Monitoring and Evaluation Plan

For the Technical Assistance on:

Empowering Communities with Sustainable Agricultural Systems; piloting a small-scale hydroponics system in:

Kubau LGA, Kaduna State, Nigeria.

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Request ID:

Technical Assistance (TA) start and end date: 2nd May 2024 - 2nd April 2025

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LIST OF ACRONYMS

CTCN	Climate Technology Centre and Network
EU	European Union
GHI	Green Habitat Initiative
NAP	National Adaptation Plan

NIE	National Implementing Entity
NCCC	National Council on Climate Change
NDC	Nationally Determined Contributions
NGO	Non-Governmental Organisation
NSTIP	National Science, Technology and Innovation Policy
M&E	Monitoring and Evaluation
MAA	Mutual Accountability Agreement
TA	Technical Assistance
ToC	Theory of Change
UNFCCC	United Nations Framework Convention on Climate Change

SECTION 1: OVERVIEW OF THE TECHNICAL ASSISTANCE

1.1 Introduction

The technology concept support is a technical assistance to a sub-national agency in Nigeria and implemented at a community, Kubau Local Government Authority (LGA) with the aim of addressing climate change, insecurity and food security. It is implemented through the joint European Union - Climate Technology Centre and Network (EU-CTCN) programme - part of the EU Multi-Annual Indicative Programme for the Thematic Programme on Peace, Stability, and Conflict Prevention (2021-2027).

The EU-CTCN programme aims to strengthen the resilience of conflict-affected societies by encouraging and facilitating conflict-sensitive, community-based technological solutions to climate change. The TA is titled Empowering Communities with Sustainable Agricultural Systems - Piloting a Small Scale Hydroponics System. The main objective is to pilot a small-scale hydroponics system in especially rural communities across the LGA. Through innovative technology and community

engagement, the TA seeks to enhance agricultural resilience, reduce reliance on erratic weather patterns, and mitigate conflict-driven disruptions to traditional farming practices, ultimately contributing to sustainable development in conflict-affected regions.

Green Habitat Initiative (GHI), a nonprofit organisation in Nigeria, emerged as the National Implementing Entity (NIE) to provide TA and entered into an agreement to pilot and implement the hydroponics system in rural communities of Kubau LGA in Kaduna State, Nigeria. The TA will be implemented in 12 months between the period of May 2024 to April 2025.

1.2 Goal and Purpose of the TA

Goal: The goal of the TA is to contribute to the resilience and well-being of communities in Kaduna State by piloting a small-scale hydroponics system.

Purpose: The purpose of the project is to address the convergence of challenges related to climate change, violent conflicts, and food insecurity in Kaduna State through the establishment of sustainable and innovative agricultural practices. By introducing hydroponics systems and providing training and capacity-building initiatives, the project aims to enhance livelihood security, reduce the risk of conflicts, and improve food security among vulnerable communities in the region.

Table 1: Basic information for the TA

Basic Information	
Title of response plan	Empowering Communities with Sustainable Agricultural Systems; piloting a small-scale hydroponics system
Technical assistance reference number	20240000015
Country/ countries	Nigeria
NDE focal point and organisation	**National Council on Climate Change (NCCC).** Name of NDE focal point: Mr. Chukwuemeka Okebugwu Email: chuksokebugwu@yahoo.com Address: Plot 444, Aguiyi Ironsi Way, Maitama Abuja
Sector(s) addressed	I.Research and development of technologies. I.Decision-making tools and/or information provision· I.Feasibility of technology options Y.Piloting and deployment of technologies in local conditions.

Technologies supported	
Implementation period and total duration	2nd May 2024 - 2nd April 2025 (12 months)
Total budget for implementation	$194,526.45
Project Proponent	**Kubau Local Government Authority** **Name of Focal Point:** Dr Yusuf Makama **Email:** yusufmakama@gmail.com Address: Kubau Local Government Secretariat, Kubau LGA, Kaduna State, Nigeria.
Implementer of response plan	**Green Habitat Initiative** **Name of Contact Person:** Engr. Sadiq Abubakar Gulma **Position:** Executive Director **Address:** R. I. Uzoma Street, Block B8, House A (Opposite Midway Plaza), Ministry of Finance Quarters, Wuye, Abuja, Nigeria. **Email:** sadiq@greenhabitat.ng

SECTION 2: MONITORING AND EVALUATION PLAN

2.1. Theory of Change (ToC)

The theory of change (ToC) of the TA posits that implementing hydroponics systems will enhance agricultural productivity, improve food security, and mitigate climate change impacts.

