Monitoring and Evaluation Plan

for the Technical Assistance on:

The Radio-Internet Climate Technology for Agricultural Resilience: Harnessing the combined potential of Radio and Internet to enhance agricultural resilience against climate change disasters in rural Kebbi State, North-western Nigeria (RANETA)

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LIST OF ACRONYMS

CTCN	Climate Technology Centre and Network
GHI	Green Habitat Initiative
NIE	National Implementing Entity
NiMet	Nigerian Meteorological Agency
NCCC	National Council on Climate Change
NGO	Non-Governmental Organisation
M&E	Monitoring and Evaluation
RANETA	The TA for Radio-internet System for Agricultural Resilience
TA	Technical Assistance
ToC	Theory of Change
UNFCCC	United Nations Framework Convention on Climate Change

Section 1: Overview of the TA

1.1 Introduction to the Technical Assistance

The Adaptation Fund Climate Innovation Accelerator (AFCIA), through the Climate Technology Center and Network (CTCN), rolled out the "Innovation Facility" to offer vulnerable countries new tools and grants to foster, scale up and accelerate innovative adaptation practices and technologies on the ground to help meet the urgency of climate change. To this end, the Nigerian Meteorological Agency (NiMet) proposed the application of the Radio and Internet system in a rural community to guarantee the flow of information from the NiMet agrometeorological data generating and analysis facilities to the rural communities where the information is quite thin.

Through a competitive process, Green Habitat Initiative (GHI), a nonprofit organisation in Nigeria, as the National Implementing Entity (NIE) emerged as the winner and entered into an agreement with the United Nations Environment Programme (UNEP) and its UNFCCC technology mechanism, the United Nations Climate Technology Centre and Network, to pilot and implement the radio and internet system in rural communities of Kebbi State, Nigeria, as a Technical Assistance (TA) to NiMet on the Radio-Internet Climate Technology for Agricultural Resilience (RANETA). The system represents a unique exploitation of the Radio and Internet to afford rural communities the opportunity to leverage technology and radio (widespread use prevalent in rural communities) to build resilience against climate change, to inform major decisions in agriculture, to serve as early warning systems, and other related activities. The TA will be implemented in 18 months between the period of March 2024 to August 2025.

1.2 Goal and Purpose of the TA

Goal: The overall goal of the TA is to ensure the effective dissemination of agroclimatic information from NiMet to small-holder farmers in rural communities of Kebbi State via an ICT medium.

Purpose: The TA will pilot the use of radio and the internet to disseminate agrometeorological information to smallholder farmers in Kebbi State, Nigeria.

Objective: The overall objective of this technical assistance is to build the resilience of smallholder agricultural practitioners and promote the wider use of agrometeorological services to improve data availability, climate forecasting, early warning, adaptation planning and decision-making in the agricultural sector. In the medium and long term, this TA aims to reduce climate risks in agricultural production, thereby improving food supply and livelihood security.

Table 1: Basic information for the TA

Basic Information	
Title of response plan	The Radio-Internet climate technology for Agricultural Resilience: Harnessing the combined potential of Radio and Internet to enhance agricultural resilience against climate change disasters in rural Kebbi State, North-western Nigeria. (RANETA)
Technical assistance reference number	**2022000049**
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. Y.Technology identification and prioritisation
Technologies supported	
Implementation period and total duration	18 months (4th March 2024 - 30th August2025)
Total budget for implementation	$182,230
Designer of the response plan	**Green Habitat Initiative (GHI)**
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 is that if farmers have prompt access to reliable agrometeorological information, then they will utilise it for improved agricultural practices.

