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Research Terms of Reference

Area-Based Assessment (ABA) on Community-Based Adaptation (CBA) to climate-related hazards and climate variability among refugees and the host community in Nyumanzi Settlement

UGA2406

Uganda

August 2024

V 1.0

IMPACT Shaping practices
Influencing policies
Impacting lives

1. Executive Summary

Country of intervention	Uganda					
Type of Emergency	<input checked="" type="checkbox"/>	Natural hazard	<input type="checkbox"/>	Conflict	<input type="checkbox"/>	Other (specify)
Type of Crisis	<input type="checkbox"/>	Sudden onset	<input checked="" type="checkbox"/>	Slow onset	<input checked="" type="checkbox"/>	Protracted
Mandating Body/ Agency	Foreign, Commonwealth, & Development Office (FCDO)					
IMPACT Project Code	25AMI					
Overall Research Timeframe	01/07/2024 to 31/03/2025					
Research Timeframe	1. Pilot/ training: 16/10/2024		6. Preliminary presentation: 05/12/2024			
	2. Start collect data: 19/10/2024		7. Outputs sent for validation: 31/01/2025			
	3. Data collected: 09/11/2024		8. Outputs published: 31/03/2025			
	4. Data analysed: 22/11/2024		9. Final presentation: 31/03/2025			
	5. Data sent for validation: 29/11/2024					
Number of assessments	<input checked="" type="checkbox"/>	Single assessment (one cycle)				
	<input type="checkbox"/>	Multi assessment (more than one cycle)				
Humanitarian milestones	Milestone		Deadline (can be tentative)			
	<input checked="" type="checkbox"/>	Donor plan/strategy (FCDO, EU, ECHO, GIZ, etc.)	31/03/2025			
	<input type="checkbox"/>	Inter-cluster plan/strategy	_ _ / _ _ / _ _ _ _			
	<input type="checkbox"/>	Cluster plan/strategy	_ _ / _ _ / _ _ _ _			
	<input checked="" type="checkbox"/>	NGO platform plan/strategy	31/03/2025			
	<input type="checkbox"/>	Other (Specify):	_ _ / _ _ / _ _ _ _			
Audience Type & Dissemination	Audience type		Dissemination			
	<input type="checkbox"/>	Strategic	<input checked="" type="checkbox"/> General Product Mailing (e.g. WorkGrEEEn mailing list)			
	<input checked="" type="checkbox"/>	Programmatic	<input type="checkbox"/> Cluster Mailing (Education, Shelter and WASH) and presentation of findings at next cluster meeting			
	<input checked="" type="checkbox"/>	Operational				
	<input checked="" type="checkbox"/>	Advocacy	<input checked="" type="checkbox"/> Presentation of findings (modalities tbc)			

		X Website Dissemination (U-Learn Resource Centre) <input type="checkbox"/> [Other, Specify]	
Stakeholder mapping	X	Yes¹	<input type="checkbox"/> No
General Objective	This research aims to identify and provide an in-depth understanding of the community-based coping and adaptation strategies to climate-related hazards and climate variability among the refugee and host communities in Nyumanzi settlement to inform humanitarian and development actors implementing climate-related programmes as well as advocate for localized climate adaptation action in Uganda.		
Specific Objectives (SOs)	<p>SO1. Analyze climate-related hazards and climate variability patterns in Nyumanzi settlement</p> <p>SO2. Analyze climate-related impacts on the community, including tangible and intangible dimensions of Non-Economic Loss and Damages (NELDs)²</p> <p>SO3. Identify and measure the prevalence, frequency of usage and sustainability of the community-based coping and adaptation strategies used by various groups to mitigate climate-related risks and adapt to climate variations, focusing on lesser-studied sectors such as health, gender, shelter, and education, and overlooked aspects of the food sector such as storage and food processing³</p> <p>SO4. Document Indigenous Knowledge, Local Knowledge (IKLK), climate-related language, concepts, and climate service (CS) needs to support the transdisciplinary and equitable co-production of climate services by providing local stakeholders with the necessary information</p>		

¹ Actors that could potentially contribute to and be informed by the research of this assessment (e.g. by providing feedback on the survey questionnaires or using the results for programmatic purposes) are Food and Agriculture Organization (FAO), World Food Programme (WFP), World Health Organization (WHO), United Nations High Commissioner for Refugees (UNHCR), Office of the Prime Minister (OPM), Refugee Welfare Council (RWC), United Nations Environment Programme (UNEP), United Nations Human Settlements Programme (UN-Habitat), Uganda National Meteorological Authority (UNMA), International Federation of Red Cross and Red Crescent Societies (IFRC), Ministry of Water and Environment (MWE), United Nations Capital Development Fund (UNCDF), United Nations Development Programme (UNDP), Lutheran World Federation (LWF), Shelter Cluster, Comprehensive Refugee Response Framework (CRRF), and United Nations Entity for Gender Equality and the Empowerment of Women (UN Women), Technische Universität Berlin (TUB), Makerere University.

² Intangible losses and damages refer to the non-economic impacts of climate change and environmental displacement that cannot be easily quantified or measured in monetary terms, such as ancestral knowledge and ways of living. Tangible NELDs can include social and psychological impacts, loss of access to ancestral burial grounds, loss of biodiversity, educational disruptions, health impacts, etc. Loss and Damage and the Challenges of Human Mobility and Displacement Working Group, Advisory Group on Climate Change and Human Mobility, [How To Quantify And Measure Loss And Damage Associated With Displacement?](#), May 2024

³ According to the [IPCC Sixth Assessment Report](#), the most studies have been on adaptation actions in the food sector, with the least on health. In the food sector specifically, current studies on climate change impacts in Africa predominantly focus on agricultural production, neglecting other critical components like food processing, storage, distribution, consumption, and availability of wild harvested food plants.

<p>Research Questions (RQs)</p>	<p>SO1. Analyze climate-related hazards and climate variability patterns in Nyumanzi settlement</p> <p>RQ1. How are patterns of climate-related hazards and climate variability manifested in Nyumanzi settlement, as observed through remote sensing and local knowledge? e.g., flood exposure, heat wave exposure, drought exposure, changing rainfall patterns</p> <p>SO2. Analyze climate-related impacts on the community, including tangible and intangible dimensions of Non-Economic Loss and Damages (NELDs)</p> <p>RQ2. How have various human systems* in Nyumanzi settlement been affected by climate-related hazards and climate variability? *Human systems identified by the IPCC: water scarcity, agriculture/crop production, animal and livestock health and productivity, fisheries yields and aquaculture production, infectious diseases, health, malnutrition, mental health, displacement, inland flooding and associated damages, damages to infrastructure, damages to key economic sectors.</p> <p>RQ3. How do the impacts identified in RQ2 affect different socioeconomic and demographic groups within Nyumanzi settlement? e.g., women, children, the elderly, specific ethnic or livelihood groups, refugees, and host communities</p> <p>SO3. Identify and measure the prevalence, frequency of usage and sustainability of the community-based coping and adaptation measures used by various groups to mitigate climate-related risks and adapt to climate variations, focusing on lesser-studied sectors such as health, gender, shelter, and education, and overlooked aspects of the food sector such as storage and food processing</p> <p>RQ4. What are the coping and adaptation strategies in each sector, their prevalence and frequency, and how do these measures vary among different socioeconomic groups?</p> <p>RQ5. When and under what circumstances are these coping and adaptation strategies employed? e.g., seasonal, disaster-specific, etc.</p> <p>RQ6. What are the current methods used refugees and the host community in Nyumanzi settlement to access climate information? What are the gaps in climate information needs identified by the local population, and what are the preferable means of communication on climate information?</p> <p>SO4. Document Indigenous Knowledge, Local Knowledge (IKLK), climate-related language, concepts, and climate service (CS) needs to support the transdisciplinary and equitable co-production of climate services</p> <p>RQ7. How is IKLK utilized in human system to address climate-related impacts? To what extent is IKLK still relevant in light of changing climate conditions?</p> <p>RQ8. How is this knowledge shared between ethnic groups, different displacement statuses (refugees and host communities), and age groups?</p>
<p>Geographic Coverage</p>	<p><i>Nyumanzi refugee settlement and a 15 km radius surrounding it (Adjumani District, Northern Region, Uganda)⁴</i></p>

⁴ Considering a pre-defined radius to select the host community sample a standard practice. Although the boundary used in IMPACT assessments in Uganda remains arbitrary, it is determined by the sample size and the size of the settlement. This boundary is designed to include the host community most likely to experience similar conditions as the refugees, rather than the entire district's host community, which may have more diverse needs.