Table 2: Theory of Change (ToC) for the Technical Assistance (TA)

Inputs	Outcomes	Impact
• Training Workshops: Conducting workshops to train community members in hydroponic farming techniques, including system setup, maintenance, and crop management. • Pilot Implementation: Setting up small-scale hydroponics systems in selected communities, providing hands-on support and guidance throughout the process. • Monitoring and Evaluation: Regularly monitoring the performance of the hydroponics systems, collecting data on crop yields, resource efficiency, and community engagement. • Knowledge Sharing: Facilitating knowledge exchange sessions where community members can share their experiences, challenges, and best practices in hydroponic farming	• Food Security: Increasing access to fresh produce year-round, thereby improving food security and nutrition within the target communities. • Economic Empowerment: Generating additional income opportunities for community members through the sale of surplus crops or value-added products. • Environmental Sustainability: Reducing the environmental impact of agriculture by optimizing resource use, minimising water consumption, and promoting sustainable farming practices. • Knowledge Transfer: Creating a ripple effect as community members share their newfound knowledge and skills with neighbouring communities, leading to broader adoption of hydroponic farming practices.	• Sustainable Agricultural Systems: Contributing to the establishment of sustainable agricultural systems that are resilient to climate change, resource scarcity, and other challenges. • Empowered Communities: Empowering communities to take control of their food production, improve their livelihoods, and build resilience against external shocks. • Long-term Sustainability: Sustaining the benefits of hydroponic farming beyond the project period through ongoing support, capacity building, and community ownership.
Underlying assumptions		

The assumptions of the TA are as follows:

1. The regulatory and policy environment supports and encourages the adoption of innovative agricultural practices like hydroponic farming.
2. Training workshops effectively transfer knowledge and skills to community members, enabling them to successfully implement and manage hydroponic farming.
3. Sufficient financial resources, technical expertise, and materials are available to establish and support the hydroponics systems.
4. Communities are interested in adopting hydroponic farming and are willing to actively participate in the project.
5. The security situation in the communities remains safe and stable.

Table 3: Result Framework

CTCN GOAL: Transfer and deployment of new and existing technologies in developing countries for Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs) and national plan implementation.			
TA Goal	The goal of this project is to pilot a small-scale hydroponics system as a strategic technology solution to address the convergence of issues stemming from climate change, insecurity, and food security in Kaduna State, Nigeria.		
CTCN Services	**Innovation**	**Implementation**	**Collaboration and stakeholder engagement**
Outcomes	Identification and prioritization of the most suitable hydroponic technology for Kaduna State based on comprehensive technology benchmarking.	Successful demonstration and pilot testing of the hydroponics facility and training of local farmers on hydroponic setup and management.	Enhanced understanding of key stakeholders and their roles in project implementation for efficient coordination and collaboration among identified stakeholders.
	Development of detailed architectural and engineering design plans tailored to local environmental conditions for hydroponics systems.	Capacity building of trainers and knowledge transfer through Training of Trainers (ToT) to support sustainable hydroponics initiatives beyond the project duration.	Formalized commitment and enhanced collaboration among stakeholders through the signing of a Memorandum of Understanding (MoU).
Outputs	Analysis report prioritising the most suitable hydroponic technology for Kaduna State based on benchmarked technologies.	Completion of the assembly and pilot testing of the hydroponics system and training of local farmers on hydroponic system setup and management.	Inception meeting report documenting the introduction of the project, team, goals, and responsibilities to the stakeholder working group.