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

Inputs	Outcomes	Impact
Radio broadcasting equipment, internet connectivity, and development of an online platform. Partnerships with local agricultural experts, community organisations, and government agencies. Production and broadcasting of radio programs focusing on climate-smart agricultural practices, weather forecasting, market information, and disaster preparedness. Conducting training workshops and field demonstrations to educate farmers on resilient farming techniques and water management.	Increased awareness, adoption and knowledge among farmers regarding agroclimatic information and climate-resilient farming techniques and adaptation strategies. Adoption of sustainable agricultural practices leading to improved crop yields and water conservation. Strengthened social networks and community cohesion among farmers, enabling collective action and knowledge sharing. Enhanced resilience of agricultural livelihoods to climate variability, extreme weather events, and market fluctuations.	Improved food security and income stability for farming households, reducing vulnerability to external shocks. Sustainable agricultural development contributing to poverty reduction, economic growth, and environmental sustainability at the community level. Empowerment of farmers as agents of change, leading to long-term improvements in agricultural productivity, livelihoods, and resilience.
Underlying assumptions		
The assumptions of the TA are as follows: 1. Adequate access to agroclimatic information, radio receivers and internet-enabled devices among target communities. 2. Supportive policy environment and institutional frameworks promoting agricultural resilience and technology adoption. 3. Positive perceptions of the use of agroclimatic information amongst smallholder farmers. 4. Active engagement and participation of local stakeholders, including farmers, community leaders, extension workers, and government agencies.		

Table 3: Result Framework

CTCN GOAL: Transfer and deployment of new and existing technologies in developing countries for NDC, NAP and national plan implementation.			
TA Goal	Exploitation of the Radio and Internet to afford rural communities the opportunity to leverage technology and radio, which has widespread use in rural communities to build the resilience of smallholder agricultural practitioners, promote wider use of agrometeorological services to improve data availability, climate forecasting, early warning, adaptation planning and decision making in the agricultural sector for the Kebbi State in Nigeria.		
CTCN Services	**Innovation**	**Implementation**	**Collaboration and stakeholder engagement**
Outcomes	Existing meteorological and climatologic equipment used by NiMet and available in Kebbi State, Nigeria, are well-understood.	The needs of the local farmers of Kebbi State, as well as the expectations of NiMet, are clearly defined.	Information on future weather conditions is relevant and timely to support strategic and tactical crop management decisions for especially smallholder farmers.
	All possible technologies that could be used to support the deployment of the RANET and identify possible barriers and challenges are adequately benchmarked.	The weather and climate information service system supports decision-making for the agricultural sector, which has been fully developed and implemented in Kebbi State.	The capacity of both system administrators and system users improved to ensure agricultural resilience.
Outputs	Output 1: Creation of a steering committee, mapping of stakeholders and inception meeting	Designing the architecture of the system	Implementation of the final prototype
	Output 2: Diagnose existing equipment and define the needs and the characteristics of the optimal system to transfer adequate climate data from the NiMet to local farmers of the Kebbi State, North-western Nigeria, to increase their resilience to Climate Change and their decision-making process while managing their land.	Piloting the technology in Kebbi state	Demonstration Workshop of the prototype to the restricted working group and to the Kebbi State

Activities	Activity 2.1 Kick-off call	Activity 4.1: Identification of relevant technologies	Activity 5.3 Organize on-site meetings with the representatives of the Kebbi State in which the pilot will be tested.
	Activity 2.2: Creation of a steering committee and Mapping of stakeholders	Activity 4.2: Identify the barriers, challenges, opportunities and strengths of the systems in place to implement such a technology.	Activity 5.4: Implement the pilot system.
	Activity 2.3: Conduct an inception meeting	Activity 4.3: Half a day workshop to present the options as well as the viability of the system.	Activity 6.1: Demonstration Workshop of the prototype to the restricted working group and to the Kebbi State.
	Activity 3.1: Diagnose the current equipment available in Nigeria to gather climate data and define their level of operationality.	Activity 4.4: Design the architecture of the system.	Activity 6.2: Adjustments to the system and start of the demonstration phase based on the comments received during the previous workshop.
	Activity 3.2: Identification of needs of the future users and administrators of the system	Activity 4.5 Organize an in-person meeting to validate the prototype technology.	Activity 6.3: Validation of the final prototype
	Activity 3.3 Half a day workshop to validate the identification of the needs.	Activity 5.1 Plan the implementation of the pilot project.	Activity 6.4: Workshop on sustainable agricultural practices
	Activity 3.4 Final report detailing the needs of the agrometeorological system.	Activity 5.2 Organize an online meeting to discuss the logistics and implementation of the pilot.	Activity 7.1 Organize a dissemination and closure workshop.