Secondary data sources	<ul style="list-style-type: none"> Loss and Damage and the Challenges of Human Mobility and Displacement Working Group, Advisory Group on Climate Change and Human Mobility, How To Quantify And Measure Loss And Damage Associated With Displacement?, May 2024 IPCC, Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, June 2023 UNHCR, Uganda Comprehensive Refugee Response Portal, last updated on 30 June 2024 Orlove et al, Indigenous climate knowledge in southern Uganda: the multiple components of a dynamic regional system, May 2010 Ford et al., Preparing for the health impacts of climate change in Indigenous communities: The role of community-based adaptation, March 2018 Lwasa et al., Resilience to Climate Change in Uganda: Policy Implications for Two Marginalized Societies, May 2019 			
Population(s)	<input type="checkbox"/>	IDPs in settlements	<input type="checkbox"/>	IDPs in informal sites
	<input type="checkbox"/>	IDPs in host communities	<input type="checkbox"/>	IDPs [Other, Specify]
	<input checked="" type="checkbox"/>	Refugees in settlement	<input type="checkbox"/>	Refugees in informal sites
	<input type="checkbox"/>	Refugees in host communities	<input type="checkbox"/>	Refugees [Other, Specify]
	<input checked="" type="checkbox"/>	Host communities	<input type="checkbox"/>	[Other, Specify]
Stratification	<input type="checkbox"/>	Geographical #: 1 Population size per strata is known? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/>	Group #: 2 Population size per strata is known? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/>	[Other Specify] #: __ Population size per strata is known? <input type="checkbox"/> Yes <input type="checkbox"/> No
Data collection tool(s)	<input checked="" type="checkbox"/>	Structured (Quantitative)	<input checked="" type="checkbox"/>	Semi-structured (Qualitative)
	Sampling method		Data collection method	
Total 1 structured tool 8 semi-structured tools			Total 862 Individual Interviews (IIs) 20 Key Informant Interviews (KIIs) 16 Participatory Workshops (PWs) 2 Focus Group Discussions (FGDs)	
Individual interviews (862)				
Structured data collection tool # 1	<input type="checkbox"/> Purposive <input type="checkbox"/> Probability / Simple random <input checked="" type="checkbox"/> Probability / Stratified simple random <input type="checkbox"/> Probability / Cluster sampling <input type="checkbox"/> Probability / Stratified cluster sampling <input type="checkbox"/> [Other, Specify]		<input type="checkbox"/> Key informant interview (Target #):_____ <input type="checkbox"/> Group discussion (Target #):_____ <input type="checkbox"/> Household interview (Target #):_____ <input checked="" type="checkbox"/> Individual interview (Target #): 862⁵ <ul style="list-style-type: none"> 430 refugee participants residing in Nyumanzi settlement, 215 men and 215 women 432 host community participants residing within a 10km radius of Nyumanzi settlement, 216 men and 216 women <input type="checkbox"/> Direct observations (Target #):_____ <input type="checkbox"/> [Other, Specify] (Target #):_____ 	

⁵ This sample size includes a 10% buffer. A buffer helps ensure that the final sample size remains statistically valid and representative of the population, even after accounting for incomplete responses, unexpected challenges such as bad weather, logistical issues, or safety concerns which can affect the ability to reach all selected participants, and sudden demographic changes in the population (e.g., new arrivals or departures) which can impact the planned sample size.

Key informant interviews (20)		
Semi-structured data collection tool (s) # 1 - Health facilities staff	X Purposive <input type="checkbox"/> Snowballing <input type="checkbox"/> [Other, Specify]	X Key informant interview (Target #): 4 - 2 KII healthcare workers/female - 2 KII healthcare workers/male <input type="checkbox"/> Individual interview (Target #):_ _ _ _ _ <input type="checkbox"/> Focus group discussion (Target #):_ _ _ _ _ <input type="checkbox"/> [Other, Specify] (Target #):_ _ _ _ _
Semi-structured data collection tool (s) # 2 - Education staff	X Purposive <input type="checkbox"/> Snowballing <input type="checkbox"/> [Other, Specify]	X Key informant interview (Target #): 4 - 2 KII education staff/female - 2 KII education staff/male <input type="checkbox"/> Individual interview (Target #):_ _ _ _ _ <input type="checkbox"/> Focus group discussion (Target #):_ _ _ _ _ <input type="checkbox"/> [Other, Specify] (Target #):_ _ _ _ _
Semi-structured data collection tool (s) # 3 - Farmers	X Purposive <input type="checkbox"/> Snowballing <input type="checkbox"/> [Other, Specify]	X Key informant interview (Target #): 4 - 2 KII farmers/refugees (male/female) - 2 KII farmers/host community (male/female) <input type="checkbox"/> Individual interview (Target #):_ _ _ _ _ <input type="checkbox"/> Focus group discussion (Target #):_ _ _ _ _ <input type="checkbox"/> [Other, Specify] (Target #):_ _ _ _ _
Semi-structured data collection tool (s) # 4 - Market vendors	X Purposive <input type="checkbox"/> Snowballing <input type="checkbox"/> [Other, Specify]	X Key informant interview (Target #): 4 - 2 KII market vendors/refugees (male/female) - 2 KII market vendors/host community (male/female) <input type="checkbox"/> Individual interview (Target #):_ _ _ _ _ <input type="checkbox"/> Focus group discussion (Target #):_ _ _ _ _ <input type="checkbox"/> [Other, Specify] (Target #):_ _ _ _ _
Focus Group Discussions (2)		
Semi-structured data collection tool (s) # 5 - Elderly	X Purposive <input type="checkbox"/> Snowballing <input type="checkbox"/> [Other, Specify]	<input type="checkbox"/> Key informant interview (Target #):_ _ _ _ _ <input type="checkbox"/> Individual interview (Target #):_ _ _ _ _ X Focus group discussion (Target #): 2 - 1 FGD elderly/refugees (mixed gender) ⁶

⁶ Elders are generally considered individuals aged 60 and above. However, cultural perceptions can vary, with some communities recognizing people as elders at a younger age due to factors like lower life expectancy and different social roles. Field Officers, in collaboration with Local Council (LC) Chairmen, will identify elders according to the local community's standards.