	Detailed architectural and engineering design schematics for a hydroponics system including growing trays, irrigation system, water pump, automated control unit, drainage system, nutrient solution tank, temperature and humidity sensors, and tray holding rails.	Training sessions conducted for trainers (ToT) on hydroponics system assembly and operation, documented with attendance records and training reports.	
Activities	Activity 4.1 Study tour	Activity 5.1: Identification and grouping of community/household participants and community trainers.	Activity 3.1 Stakeholder mapping
	Activity 4.2: Benchmark possible technologies and prioritise the most suitable to the context in Kaduna state.	Activity 5.2: Development of training resources	Activity 3.2 Establish a stakeholder working group
	Activity 4.3: Architectural & Engineering design of the hydroponics system	Activity 5.4: Assembly and piloting of the small-scale solar hydroponics system.	Activity 3.3 Conduct an inception meeting
	Activity 4.4: Demonstration and adoption of A&E design	Activity 5.5: Training of Trainers (ToT) on hydroponics system	Activity 5.3: MAA signing between IP and project proponent

Table 4: List of CTCN performance Indicators Included in EMSAS-Hydroponics

The EMSAS-Hydroponics TA will strengthen smallholder farmers' resilience against climate change and attract investment by contributing to the following CTCN core impact indicators.

S/N	Indicator	Qualitative/ Quantitative Description
1.	Anticipated increased economic, health, well-being, infrastructure and built environment, and ecosystems resilience to climate change impacts as a result of technical assistance.	**Infrastructure and built environment** The established hydroponics system is anticipated to provide a viable alternative to the traditional system of farming that is exposed to drought, harsh climate changes, and insecurity. By adopting the hydroponics system, farmers are anticipated to build resilient agricultural infrastructures that will allow them to grow agricultural products devoid of vulnerability to harsh climate conditions that affect the traditional system of agriculture. Please see Table 5: Output 5: Activity 5.4. **Economic** Trained farmers on hydroponics systems are anticipated to have improved economic resilience through expected returns from all-year-round cultivation of crops and increased yield. Please see Table 5: Output 6: Activity 6.1. **Health and well-being** With improved agricultural yield from the implementation of the hydroponics system, it is anticipated that the population of the target community will achieve increased food security thereby increasing overall nutrition and health and well-being of the community.
2.	Anticipated number of direct and indirect beneficiaries as a result of the TA	**Total Beneficiaries** This will count the number of staff representing the government entities that will manage and sustain the hydroponics and the number of people in the communities that will benefit from the hydroponics system (living in the area covered by the system). Please see Table 5: Output 5: Activity 5.5 and Output 6: Activity 6.1

Table 5: List of TA performance Indicators

(A) Outputs and Activities as described in the Response Plan	(B) Indicator:	(C) Expected results:	(D) Method and frequency for data collection:	(F) Comments:
Output 3: *Stakeholder mapping, Stakeholder engagement and the establishment of stakeholder working group (SWG)*				
Activity 3.1: Stakeholders mapping	Number of stakeholders identified.	30	Stakeholder mapping report (Annually)	This will involve the identification of key stakeholders at national, state and local government levels.
Activity 3.2: Creation of a Stakeholder Working Group (SWG)	Number of Stakeholder organisations selected to serve as SWG. Number of SWG meetings held Number of participants in climate technology RD&D events	8 10 18	SWG register (Annually). Event reporting template (Quarterly). Headcount, Attendance register (Quarterly).	This is assuming eight (8) stakeholders are selected to serve as SWG members and SWG meetings are held at least once every month. Two participants (1 male and 1 female) from each SWG member organisation plus the NIE are expected to attend the meetings making a total of 18 participants.
Activity 3.3: Conduct an inception meeting	Number of participants in climate technology RD&D events	1	Attendance register, Meeting minutes, and participant lists. (Annually)	This will be conducted after the completion of Activity 3.1 and 3.2
Activity 3.4: Conflict Analysis Report	Total number of deliverables produced during the assistance (excluding mission, progress, and internal reports)	1	Event reporting template (Annually)	This activity will present the findings of a conflict analysis conducted to assess potential conflicts and tensions within the project area.