Table 4: 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 2: *Creation of a steering committee, mapping of stakeholders, and inception meeting*				
Activity 2.1: Kick-off call	Number of participants in climate technology RD&D events	8	Headcount, Attendance register (Bi-Annually)	Two participants, each from the project implementers (GHI), project proponents (NIMET), NDE and CTCN, are targeted to participate in the kick-off call.
Activity 2.2: Creation of a Stakeholder Working Group (SWG) and Mapping of stakeholders	Number of participants in climate technology RD&D events	8	Headcount, Attendance register (Bi-Annually)	Assuming 8 different organisations will agree to appoint a focal person to join the SWG and also participate in all meetings. There might be a challenge of having people travel from Kebbi to join the meeting in Abuja.
Activity 2.3: Conduct an inception meeting	Number of participants in climate technology RD&D events	20	Attendance register (Bi-Annually)	This is assuming twelve (12) members of the SWG and eight (8) other stakeholders from the sub-national government, NGOs, int. agencies, and farmer groups will

				participate in the inception meeting.
Output 3: Diagnose existing equipment and define the needs and the characteristics of the optimal system to transfer adequate climate data from the NIMET to local farmers of the Kebbi State, North-western Nigeria, to increase their resilience to Climate Change and their decision-making process while managing their land.				
Activity 3.1: Diagnose the current equipment available in Nigeria to gather climate data and define their level of operationality.	Number of climate technology RD&D-related events	2	Event reporting template, interviews (Quarterly)	Assuming the event to diagnose the existing technology or system in Nigeria holds with NiMet at their stations in Abuja and Kebbi Security challenges might hamper accessing the equipment if they are in difficult locations.
Activity 3.2: Identification of needs of the future users and administrators of the system	Number of climate technology RD&D-related events	1	Event reporting template (Quarterly)	This is assuming accurate feedback and cooperation of all relevant stakeholders and targeted beneficiaries during the conduction of the needs assessment. Security challenges might hamper access to some farmers in Kebbi State.
Activity 3.3: Half a day workshop to validate the identification of the needs.	Number of participants in trainings organised by proponents and implementing partners	20	Headcount, Attendance register (Bi-Annually)	This is assuming the participation of eight (8) members of the SWG, ten (10) stakeholders from the sub-national

				government, int agencies, NGOs, and farmer groups, and two (2) technical experts from GHI.
Activity 3.4: Final report detailing the needs of the agrometeorological system.	Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	1	(Quarterly)	This is assuming the successful completion of activities 3.2 and 3.3
Output 4: Designing the architecture of the system				
Activity 4.1: Identification of relevant technologies	Number of climate technology RD&D-related events	1	Event reporting template (quarterly).	This is assuming the cooperation and commitment of NiMet and other relevant government agencies to share complete information regarding the existing agroclimatic technologies.
Activity 4.2: Identify the barriers, challenges, opportunities, and strengths of the systems in place to implement such technology.	Number of climate technology RD&D-related events	1	Event reporting template (Quarterly)	This is with the assumption that activity 4.1 is successfully conducted.
Activity 4.3: Half a day workshop to present the options as well as the viability of the system.	1. Number of participants in training organised by proponents and implementing partners.	20	1. Headcount, Attendance register (Bi-Annually)	This is assuming the participation of eight (8) members of the SWG, ten (10) stakeholders from the sub-national