		<ul style="list-style-type: none"> - 1 FGD elderly/host community (mixed gender) <input type="checkbox"/> [Other, Specify] (Target #):_ _ _ _ _	
Participatory workshops (16)			
Semi-structured data collection tool (s) # 6 <i>- Refugees and host community</i>	<input checked="" type="checkbox"/> Purposive <input type="checkbox"/> Snowballing <input type="checkbox"/> [Other, Specify]	<input type="checkbox"/> Key informant interview (Target #):_ _ _ _ _ <input type="checkbox"/> Individual interview (Target #):_ _ _ _ _ <input type="checkbox"/> Focus group discussion (Target #):_ _ _ _ _ <input checked="" type="checkbox"/> Participatory Workshops: 16 <ul style="list-style-type: none"> - 4 PW refugees/women - 4 PW refugees/men - 4 PW host community/women - 4 PW host community/men 	
Target level of precision if probability sampling	95% level of confidence	5 +/- % margin of error	
Disaggregation by gender and age <i>Are you planning to conduct sex/age disaggregated analysis?</i>	Gender <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Age <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Data management platform(s)	<input checked="" type="checkbox"/> IMPACT <input type="checkbox"/> [Other, Specify]	<input type="checkbox"/> UNHCR	
Expected output type(s)	<input type="checkbox"/> Situation overview #: _ _ <input checked="" type="checkbox"/> Presentation (Preliminary findings) #: 1 <input type="checkbox"/> Interactive dashboard #: _	<input checked="" type="checkbox"/> Report #: 1 <input checked="" type="checkbox"/> Presentation (Final) #: 1 <input type="checkbox"/> Webmap #: _ _ <input checked="" type="checkbox"/> Results table #: 1	<input type="checkbox"/> Profile #: _ _ <input type="checkbox"/> Factsheet #: _ _ <input checked="" type="checkbox"/> Map #: 4⁷
Access	<input checked="" type="checkbox"/> Public (available on REACH resource center and other humanitarian platforms) <input type="checkbox"/> Restricted (bilateral dissemination only upon agreed dissemination list, no publication on REACH or other platforms)		
Visibility	IMPACT, U-Learn Donor: FCDO Coordination Framework: Working Group on Energy and Environment (WorkGrEEen) Partners: U-Learn		

⁷ Nyumanzi base map, Standardized Precipitation Index (SPI), Temperature Map, Flood Map

2. Rationale

2.1 Background

General background on Uganda and Nyumanzi Settlement

Uganda, a landlocked country in East Africa, is designated as a low-income country and falls within the category of economies recognised by the United Nations as least developed countries.^{8,9} As of 2024, Uganda is home to more than 45.9 million inhabitants, including around 1.7 million refugees primarily originating from South Sudan (56%) and the Democratic Republic of Congo (DRC) (31%).^{10,11} It stands out as being the country with the highest number of refugees on the African continent.¹² Over 90% of refugees live in 12 districts spanning the West Nile and Southwest regions. Residing in open villages known as “settlements”, they coexist with the local communities.¹³

Agriculture is the backbone of Uganda's economy, employing a significant portion of the population.¹⁴ It includes both crop production and livestock farming (mostly cattle and goats), with a focus on staples such as maize, beans, and cassava, as well as cash crops like coffee, tea, and tobacco. Smallholder farming predominates, with the majority relying on rain-fed methods rather than irrigation.^{15,16,17} In Northern Uganda, 95% of the refugees are engaged in crop production, highlighting their integration into local agricultural practices.¹⁸

The Government of Uganda (GoU) is committed to including localization provisions in its strategies and frameworks for the refugee response. This initiative aims to empower national and local responders, thereby progressively achieving the Grand Bargain commitments by 2027. A key part of this commitment involves the Ministry of Water and Environment (MWE), which will play a crucial role in enhancing early-warning systems for climate-related disaster risk reduction. To achieve this, the MWE plans to develop 12 comprehensive Climate Action Plans. These plans will be implemented across various refugee host districts to promote climate change awareness and capacity-building programs. The goal is to ensure that local communities are well-equipped to respond to climate-related challenges and disasters. In addition to these efforts, the GoU pledges to further reinforce localization in its refugee response strategies. By doing so, it aims to fortify the involvement of national and local responders, aligning with the overarching objective of meeting the Grand Bargain commitments by 2027.

The overarching climate adaptation and mitigation policy in Uganda is the 2015 National Climate Change Policy. Much of the responsibility for the implementation of this plan lies with the District Local Governments (DLGs), in particular with the Natural Resources Departments and Environmental Committees. The policy also states that issues of climate are to be incorporated into District Development Plans. In 2021, Uganda passed the National Climate Change Act, which has mandated the creation of District Climate Action Plans. Despite the considerable responsibilities of DLGs in climate

⁸ World Bank, [World Bank Country Classifications by Income Level \(Uganda\)](#), 2022

⁹ United Nations Conference on Trade and Development (UNCTAD), [UN list of least developed countries](#), n.d.

¹⁰ Uganda Bureau of Statistics (UBOS), [Census 2024 - Preliminary Results](#), June 2024

¹¹ UNHCR, [Uganda Comprehensive Refugee Response Portal](#), last updated on 31 July 2024, consulted on 15 August 2024

¹² UNHCR, [Uganda](#), n.d.

¹³ Ibid.

¹⁴ In 2019, 80% of the total households in Uganda were engaged in agriculture. UBOS, [Annual Agricultural Survey \(AAS\) 2019 – Statistical Release](#), May 2022

¹⁵ The average agricultural household holding size in Uganda is 1.3 hectares. Notably, 67% of these households have holdings of less than 1 hectare, while only 13% possess more than 2 hectares. UBOS, [Annual Agricultural Survey \(AAS\) 2019 – Statistical Release](#), May 2022

