and Sindh) in relation to current water resources, water-use patterns and water needs in the agriculture sectors in their respective provinces	62%	66%	75%	Results were validated through an independent analysis of the Training Interim Survey's raw data. Duplicate answers were discarded.
ACWA Portal accessed	Share of portal return visits by users in the Indus Basin in proportion to unique visitors (%)	0%	-	5%	The portal is not yet operational and therefore not assessed.

Expected results	Indicator	2024 Annual Report (cumulative value)	Revised by Evaluation Team 2024 (cumulative value)	Interim target	Key issues
Component 2. Building on-farm resilience to climate change					
Extension workers, partner field staff and farmer facilitators are skilled in promoting climate-resilient agriculture and OFWM practices	Change in farmer understanding of climate-resilient agriculture and OFWM practices as a result of trainings provided by extension workers, partner field staff and farmer facilitators	86%	98%	80%	The Evaluation Team was able to verify the value for 2024: using the 2024 learning assessment, our estimate is 98.07%. For previous years, the learning assessments did not include a question that directly addresses this indicator. According to the 2023 Annual Performance Report, the value for 2023 is reported as 0% because it was not measured. This aligns with our analysis. However, the cumulative value until 2024 in the annual report is listed as 86%, which we have been unable to verify.
Farmers are skilled in using climate-resilient agricultural practices	Proportion of farmers trained by the project who begin to apply climate-resilient agriculture and OFWM practices on their fields before the completion of their respective project trainings	75%	99%	70%	The Evaluation Team could only verify adoption after completion of the training. Results were estimated through an independent analysis of the 2024 FFS Post-training Assessment raw data (adopt at least one practice). In our independent analysis, we included only participants in the FFS activities and estimated the indicator using post-stratification, assigning greater weight to districts with more FFS beneficiaries during the analysis period. We used the most recent database from the 2024 learning assessment. The value reported in the 2024 Annual Performance Report closely matches the 2023 learning assessment value for Punjab alone.
Component 3. Creating an enabling environment for continued transformation					
Heightened awareness, understanding and action by farmers throughout the project area with regard to climate change issues	Number of farmers reached through awareness-raising campaigns who have begun to apply at least one project-promoted climate-resilient agriculture and OFWM practice	0		0	Not assessed at this stage as no value was reported in the 2024 Annual Performance Report.
Relevant federal and provincial government staff capacity in place for use of climate information in policymaking	Change in trained staff's capacity to utilize project-supported information systems, which will be measured by assessing their: i) understanding of	42.91%	42%	70%	Results were validated through an independent analysis of the Training Interim Survey's raw data. Duplicate answers were discarded.

Expected results	Indicator	2024 Annual Report (cumulative value)	Revised by Evaluation Team 2024 (cumulative value)	Interim target	Key issues
	relevant climate information; ii) knowledge of where to find this information; and iii) knowledge of how to use this information in their work (%)				
Farmers have access to and use services that enable them to adopt climate-resilient practices	Percent of targeted farmers to be reached through the structured extension activities (Component 2) who have diversified their use of financial services and/or value chain	0%	-	30%	Not assessed at this stage as no value was reported in the 2024 Annual Performance Report.
	Proportion of union councils in which private service providers (input dealers, agrotechnicians, farm management consultants) provide specialized services to growing clientele of farmers adapting to climate change	45.1%	-	60%	The Evaluation Team could not verify the indicator. The 2024 report on Digital Skills Training for Women was shared, but data are not disaggregated at the union council level.

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