	2. Percentage of participants reporting satisfaction with CTCN training. 3. Percentage of participants reporting increased knowledge, capacity and/or understanding as a result of CTCN training.	75% 75%	2. CTCN training feedback form (Bi-Annually) 3. CTCN training feedback form (Bi-Annually)	government, NGOs, int. agencies, and farmer groups, and two (2) technical experts from GHI.
Activity 4.4: Design the architecture of the system.	Number of climate technology RD&D-related events	1	Event reporting template (Quarterly)	This is with the assumption that activities 4.1, 4.2 and 4.3 are successfuly conducted.
Activity 4.5 Organize an in-person meeting to validate the prototype technology.	1. Number of climate technology RD&D-related events. 2. Number of participants in climate technology RD&D events	1 20	Event reporting template (Quarterly)	This is with the assumption that activity 4.4 is successfully conducted. This is assuming the participation of eight (8) members of the SWG, ten (10) stakeholders from the sub-national governments, int. agencies, NGOs, and farmer groups, and two (2) technical experts from GHI.
Output 5: Piloting the technology in Kebbi state				
Activity 5.1: Plan the implementation of the pilot project.	Number of climate technology	1	Event reporting template (Quarterly)	Assuming the technology is successfully

	RD&D-related events			validated by all stakeholders.
Activity 5.2: Organize an online meeting to discuss the logistics and implementation of the pilot.	1. Number of climate technology RD&D-related events. 2. Number of participants in climate technology RD&D events	1 20	Event reporting template (Quarterly) Attendance register (Bi-Annually)	Assuming the technology is successfully validated by all stakeholders. This is assuming the participation of eight (8) members of the SWG, ten (10) stakeholders from the sub-national government, NGOs, and farmer groups, and two (2) technical experts from GHI.
Activity 5.3: Organize on-site meetings with the representatives of the Kebbi State in which the pilot will be tested.	1. Number of climate technology RD&D-related events. 2. Number of participants in climate technology RD&D events	3 20	Event reporting template (Quarterly) Attendance register (Bi-Annually)	Assuming the technology is successfully validated by all stakeholders. This is assuming the participation of eight (8) members of the SWG, ten (10) stakeholders from the sub-national government and farmer groups, and two (2) technical experts from GHI.
Activity 5.4: Implement the pilot system.	1. Number of direct and indirect beneficiaries as a result of the TA	TBD	Survey (Annually)	This assumes that the technology has been successfully piloted and that the beneficiaries have adopted it.

Output 6: Implementation of final prototype				
Activity 6.1: Demonstration Workshop of the prototype to the restricted working group and to the Kebbi State.	Number of participants in trainings organised by proponents and implementing partners	20	Headcount, Attendance register (Bi-Annually)	This is assuming the participation of eight (8) members of the SWG, ten (10) stakeholders from the sub-national government, NGOs, and farmer groups, and two (2) technical experts from GHI.
Activity 6.2: Adjustments to the system and start of the demonstration phase based on the comments received during the previous workshop.	Number of climate technology RD&D-related events	1	Event reporting template (Quarterly)	This assumes the technology has been successfully piloted and the relevant stakeholders provide feedback.
Activity 6.3: Validation of the final prototype.	Number of climate technology RD&D-related events	1	Event reporting template (Quarterly)	Assuming all feedback from the stakeholders has been implemented, and the final prototype has been developed.
Activity 6.4: Workshop on sustainable agricultural practices	Number of participants in trainings organised by proponents and implementing partners	60	Headcount, Attendance register (Bi-Annually)	This is assuming farmers in Kebbi State participate.
Output 7: Disseminate information to future users, administrators and beneficiaries of the system				
Activity 7.1: Organize a dissemination and closure workshop	1. Number of participants in training organised by proponents and implementing partners.	20	Headcount, Attendance register (Bi-Annually)	This is assuming the participation of eight (8) members of the SWG, ten (10) stakeholders from the sub-national government and

	2. Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	1	Event reporting template (Quarterly)	farmer groups, and two (2) technical experts from GHI. This is with the assumption that the closure workshop was successfully conducted.