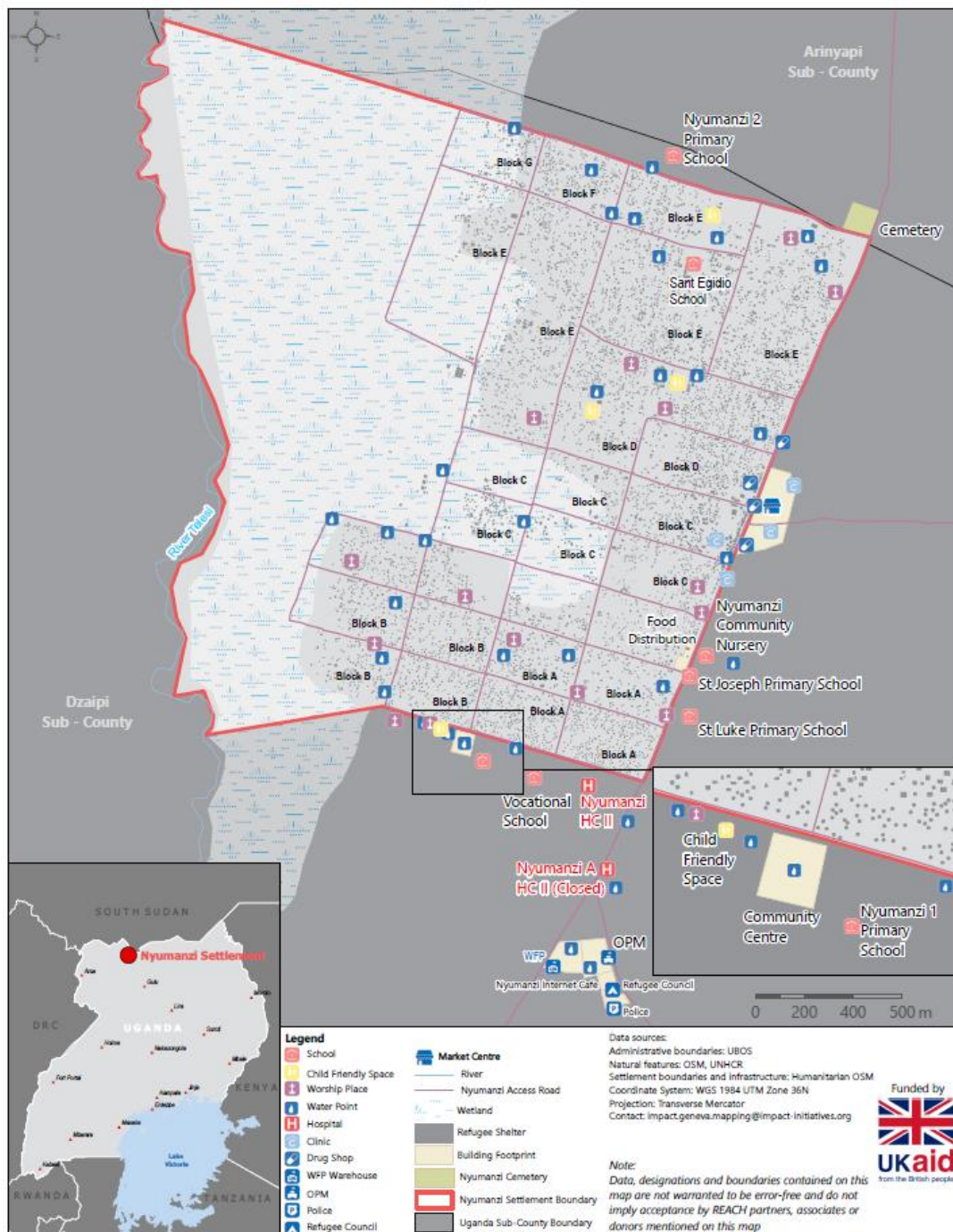
¹⁶ In 2019, only 2.9% of agricultural households used irrigation on at least one plot during the first season, and 2.4% of households did so in the second season. UBOS, [Annual Agricultural Survey \(AAS\) 2019 – Statistical Release](#), May 2022

¹⁷ UBOS, [Overview of the National Livestock Census 2021](#), 2021

¹⁸ UNHCR, Uganda Country Refugee Response Plan - The integrated response plan for refugees from South Sudan, Burundi and the Democratic Republic of the Congo - January 2019 — December 2020, 2020

adaptation planning and resource management, DLGs often lack sufficient localized information and capacity to plan properly.

Map 1. Nyumanzi settlement, 2024¹⁹



Nyumanzi settlement, established in 2014, is situated in Adjumani district and Dzaipi sub-county in Northern Uganda, near the South Sudan border, and 40 kilometers from Adjumani town.²⁰ By June 2024, it was the largest of the 19 sub-settlements (or zones) within the broader Adjumani settlement area, with a refugee population of 46,114 individuals, primarily from South Sudan. A 2018 settlement map shows that Nyumanzi comprises 23 blocks covering 488 hectares along the Ayugi River, with some blocks overlapping "wet spots", possibly indicating permanent or seasonal

¹⁹ For a clearer view of the map, please click [here](#).

²⁰ Dzaipi subcounty is sometimes spelled as Djaipi subcounty

swamps.^{21,22,23} During the scoping exercise conducted by IMPACT Initiatives in June 2024,²⁴ Nyumanzi was identified as an area prone to flooding and exposed to extreme heat. Indeed, the Monitor reported that over 4'000 refugees and host community members from Nyumanzi settlement had been displaced due to pluvial (rain induced) floods in September 2023.²⁵ In October 2023, the Ankole Times reported that authorities in Dzaipi sub-county requested the government to relocate the Nyumanzi Refugee Settlement due to severe flooding, which had been a major issue for three consecutive years.²⁶ The January – February 2024 situation report by UNICEF signaled confirmed cholera cases in Adjumani district and WASH supplies distributed to Nyumanzi HC III and Adjumani Hospital, and to Nyumanzi Reception Centre supporting new arrivals.²⁷ The ethnic groups in Nyumanzi are likely to be the Dinka, Nuer, Acholi, Madi, Lendu, Lema, and Lugbara, and most are likely to be patriarchal and patrilineal.^{28,29} Nyumanzi currently has one health center (Nyumanzi HC III), seven schools, and one marketplace serving the settlement, including the host community.³⁰

Climate change and adaptation

Africa's contribution to historical greenhouse gas (GHG) emissions responsible for human-induced climate change is among the lowest globally, with the continent also having the lowest per capita GHG emissions compared to other regions. By 2022, Uganda had only produced 0,006% of the global cumulative CO2 emissions since 1750.³¹ Despite this, Africa has already felt extensive impacts from human-induced climate change.³² According to the Notre Dame Global Adaptation Initiative (ND-GAIN) most recent rankings (2021), **Uganda was ranked the 14th most vulnerable country and the 163rd out of 182 countries in terms of readiness to react to impacts of climate change, indicating that it is among the least prepared to effectively address and adapt to these.**³³

Some of the loss and damage from climate change on the African continent as identified by the Intergovernmental Panel on Climate Change (IPCC) are the following:

Sector	Loss and damage from climate change ³⁴
Human settlements and infrastructure	<ul style="list-style-type: none"> ○ Loss or damage to formal and informal dwellings ○ Damage to transport systems ○ Damage to energy systems ○ Water supply, sanitation, education and health infrastructure ○ Migration
Health	<ul style="list-style-type: none"> ○ Loss of life ○ Loss of productivity ○ Reduced nutrition

²¹ The Ayugi River is not a part of the Nile River itself but is a tributary that eventually drains into the Nile system
²² UNHCR, [Adjumani Nyumanzi-Settlement March-2018](#), March 2018
²³ Blocks refer to the primary organizational units or subdivisions within the settlement. These blocks serve to manage and organize the settlement area.
²⁴ In June 2024, IMPACT conducted a scoping exercise in Rwamwanja, Palabek, and Adjumani. All three settlements had been identified as high vulnerable to climate change impacts based on a Secondary Desk Review.
²⁵ Monitor, [Over 4,000 refugees hit by floods in Adjumani](#), September 2023
²⁶ The Ankole Times, [West Nile – Government Urged to Relocate Nyumanzi Refugee Settlement Due to Flooding](#), Octobre 2023
²⁷ UNICEF, [UNICEF Uganda Humanitarian Situation Report No. 1: January-February 2024](#), March 2024
²⁸ Noted from the scoping mission, though no online official information is available on this
²⁹ Data is typically aggregated at the level of Adjumani settlement, which includes Nyumanzi along with other sub-settlements, rather than being specifically disaggregated for Nyumanzi itself. Publicly available data will therefore primarily refer to the Adjumani settlement as a whole, making the disaggregation of secondary data for individual sub-settlements like Nyumanzi generally not feasible
³⁰ To be confirmed.
³¹ Our World in Data, [Uganda: CO2 Country Profile](#), 2023
³² IPCC, [Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change](#), June 2023
³³ ND-GAIN, [Uganda](#), 2021
³⁴ For the complete list, please visit the IPCC report [here](#)

Economy, poverty and livelihoods	<ul style="list-style-type: none"> ○ Loss of livelihoods, jobs and income ○ Community and involuntary displacement ○ Reduced labour productivity and earning potential ○ Delayed and poorer education progress
Heritage	<ul style="list-style-type: none"> ○ Loss of traditional cultures and ways of life ○ Loss of language and knowledge systems ○ Damage to heritage sites