Output 4: *Architectural design of hydroponic system*				
Activity 4.1: Study Tour	Number of hydroponic farming centres visited. Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	6 1	Event reporting template (Annually) Event reporting template (Annually)	The number of visits will be decided based on verified contacts made. A detailed report of findings from the study tour will be developed.
Activity 4.2: Benchmark Possible Technologies	Number of hydroponic technology systems analysed. Number of climate technology RD&D-related events.	3 1	Event reporting template (Annually)	This activity involves studying all available hydroponics systems to select the best systems that will be implemented.
Activity 4.3: Architectural & Engineering Design	Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	1	Architectural & Engineering Design/Report	The outcome of Activity 4.2 will inform the design.
Activity 4.4: Demonstration and adoption of A&E design	Number of stakeholder organisations attending the workshop. Number of participants in climate technology RD&D event	8* 16	Headcount, Attendance register (Annually).	This activity involves demonstrating the completed A&E design to the SWG. In total, 2 representatives of each of the 8 SWG member organisations are expected to attend the event.

Activity 4.5: Estimate the cost of setting up the hydroponics system.	Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	1	Bill of Quantity for selected system(s)	A detailed breakdown of the cost implication of implementing the selected hydroponics system will be developed.
Output 5: Hydroponics System Set-Up and Demonstration				
Activity 5.1: Identification and Grouping of Participants	Number of participants identified and grouped. Number of participants in climate technology RD&D event	60	Headcount, Attendance register.	This is assuming 60 community members are identified and grouped for the training.
Activity 5.2: Development of Training Resources	Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	2	Training Manuals developed and approved (Annually).	This involves the development of training manuals on hydroponics system setup and hydroponics farming.
Activity 5.3: MoU Signing between IP and Project Proponent	Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	1	Signed MoU (Annually)	This is a one-off activity that will be done to ensure the sustainability of project facilities.
Activity 5.4: Assembly and Piloting of System	Number of hydroponics systems established	1	Event reporting template (Annually)	This activity involves the construction of one hydroponics system that will be used to train the target participants on the hydroponics system of farming.

	Anticipated increased infrastructure resilience. Anticipated increased health and well-being of the target group	30% of the target community's population (3,416 persons) 30% of the target community's population (7,917 persons)		The established hydroponics system is anticipated to provide a viable alternative to the traditional system of farming that is exposed to drought, harsh climate changes, and insecurity. By adopting the hydroponics system, farmers are anticipated to build resilient agricultural infrastructures that will allow them to grow their agricultural products devoid of vulnerability to harsh climate conditions that affect the traditional system of agriculture. With improved agricultural yield from the implementation of the hydroponics system, it is anticipated that the population of the target community will achieve increased food security thereby increasing overall nutrition and Health and well-being of the community.
Activity 5.5 Training of Trainers (ToT)	Number of trainers trained. Number of participants in climate technology RD&D event Number of direct and indirect	10	Attendance register, Meeting minutes, and participant lists. (Annually)	These trainers will be trained and in turn, provide training services to other communities.

	beneficiaries as a result of the TA	11,333*	Approved End-of-Project Assessment	
Output 6: Community Training on Hydroponics				
Activity 6.1: Training on Hydroponics System.	Number of participants trained. Number of participants in climate technology RD&D event. Number of direct and indirect beneficiaries as a result of the TA. Anticipated increased economic resilience.	60 11, 333 30% of the target community's population (7,917 persons*)	Attendance register and participant lists. (Annually) Approved End-of-Project Assessment Attendance register and participant lists. (Annually)	This will involve training beneficiaries from the target communities.
Activity 6.2: Sensitization Workshop on Conflict Prevention	Number of participants trained. Number of participants in climate technology RD&D event	60	Attendance register and participant lists. (Annually)	This will complement the hydroponics training events conducted.
Output 7: Project Sustainability Strategy and Close-Up				
Activity 7.1: Definition of Roadmap for Scaling	Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	1	Attendance register and participant lists. (Annually)	This will involve the development of a strategic document to highlight a strategy for scaling up the hydroponics system to other communities.

Activity 7.2: Demonstration Workshop to Stakeholders	Number of stakeholders attending the workshop. Number of participants in climate technology RD&D event.	30	Attendance register and participant lists. (Annually)	This will involve all identified stakeholders within and outside Kaduna State.
Activity 7.3: End-of-Project Assessment	Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	1	Approved End-of-Project Assessment	A report detailing the evaluation result of the TA highlighting results achieved against baseline conditions.

*See Annex 1 for the breakdown of how the beneficiaries are calculated.

SECTION 3: IMPACT STATEMENT

This section outlines the initial impact statement of the TA, which will be updated upon completion.