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	The Federal Government of Nigeria, in its response strategies to inculcate climate change adaptation in Nigeria, has identified the review and strengthening of climate information systems that provide early warning in a useful manner to farmers. They are also strengthening the capability of extension services providers to train farmers in best practices in the use of weather and climate data. Furthermore, there is a coordinated effort to strengthen indigenous knowledge-based adaptation techniques and to support effective research and knowledge development, as well as management to connect farmers and researchers to adapt to dynamic current and future climate scenarios. However, there is very little insight into the technological media and/or platforms that are currently being deployed to provide early warning systems for farmers who are exposed to climate change. Additionally, the research that has been conducted by experts to build climate resilience of local farmers

	has not been communicated to them via a technology that they can readily comprehend and use.
CTCN assistance	● To define, select, design, and implement a "weather and climate information service system" in Kebbi State to support decision-making for the agricultural sector. ● Provide capacity building to State actors to ensure that information on future weather conditions is relevant and timely to support strategic and tactical crop management decisions. ● Ensure capacity building for both system administrators and system users.
Anticipated impact	● Number of direct and indirect beneficiaries as a result of the TA ● Effective dissemination of agro-meteorologic data to small-holder farmers to enable the adoption of sustainable and resilient agricultural practices. ● 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* In addition to the primary objectives of the technical assistance (TA), it will result in increased agricultural productivity resulting from the adoption of climate-smart practices that can contribute to improved food security in rural communities. Practices such as agroforestry, soil conservation, and water management not only improve resilience but also help mitigate the impacts of agriculture on ecosystems and natural resources. Furthermore, the TA can facilitate knowledge sharing and networking among farmers, extension agents, researchers, and other stakeholders. Also, evidence from the successful implementation of the TA can inform policy decisions at the local, national, and regional levels, leading to the scaling up of similar interventions and investments in agricultural resilience.
Gender aspects of the TA	*Instruction: Please indicate if technical assistance will be supported by a gender analysis. Describe expected gender benefits as described in the response plan and in the relevant deliverables.* A gender assessment will be conducted at the beginning and end of the technical assistance to understand the gender structure of the target beneficiaries. GHI will aim for at least 40% gender inclusivity by assigning roles and responsibilities to women to ensure gender mainstreaming and representation. Capacity-building exercises for technicians to acquaint themselves with the skill to carry out minor maintenance and repair of RANET equipment will also target at least 40% gender inclusivity.
Anticipated contribution to NDC	*2 to 4 bullet points. Approximately 350 characters with spaces.* ● The RANET technology is aligned with the National Climate Change policy for 2012, which identified reviewing and strengthening climate information systems to provide early warning in a manner useful to local farmers as one of agricultural sectoral adaptation and mitigation programs.

	● Furthermore, the same document listed strengthening the capabilities of extension service providers to train farmers in best practices, including the use of weather and climate data. ● The RANET concept seeks to explore the Radio and Internet to afford rural community smallholder agricultural practitioners the opportunity to leverage climate data to build climate change resilience in line with the National Climate Change Policy for Nigeria (2021-2030) ● The National Determined Contributions (NDCs) for Nigeria (Amended 2021) also lists Climate-smart agriculture as a key mitigation measure for climate change in the Agricultural sector.
The narrative story	*Approximately 1200 characters with spaces.* *Please provide a brief description of the background and context for the technical assistance. Describe the main problems and barriers for climate change mitigation and/or adaptation in terms of climate technologies that the CTCN technical assistance will address.* Research studies conducted on farmer perceptions of climate change in Northwest Nigeria have highlighted that most farmers do not believe they are affected by climate change. This implies that there is a significant lack of knowledge on climate change and its effects. Furthermore, farmers in Northwest Nigeria lack effective access to climate change information because there is an existing gap between the innovative climate change adaptation contributions from the internet and research institutes and the end user farmers. These innovative contributions do not get to the farmer end users in a form that is appropriate either in terms of communication media and/or language. The lack of smallholder farmer access to climate change information and the conservative mindset they harbor towards innovation means that these farmers continue to lose a significant portion of their farmlands due to floods and heavy rainfalls, which worsens the already fragile food security within the region. Studies have shown that an estimated 50-75% of Adamawa, Bauchi, Borno, Gombe, Jigawa, Kano, Katsina, Kebbi, Sokoto, Zamfara, and Yobe states are affected by rapidly rising desertification (Azare, 2020). The same study also highlights that Nigeria is losing over 350,000 hectares of arable land yearly because of climate change-induced desertification. The Federal Government of Nigeria, in its response strategies to inculcate climate change adaptation in Nigeria, has identified the review and strengthening of climate information systems that provide early warning in a useful manner to the farmers. They are also strengthening the capability of extension services providers in training farmers in best practices in the use of weather and climate data. Furthermore, there is a coordinated effort to strengthen indigenous knowledge-based adaptation techniques and to support effective research and knowledge development, as well as management to connect farmers and researchers to adapt to dynamic current and future climate scenarios. However, there is very little insight into the technological media and/or platforms that are currently being deployed to provide early warning systems for farmers who are exposed to climate change. Additionally, the research