Information gaps identified

At the current level of global warming, 83% of evaluated adaptation responses demonstrate medium potential for reducing risks, indicating mixed effectiveness. However, there is insufficient evidence to gauge their continued efficacy as global temperatures rise further. Certain measures, like crop irrigation and adjusting planting schedules, may encounter adaptation limits beyond 1.5°C and 2°C of warming.³⁵ Therefore, **it is important to continue exploring local adaptation strategies that have not yet been fully explored to expand the range of available, context specific, and culturally appropriate options, particularly as we approach these critical thresholds.**

According to the IPCC, there's a critical need for more research on the differential impacts of climate change and **adaptation options available to vulnerable groups** in Africa. This includes understanding how social status dimensions intersect with climate vulnerability. Gender and other social factors require further analysis to grasp their impacts and to develop targeted adaptation strategies, especially for **women in patrilineal kinship systems, people with disabilities, youth, girls, and the elderly. Refugees were scarcely mentioned in the IPCC report and likely also constitute a group of interest deserving of targeted research. Capacity building among vulnerability assessors is urgently needed to integrate these considerations effectively.**

In terms of sectors, the IPCC noted that most studies were on adaptation actions in the food sector, with the least on health. In the food sector specifically, current studies on climate change impacts in Africa predominantly focus on agricultural production, neglecting other critical components like **food processing, storage, distribution, consumption, and availability of wild harvested food plants**. Indeed, for Africa combined, the sectors targeted with most support for adaptation are agriculture and water supply and sanitation, which account for half of total adaptation finance from 2014–2018. The sectoral distribution has changed little over these years, suggesting adaptation planners and funders are maintaining a relatively narrow view of where support is needed and how to build climate resilience.³⁶ **Other sectors such as shelter, physical health, mental health, education, and market/production infrastructure and their intersectionality can provide a more holistic understanding of the climate impacts and adaptation.**

Climate services (CS) investments in Africa have primarily focused on the agricultural sector, with **limited initiatives directed towards pastoralism, health, water, energy, and disaster risk reduction**.³⁷ Despite this investment, there is a significant gap between the supply and uptake of CS due to issues such as inaccessible, unaffordable, and contextually irrelevant information, as well as poor communication. Addressing these challenges through transdisciplinary co-production of CS, including short-term and user-centric information, integrating IKLK, and building user trust, can enhance the effectiveness of CS. Improved institutional capacity and strategic financial investment are seen as key to leveraging

³⁵ IPCC, [Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change](#), June 2023

³⁶ Savvidou et al., 2021 in IPCC, [Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change](#), June 2023

³⁷ In the IPCC 6th Report, CS are understood as involving generating, customizing, and delivering climate information to support decision-making across all levels of society. In Africa, CS are provided by a range of entities, including National Meteorological and Hydrological Services (NMHS), NGOs, the private sector, and research institutions. This diverse landscape offers opportunities for public-private partnerships aimed at improving the availability and accessibility of climate information across the continent.

CS for helping African stakeholders adapt to projected climate risks. **This necessitates obtaining more details on the specific information needs of local communities and the IKLK available, in order to tailor the information and vocabulary accordingly.**

More specifically, in African Indigenous agrarian systems, communities integrate IKLK to anticipate and respond to climate variability, enhancing resilience against various challenges. This traditional wisdom, combined with IKLK, offers holistic approaches to climate change adaptation, vital for mitigating community stresses. Indigenous languages play a critical role in effectively communicating climate change impacts and adaptation strategies, particularly given the low literacy rates among women and girls in Africa. Despite its potential, environmental IKLK faces challenges: many farmers rely on it but perceive inadequate government support and recognition in policy development. **As a result, this IKLK, predominantly passed down orally through generations, is at risk of gradual erosion and loss due to gaps in memory transmission.**

Who is the audience

- **Local Community Leaders and Organizations.** Engaging them ensures that research findings directly inform grassroots-level actions and policies.
- **Government Officials and Policymakers at All Levels.** They have the authority to implement policies and allocate resources for climate adaptation. Such research could provide evidence-based insights to guide local policies, development plans, and resource allocation.
- **Implementing actors in the refugee response.** The findings can influence funding priorities and project design, enhancing support for climate-resilient initiatives in Nyumanzi and settlements of similar contexts.
- **Humanitarian and development donors.** The findings can provide insights into local needs and priorities, influencing funding decisions and programmatic interventions.

Links with in-country strategy

One of the main pillars of IMPACT's mission in Uganda for its 2023 strategy (with the 2024–2027 strategy currently under development) is Climate and Disaster Risk Reduction (DRR), while the other two pillars are focused on humanitarian prioritization and the Humanitarian-Development-Peace Nexus. Specifically, the aim is to inform climate change adaptation and disaster risk programming through a robust understanding of risks and climate impacts.

Key gaps in information identified in the in-county strategy include:

- The lack of **localized information** on the impact of climate change and disasters, despite numerous national-level studies.
- Limited integration of DRR and climate change considerations into **district and regional planning**.
- Insufficient involvement of **communities** in understanding climate change and disaster risks and in **local planning** processes.

The research in Nyumanzi therefore aligns closely with IMPACT's mission strategy, particularly its pillar on Climate and Disaster Risk Reduction (DRR). It provides detailed, community-specific insights into how climate change affects the refugee and host communities in Nyumanzi. This **localized understanding** helps bridge the gap between national-level studies and on-the-ground realities. The findings can also be used to advocate for the integration of climate resilience into local planning processes. By providing evidence-based recommendations, this research supports the mainstreaming of these considerations into broader **development plans**. Finally, the participatory approach, which involves the local community in the research process, ensures that their knowledge and perspectives are incorporated.

2.2 Intended impact

- Improving understanding of the current situation to inform ongoing or planned humanitarian interventions: This research aims to offer a detailed and comprehensive understanding of climate change impacts and the population's responses. By quantifying and evaluating coping and adaptation strategies for climate variations and change, the study will identify potentially maladaptive practices to mitigate and positive adaptations to support. In anticipation of future disasters such as floods, the responses will be informed by a multi-sectoral understanding of likely needs, ensuring a more effective and coordinated approach.
- Improving understanding of the current situation to inform strategic decision-making processes, including funding allocations: By identifying the current and projected impacts of climate change on the population, this research enables a more holistic allocation of funding. This approach ensures that all aspects of adaptation are addressed, rather than focusing on a single element, leading to a more comprehensive and effective adaptation strategy.

3. Methodology

The area and settlements approach offers both principled and practical guidance to operationalize such commitments as the [Grand Bargain](#), the [Localization Agenda](#), and the Nexus, which have prompted us all to reconsider how we deliver humanitarian assistance. Area-and settlement-based assessments aim to inform humanitarian planning and response in specific areas and settlements affected by humanitarian crises. Building on quality granular data, these assessments support more localized and context appropriate assistance for affected communities in crisis-affected areas, reflecting affected people's perceptions and local responders' and communities' capacities.

According to the IPCC, traditional risk assessments often fall short by considering only one climate hazard and one sector at a time, leading to substantial misestimations of risk. The ABA methodology's holistic approach allows for the consideration of multiple interacting climate risks and their compounded impacts on human systems. This is important in areas like Nyumanzi, where overlapping risks can significantly exacerbate vulnerabilities. The lack of community agency in climate governance is a significant barrier to effective adaptation in Africa, with sources indicating that Uganda is no exception.³⁸ Studies cited in the IPCC report highlight the limited participation power of citizens and the impact of low civic education.³⁹ The ABA methodology addresses this by actively involving community members in the assessment process, thereby enhancing their agency and fostering a sense of ownership over adaptation interventions. Additionally, no adaptation response categories are deemed highly feasible for implementation, largely due to significant technological and institutional barriers. Despite the challenges, the social dimension of adaptation responses shows greater feasibility, with moderate feasibility noted for 88% of categories identified by the IPCC.⁴⁰ The ABA methodology, which emphasizes community involvement and local knowledge, aligns well with this finding. It enables the identification and support of socially feasible adaptation strategies that are grounded in the lived experiences and capacities of the local population.