Table 5: Impact Description of the TA

Impact Statement	
Challenge	In Kaduna State, conflict is linked to land-use disputes between nomadic pastoralist communities and farming communities. Drought and desertification over the last decades have pushed herders southwards in farmers' land (Herbert & Husaini, 2018). In some instances, religious and ethnic undertones further con-notated into existing conflicts as most herders are Muslim Fulani and most of the farmers are Christians of various ethnicities (Crisis Group, 2018). Among key drivers of the ongoing violence are the spread of ethnic militias, the failure of the federal government to respond to conflict and tensions, and the introduction of anti-grazing laws in November 2017, which resulted in an exodus of herders into neighbouring regions, sparking clashes with farmers (Crisis Group, 2021). The farmer-herder issues have led to clashes and widespread cattle rustling (Crisis Group, 2022b & 2022d). Herder-farmer issues and the rise of criminal gangs in the region have led to rapidly increasing rates of violent crime, including banditry, kidnapping, and killings, which the authorities have failed to stem (Amnesty International, 2022; Crisis Group, 2020,2022d, 2023a & 2023e).[1]

[1] https://www.cahraslist.net/

	Furthermore, the impacts of drought and desertification have unleashed a cascade of challenges, predominantly affecting communities reliant on rain-fed agriculture. These environmental crises have catalysed inter-communal conflicts between traditional farmers and nomadic herders as land and water resources dwindle. The escalation of violence, perpetuated by armed groups such as bandits, and armed violent herdsmen, has further exacerbated the region's fragility. The severity of the food security crisis, compounded by these factors, is evidenced by a recent report from the United Nations Food and Agriculture Organization[2], which signals that a staggering 25.3 million Nigerians are teetering on the brink of acute food insecurity. In response, the Federal Government declared a state of emergency concerning the nation's food security on July 14, 2023[3]. In light of the multifaceted and urgent challenges confronting Kaduna State, there is a critical need for innovative solutions. Thus, this technical assistance (TA) aims to pilot a small-scale hydroponics system as a strategic response to the convergence of issues arising from climate change, insecurity, and food security in the region. Hydroponics, with its capability to mitigate reliance on unpredictable weather patterns, particularly erratic rainfall due to climate change, offers a promising avenue. Moreover, its capacity to operate within controlled environments provides a shield against the disruptions brought by violent conflicts and insecurity that have destabilised traditional farming practices.
CTCN assistance	● To define, select, design, and implement a "small-scale hydroponic farming technology" in Kubau, Kaduna to promote the adoption of climate-smart agriculture. ● Provide capacity building to local communities on the setup, installation and management of hydroponic farms. ● Ensure capacity building for both system administrators and system users.
Anticipated impact	● Number of direct and indirect beneficiaries as a result of the TA. ● Increased adoption of the hydroponic farming system. ● Reduce conflicts and violence arising from land-based resource competition. ● Significantly increase agricultural yield to ensure food security as targeted by the Federal Government of Nigeria.
Anticipated co-benefits from the TA	*Instruction: Please indicate expected co-benefits as described in the response plan and in the relevant deliverables* Climate Resilience: Hydroponics systems, being less reliant on rainfall and soil quality, are inherently climate-resilient. This can help communities better adapt to changing weather patterns and reduce the vulnerability of agriculture to climate-related risks.

2 https://www.un.org/en/global-issues/food

3 https://reliefweb.int/report/nigeria/state-emergency-declaration-food-security-policy-brief-august-2023#:~:text=In%20part%20against%20this%20background,security%20situation%20in%20the%20country.