	that has been conducted by experts to build climate resilience of local farmers has not been communicated to them via a technology that they can use. The overall objective of this technical assistance will be to pilot the RANET (Radio Internet System) in Kebbi State, Nigeria. RANET is a unique exploitation of the Radio and Internet to afford rural communities the opportunity to leverage technology and radio, which has widespread use in rural communities to build the resilience of smallholder agricultural practitioners, promote wider use of agrometeorological services to improve data availability, climate forecasting, early warning, adaptation planning, and decision making in the agricultural sector for the Kebbi State in Nigeria. In the medium and long term, this project aims to reduce climate risks in agricultural production, thereby improving food supply and livelihood security. *References: Azare et al., 2020 "Deforestation, Desert encroachment, Climate change and Agricultural production in the Sudano-Sahelian Region of Nigeria" Journal of Applied Scientific Environmental Management Vol 24 (1), pp 127-132.*
Contribution to SDGs	*To the extent possible, please describe your contribution to approximately 3 SDGs, including SDG13, with a few sentences for each SDGs concerned.* *A complete list of SDGs and their targets is available here: https://sustainabledevelopment.un.org/partnership/register/.* ***SDG 2:* End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.** The TA will have a secondary benefit in promoting sustainable agriculture resulting from the impact modelling that will result from collecting the necessary weather data and disseminating it to the people of Nigeria, including farmers. ***SDG 6:* Ensure availability and sustainable management of water and sanitation for all.** From the acquired data, agriculture management can be achieved as a secondary benefit arising from a more resilient and data-driven system that can then advise first responders before and during flooding seasons. ***SDG 13:* Take urgent action to combat climate change and its impacts.** The Radio-Internet system (RANET), which had its pilot tests in Bankilare, Niger, and Uganda in the early 2000s, represents a unique exploitation of the Radio and Internet to afford rural communities the opportunity to leverage technology and radio, which has widespread use in rural communities to build the resilience of smallholder agricultural practitioners. ***SDG 13.1:* Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.** The scheme will seek to ensure the flow of information from the urban centres to the rural communities where the information is quite thin. It will supply scientific-based information on drought and other climate-related disasters over a distributed network that is owned and managed by local communities.

	***SDG 13.2:* Integrate climate change measures into national policies, strategies, and planning.** The RANET system will seek to combine data from global climate data banks that climate researchers have access to, which contain seasonal rainfall predictions about North-western Nigeria. ***SDG 13.4b:* Promote mechanisms for raising capacity for effective climate change-related planning and management in least-developed countries and small island developing States, including focusing on women, youth, and local and marginalised communities** Capacity building exercises for technicians to acquaint themselves with the skill to carry out minor maintenance and repair of RANET equipment will also target at least 40% gender inclusivity.