3.1 Methodology overview

Methodology step-by-step

This planned research is based on a mixed methodology, with both a quantitative and a qualitative component. The quantitative method serves to quantify the perceived impact of climate change and the ensuing coping and adaptation

³⁸ The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT), [Institutional challenges to climate change adaptation: A case study on policy action gaps in Uganda](#), February 2023

³⁹ IPCC, [Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change](#), June 2023

⁴⁰ IPCC, [Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change](#), June 2023

strategies put in place by the community. Two teams, each consisting of ten enumerators and led by either an IMPACT Field Officer or a locally hired team leader, will conduct 862 individual interviews (IIs). These interviews will take place from October 11 to October 31, 2024. The 862 interviews will be equally divided between 430 refugee participants from Nyumanzi Settlement and 430 participants from the host community within a 15 km radius of the settlement. These samples will be further divided by gender, to achieve an equal split across both genders. The refugee sample will be proportionally distributed across the blocks within the settlement according to their respective population sizes.⁴¹

The structured survey tool (for IIs) will be built with extensive inputs from four IMPACT Field Officers and three external reviewers from relevant stakeholder organisations. A field trip to Nyumanzi, scheduled from August 19 to August 23, further refined the tools and gather feedback from local actors. Data will be cleaned and analysed using R. Preliminary analysis will be presented both online and in Nyumanzi early December through a Joint Analysis Workshop which will serve to validate and further contextualise the results before they are used to write up the final report. The final results will then be presented in a publicly available report, scheduled for March 2025, which will be available on the U-Learn Resource Centre (online).

The analysis will also integrate Geographic Information Systems (GIS) and Remote Sensing (RS) outputs to validate and deepen the understanding of the impacts of climate-related hazards and climate variability in Nyumanzi. Specifically, the research will utilize the Vegetation Condition Index (VCI),⁴² the Vegetation Health Index (VHI),⁴³ and the Standardized Precipitation Index (SPI)⁴⁴ to detect patterns of drought exposure in Northern Uganda. For flood assessments on the most recent floods in Nyumanzi (likely from 2021 onwards), the UN-SPIDER methodology will be employed, while the analysis of heatwaves in Northern Uganda will involve calculating the frequency of extreme temperature events. These outputs will map areas of vulnerability and provide insights into how climate-related hazards and climate variability have impacted the settlement and its surroundings over time. The GIS/RS outputs, including drought, flood, and heatwave assessments, will be correlated with human systems such as agriculture, water resources, and health. Through this approach, the analysis will reveal how climate-induced stressors have disrupted key systems, aiding in the identification of the most affected sectors and guiding adaptation measures. For example, flood mapping will help identify the affected land use types, such as the flooded cropland area. Additionally, temporal analysis of climate events (e.g., droughts, floods) and corresponding changes in land use or resource management will uncover the timing and triggers of adaptation strategies within the community.

The qualitative component serves to provide additional context, specifically on indigenous knowledge and uncovering coping and adaptation strategies beyond those integrated in the quantitative survey. The qualitative component will consist of 16 Participatory Workshops (PWs), 2 Focus Group Discussions (FGDs), and between 20 Key Informant Interviews (KIIs).

- a. The PWs are the most in-depth qualitative exercises and will target the refugee and the host community with an equal gender split.
- b. The FGDs will focus on elders/elderly people from both the host and refugee communities, as PWs are not suitable for their age group. Elders/elderly people may be uniquely affected by climate-related hazards and variability, making their insights important for understanding the community's vulnerabilities and adaptation needs.

⁴¹ Blocks refer to the primary organizational units or subdivisions within the settlement. These blocks serve to manage and organize the settlement area.

⁴² VCI is a remote sensing-based index used to assess the condition of vegetation in a specific area, typically in relation to drought monitoring. The VCI is derived from the Normalized Difference Vegetation Index (NDVI), which measures vegetation health based on the difference between near-infrared (which vegetation strongly reflects) and red light (which vegetation absorbs). [Formula for VCI](#)

⁴³ VHI is a more comprehensive index used to assess the health of vegetation by integrating both the Vegetation Condition Index (VCI) and the Temperature Condition Index (TCI). It is designed to provide a more holistic view of vegetation health, considering both the vegetation greenness (via NDVI) and thermal stress (via temperature data). [Formula for VHI](#)

⁴⁴ SPI is a widely used index in climatology and hydrology to quantify the precipitation deficit or surplus over a given time and therefore provides information about drought-like conditions. [Formula for SPI](#)

- c. The KIIIs will focus on sectoral specialists such as healthcare and education workers to cover the human systems as identified by the IPCC (water scarcity, agriculture/crop production, animal and livestock health and productivity, fisheries yields and aquaculture production, infectious diseases, health, malnutrition, mental health, displacement, inland flooding and associated damages, damages to infrastructure, damages to key economic sectors).

Key definitions

- **Adaptation**, in human systems, refers to “the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities.” **Incremental adaptation** is when adaptation “maintains the essence and integrity of a system or process at a given scale. In some cases, incremental adaptation can accrue to result in transformational adaptation.” **Transformational adaptation** is when “adaptation changes the fundamental attributes of a socio-ecological system in anticipation of climate change and its impacts.”⁴⁵
- **Climate change adaptation** is defined by UNFCCC as “adjustments in ecological, social or economic systems in response to actual or expected climatic stimuli and their effects. It refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change.”^{46,47,48}
- **Climate change** is defined by the IPCC as a “change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use.”⁴⁹
- **Climate services (CS)** are the provision of climate information in a way that is useful for decision-making at all levels of society. The IPCC has identified a range of climate service providers, including primarily National Meteorological and Hydrological Services (NMHS) and partner institutions, complemented by NGOs, the private sector and research institutions. **Coproduction**, in the context of climate services, refers to the collaborative process between climate scientists and stakeholders (such as policymakers, practitioners, and communities) to generate and use climate information effectively. The aim of co-production is to enhance the relevance and usability of climate services by ensuring they address the actual needs and preferences of end-users, leading to better-informed decision-making and more effective adaptation strategies.⁵⁰
- **Climate variability** refers to “variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all spatial and temporal scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).”^{51,52}

⁴⁵ IPCC, [Special Report: Global Warming of 1.5 °C - Glossary](#), n.d.

⁴⁶ UNFCCC, [Adaptation and Resilience – Introduction](#), n.d.

⁴⁷ According to [UNFCCC](#), “adaptation actions can take on many forms, depending on the unique context of a community, business, organization, country or region. There is no ‘one-size-fits-all-solution’—adaptation can range from building flood defenses, setting up early warning systems for cyclones, switching to drought-resistant crops, to redesigning communication systems, business operations and government policies.”

⁴⁸ Climate change adaptation is not to be confused with climate change **mitigation**, defined by UNFCCC as “efforts to reduce emissions and enhance sinks.”

⁴⁹ IPCC, [Special Report: Global Warming of 1.5 °C - Glossary](#), n.d.