	Resource Efficiency: Hydroponics systems use significantly less water and space compared to traditional farming. This promotes efficient resource utilisation, which is beneficial in regions facing water scarcity and land degradation. Improved Nutrition: The ability to control nutrient levels in hydroponics systems can lead to the production of nutrient-rich crops, potentially improving the nutritional intake of communities and addressing malnutrition issues. Community Engagement: The project can foster community engagement and cooperation through shared responsibility for managing hydroponics systems. This can strengthen social bonds and collective efforts to address food security challenges. Economic Growth: The increased agricultural productivity and surplus produce generated by hydroponics can stimulate economic growth at the community level, generating income and employment opportunities.
Gender aspects of the TA	Gender mainstreaming in this project involves recognising and addressing these gender disparities to ensure that women and men have equal opportunities to benefit from CSA interventions and contribute to sustainable agricultural development. It means understanding and accounting for the different roles, needs, and constraints of women and men in agriculture and designing interventions that are responsive to these realities. Key elements of gender mainstreaming for this project include Inclusive Decision-Making: Ensuring that women are actively involved in decision-making processes related to CSA interventions, including planning, resource allocation, and policy development. Equal Access to Resources: Addressing gender disparities in access to productive resources such as land, water, seeds, and financial capital. This may involve providing targeted support and opportunities for women farmers to access resources and technology. Capacity Building: Providing training and capacity-building initiatives tailored to the specific needs and priorities of women farmers, enabling them to effectively adapt to climate change and adopt CSA practices. Promoting Women's Leadership: Empowering women to take on leadership roles within agricultural communities and decision-making bodies, ensuring their voices are heard and their contributions are valued. Gender-Responsive Technology: Designing and promoting CSA technologies and practices that are accessible and beneficial to both women and men, taking into account their different roles and responsibilities in agricultural production.
Anticipated contribution to NDC	● Page 25 of Nigeria's updated NDC Document indicates the Government's commitment to invest in Climate Smart Agricultural practices and technologies to enhance sustainable food production and food security. This small-scale Hydroponics technology directly aligns with this commitment. ● One of Nigeria's sectoral strategies mentioned in the National Science, Technology and Innovation Policy (NSTIP) 2022 is to encourage modern technologies in agriculture including organic agriculture, smart farming systems, e-agriculture, hydroponics, vertical farming, urban agriculture, digital agriculture, drones and artificial intelligence in agriculture.

The narrative story	In the Northern part of Nigeria, particularly in states like Kaduna State, which is generally arid, the impacts of drought and desertification have been disproportionately pronounced, affecting communities predominantly reliant on rain-fed agriculture. These environmental crises have triggered inter-communal conflicts between traditional farmers and nomadic communities engaged in livestock herding as land and water resources become increasingly scarce. These have heightened violence perpetrated by armed groups, including the extremist organisation Boko Haram, bandits, and herdsmen. Evidencing the severity of the food security crisis due to these two factors, a recent report from the United Nations Food and Agriculture Organization has signified that an alarming 25.3 million Nigerians stand on the precipice of acute food insecurity. Consequently, the Federal Government felt compelled to declare a state of emergency concerning the nation's food security on July 14, 2023. In response to the complex and urgent challenges facing Kaduna State, the technical assistance will pilot a small-scale hydroponics system as a strategic solution to address the convergence of issues stemming from climate change, insecurity, and food security in the region. Hydroponics is expected to reduce reliance on unpredictable weather patterns, especially erratic rainfall due to climate change, and can be operated within controlled environments, shielding farmers from the vagaries of violent conflicts and insecurity that have disrupted traditional farming practices. Their scalability and adaptability enable community-level deployment, providing an immediate and tangible response to food security concerns.
Contribution to SDGs	**SDG 2: Zero Hunger** The project directly contributes to SDG 2 by addressing food insecurity through the implementation of hydroponics systems. By introducing innovative and sustainable farming techniques, especially in regions prone to climate change-related challenges, the project aims to enhance agricultural productivity, improve access to nutritious food, and ultimately work towards ending hunger. **SDG 13: Climate Action** Through the adoption of climate-smart agriculture practices like hydroponics, the project actively supports SDG 13 by mitigating climate change impacts. promoting techniques that require fewer natural resources and emit fewer greenhouse gases, contributes to reducing the agricultural sector's carbon footprint. Additionally, the project's focus on renewable energy sources like solar power aligns with the goal of transitioning towards a low-carbon economy. **SDG 5: Gender Equality** The project integrates gender mainstreaming strategies to promote SDG 5 by ensuring equal participation and benefit for both men and women in agricultural activities. By conducting gender assessments, implementing gender-responsive training programs, and fostering women's inclusion in decision-making processes, the project aims to address gender disparities in access to resources, knowledge, and opportunities within the agricultural sector.