⁵⁰ IPCC, [Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change](#), June 2023

⁵¹ IPCC, [Special Report: Global Warming of 1.5 °C - Glossary](#), n.d.

⁵² Climate change is not considered a type of climate variability. Instead, they are related but distinct concepts. Climate variability encompasses the short- to medium-term fluctuations within the climate system, while climate change refers to long-term trends and shifts in the climate. Climate variability is part of the natural ebb and flow within the climate system, whereas climate change represents a significant and sustained alteration, often driven by human influence.

- **Coping strategies**, as opposed to adaptation, are short term processes of temporary adjustments during and immediately after a hazard. For more information on the difference between coping and adaptation strategies, see source.⁵³
- **Elders** are generally considered individuals aged 60 and above. However, cultural perceptions can vary, with some communities recognizing people as elders at a younger age due to factors like lower life expectancy and different social roles. This research will consider 60 years of age as the baseline but may include younger individuals identified as elders by local community leaders and members (e.g., if they hold significant traditional knowledge or social roles).
- The **host community**, for this assessment, does not refer to all host communities in the refugee-hosting districts covered. Instead, data collection will focus on the host communities that reside in sub-counties that border or overlap with Nyumanzi, and who are at most 10 kilometres from the settlement border.
- **Indigenous Knowledge and Local Knowledge (IKLK)** refer to the cumulative body of knowledge, practices, and beliefs developed by communities through their long-term interactions with their natural environment. **Indigenous Knowledge** refers to the “understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings.” **Local knowledge** refers to the “understandings and skills developed by individuals and populations, specific to the places where they live.” These knowledge systems are cumulative, representing generations of lived experience, trial and error, and intimate understanding of specific environmental conditions. They encompass various domains, including agriculture, health, environmental management, and cultural practices.⁵⁴
- The term “**Loss & Damage**” (**L&D**) refers to the economic and non-economic impacts of climate change, including extreme weather events and slow onset events, that are not avoided through mitigation and adaptation efforts. **Economic losses** can be understood as the loss of resources, goods and services that are commonly traded in markets. **Non-economic losses (NELs)** refer to a “broad range of losses that are not easily quantifiable in financial terms or commonly traded in markets. These losses are additional to the loss of property, assets, infrastructure, or agricultural production and revenue that can result from the impacts of the adverse effects of climate change. Non-economic losses may affect individuals (e.g. loss of life, health, or mobility), society (e.g. loss of territory, cultural heritage, indigenous or local knowledge, or societal or cultural identity) or the environment (e.g. loss of biodiversity or ecosystem services).”⁵⁵
- **Maladaptation** refers to actions or strategies that inadvertently increase the risk of negative climate-related outcomes. This may occur through elevated greenhouse gas emissions, heightened vulnerability to climate change, or reduced welfare, either in the present or future. Typically, maladaptation arises as an unintended consequence of well-meaning actions that may lead to increased *risk* of adverse climate-related outcomes, including via increased *GHG* emissions, increased *vulnerability to climate change*, or diminished welfare, now or in the future. Maladaptation is usually an unintended consequence.⁵⁶
- **Refugees** are “people who have fled war, violence, conflict or persecution and have crossed an international border to find safety in another country”.⁵⁷
- **Settlements** in the Ugandan context are areas assigned for refugee settlement by the Government of Uganda. The settlements, located in rural regions, are managed by the Office of the Prime Minister (OPM) with the support of UNHCR. Uganda hosts a total of 13 settlements, accommodating over 1.7 million refugees, as part of its progressive refugee policy, which allows refugees to access land for agriculture, work, and move freely within the country.⁵⁸

⁵³ Shah Md Atiqul Haq et al., [Climate Change, Debate and Dimensions of Coping Strategies](#), 2021

⁵⁴ IPCC, [Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change](#), August 2022

⁵⁵ UNFCCC, [Non-Economic Losses](#), n.d.

⁵⁶ IPCC, [Special Report: Global Warming of 1.5 °C - Glossary](#), n.d.

⁵⁷ UNHCR, [Who we protect - Refugees](#), n.d.

⁵⁸ UNHCR, [Uganda Comprehensive Refugee Response Portal](#), last updated on 31 July 2024, consulted on 15 August 2024

3.2 Population of interest

- Geographical area assessed: Nyumanzi Settlement (Dzaipi subcounty, Adjumani District, Northern Uganda)
 - Nyumanzi Settlement has been identified as an optimal site for this research through a scoping exercise conducted by IMPACT in June 2024 and a comprehensive Secondary Desk Review (SDR). The settlement is significantly impacted by environmental stressors, including frequent flooding, extreme temperature fluctuations, and prolonged dry spells. As the largest sub-settlement in Adjumani, Nyumanzi's context is considered representative of conditions in other settlements across the North and West Nile regions, suggesting that the research findings will have broader applicability. IMPACT has also highlighted the interest and cooperation of settlement authorities in facilitating this research, which is crucial for its successful implementation. The authorities' willingness to support the study underscores the relevance and urgency of understanding and addressing climate-related challenges in these communities.
- Population assessed: refugees and the host community (15 km radius from the settlement, within Dzaipi/Arinyapi sub counties).

3.3 Secondary data review (SDR)

The availability of secondary data is limited. The data that is accessible online is often aggregated at the larger Adjumani settlement level, rather than being disaggregated specifically for Nyumanzi Settlement. This aggregation poses a challenge for obtaining precise and localized information necessary for this research.

Moreover, secondary data frequently lacks clarity regarding the thresholds and definitions used for various climate-related hazards and climate variability. For example, when the term "drought" is mentioned, it is often unclear whether it refers to meteorological, hydrological, agricultural, or another type of drought. This lack of specificity hinders the ability to accurately interpret and utilize the data in the context of the research objectives.

Despite these limitations, the available secondary data is still utilized in this research. The IPCC Sixth Assessment Report played a significant role in shaping the research design by highlighting information gaps at the continental level. These gaps were further explored during IMPACT's scoping exercise conducted in June 2024, ensuring that the research addresses areas where data is most needed. For the complete SDR source selection, please see Annex 1.

To address the challenges posed by limited and aggregated secondary data, this research will also leverage Geographic Information Systems (GIS) and Remote Sensing (RS) technologies. These advanced tools enable the disaggregation of climate data to the settlement level and provide a more granular understanding of the climate-related challenges specific to Nyumanzi. The GIS/RS methodology will include various assessments, such as drought, flood, and heatwave analyses, and long-term climate trend projection.

The table below outlines the specific GIS/RS assessments, the methods and indices utilized, their purposes, data sources, and descriptions. These analyses are crucial for supplementing the existing secondary data and providing critical insights into the impacts of climate variability and change on the refugee and host communities.

Assessment Type	Method/ Index	Purpose	Data Source	Description
Drought Assessment	Vegetation Condition Index (VCI)	Assess the impact of drought on vegetation health (greenness)	MODIS EVI (Enhanced Vegetation Index) MODIS EVI	VCI highlights areas prone to drought by comparing current vegetation conditions with historical data over a 20-year period (2003-2023)

	Vegetation Health Index (VHI)	Measure vegetation health during the drought period	MODIS NDVI (Normalized Differentiated Vegetation Index) NDVI and MODIS LST (Land Surface Temperature) LST	VHI combines greenness (NDVI) and land surface temperature to identify areas most affected by the 2023 drought
	Standardized Precipitation Index (SPI) SPI Methodology	Quantify precipitation anomalies to assess drought severity	CHIRPS (Climate Hazards Group InfraRed Precipitation with Station data)	The 12-month SPI for 2023 reflects deviations from long-term precipitation patterns, indicating drought severity
Flood Assessment	UN Spider Flood Assessment Methodology UN Spider	Detect and analyze flood-affected areas over multiple years	Sentinel-1 SAR GED	This methodology compares pre- and post-flood satellite images from 2018-2022 to identify consistently flood-prone areas. The analysis is related to the yearly rainy seasons.
Heatwave Assessment	Percentage of Days with Elevated Temperature	Assess frequency and intensity of heatwaves	MODIS Land Surface Temperature and Emissivity (MOD11) and Landsat 8 thermal bands MOD11	Analysis calculates the percentage of days where the maximum daily temperature exceeds the average by at least 5°C during the hot season, using data over a (10-20) year period.
Climate Change Projection and Long-Term Trends	IPCC Climatic Models (NEX-GDDP-CMIP6)	Understand general climate trends and shocks	WorldClim and ERA5, NEX-GDDP-CMIP6 via Google Earth Engine NEX-GDDP-CMIP6	Climate projections are based on IPCC models from WorldClim, while long-term trends and short-term shocks are analyzed using precipitation and temperature data from ERA5, accessible via Google Earth Engine.

3.4 Primary Data Collection

3.4.1 Quantitative data collection

- **Method** – Two teams of ten locally hired enumerators will collect individual surveys across all blocks of the Nyumanzi settlement from October 1 to November 2, 2024.⁵⁹ A total of 862 surveys will be conducted, based on a 95% confidence level, a 5% margin of error, and a 10% buffer. This sample size ensures representation across

⁵⁹ Blocks refer to the primary organizational units or subdivisions within the settlement. These blocks serve to manage and organize the settlement area.

four strata: female and male refugees, and female and male host community members. This approach will provide a 95% confidence level with a 5% margin of error for the broader strata of refugees and host community members. The sample sizes are calculated using the 2024 UBOS national population census (preliminary results) for the host community and the UNHCR July 2024 settlement data for the refugees.⁶⁰

The Field Officers, trained prior to departure to the field by the IMPACT assessment team in Kampala, will train the enumerators on location ahead of data collection. Data will be collected using Kobo. Enumerators will be provided with phones and tablets to do the data collection. The refugee and host community individuals will be randomly selected for data collection, through random geospatial sampling.

Population size	Female	Male	Total
Refugees in Nyumanzi settlement	Information not available	Information not available	46,301
Host community in Adjumani district	155,087	145,299	300,386
Total	N/A	N/A	346,687

Sampling	Female	Male	Total
Refugees	195 (215) 95%-7%	195 (215) 95%-7%	381 (420) 95%-5%
Host community	196 (216) 95%-7%	196 (216) 95%-7%	385 (424) 95%-5%
Total	196 (216) 95%-7%	196 (216) 95%-7%	782 (862)

**Between brackets: including a 10% buffer*

**In bold: actual target samples to achieve*

**For the female and male refugee strata, the sample sizes were calculated to account for the unknown gender distribution in the settlement. Since only the total refugee population of the settlement was known, the sample sizes were designed to remain representative in case up to 80% of the population is either male or female. This ensures that the sample will be valid, regardless of whether the population is more heavily skewed towards one gender.*

- **Sampling** – Individuals will be selected through the random selection of GIS-generated geopoints by the GIS Officer, and adult members of each household (if there are more than one available adult) will be randomly selected by the enumerator through the [Kish grid method](#) to avoid selection bias.⁶¹ For the random selection of refugee participants, the sample size in each block of the settlement will be proportional to the size of the population. In the rare instance that a geopoint falls on an uninhabited location, the enumerator will locate the nearest housing within a 150-meter radius. If no housing is found within this range, the GIS Officer will share an additional random geopoint. Each day, the Senior Data Officer and the Associate Research Manager in Kampala will monitor the number of interviews conducted for each category. They will guide the field team on which targets to prioritize. For instance, the Kampala team might determine that the sample for refugee women has been achieved, while additional interviews with male refugees are still needed.
- **Tool** – The quantitative tool has been designed in Excel to be used with Kobo on tablets. The draft will be reviewed internally by four Field Officers with extensive experience in surveying in the settlements for IMPACT, in

⁶⁰ The UBOS preliminary results are available [here](#). However, [UNHCR data from July 2024](#) is disaggregated at the Nyumanzi settlement level but those does offer gender disaggregation. If gender data for Nyumanzi is not available, we will use the maximum sample size based on the same parameters to ensure that the results remain representative and reliable.

⁶¹ The Kish Grid method is a systematic technique for selecting individual respondents within households for surveys. It involves creating a grid of eligible individuals in a household, randomly selecting a number, and choosing the individual corresponding to that number.

order to get their feedback in terms of local-appropriateness, vocabulary and phrasing, answer options, etc. This version is then sent for technical review by IMPACT HQ. This tool will aim to collect information on the identified climate change and variability manifestations as perceived by the refugees and the host community, as well as the impacts on the various human systems identified by the IPCC (water scarcity, agriculture/crop production, animal and livestock health and productivity, fisheries yields and aquaculture production, infectious diseases, health, malnutrition, mental health, displacement, inland flooding and associated damages, damages to infrastructure, damages to key economic sectors) and the associated coping and adaptation strategies.

- **Triangulation / briefing and debriefing of enumerators** – The triangulation strategy for quantitative data is extensive. Enumerators will be trained by the Field Officers prior to data collection. Two days of training will take place, so that the tools as well as the assessment background can be covered in depth. From the start of data collection, all submitted data will be closely monitored. Every night, a data monitoring script will run on the data, checking for the following:
 - Performance against sampling targets
 - Verification of GPS points
 - Number of surveys per enumerator
 - Time lapsed per survey
 - Time elapsed between surveys
 - Logical errors or inconsistencies

A tracker as well as a cleaning log will be produced and shared with the assessment and field teams every morning. The cleaning log will also illustrate the surveys that will or may be deleted, for example as a result of incorrect GPS points or short duration. A summary of the issues and performance against targets will be created by the assessment team and shared with the field officers. These summaries will be used by the field team to brief the enumerators before data collection every morning. The most common logical errors will be discussed in those briefings. Additionally, the data monitoring will flag any enumerators that are not collecting according to schedule, submitted surveys that are suspiciously short, or making a large number of logical errors. The field team will follow-up with these enumerators in particular, to make sure these issues are resolved for the continuation of data collection.

3.4.2 Qualitative data collection

Method – One Senior Field Officer will lead the qualitative exercises, with support from a locally hired team leader for the Focus Group Discussions and Participatory Workshops, from October 11 to October 31. This will occur concurrently with the quantitative data collection.

Participatory Workshops

PWs are interactive sessions designed to engage participants actively in discussions, decision-making, and problem-solving activities. These workshops are characterized by their collaborative approach, where participants contribute their ideas, knowledge, and skills to achieve common goals. 16 PWs will be organised with female and male refugees, and with female and male host community members. Ideally, members from different tribes will highlight the variations in practices and perspectives between tribes. Each PW will last about one day and involve several activities. The outputs of the PWs will be maps and matrices which will then be digitalized.

- Activity 1. Mapping and Spatial Analysis - Use participatory mapping to identify and visualize key areas affected by climate change, such as flood zones. This activity will involve community members in creating detailed maps that highlight not only environmental changes but also sociocultural landmarks that are significant to the local population (locations of historical or cultural significance such as cemeteries, central hubs for economic activity and food

distribution, etc.). A printed base map of Nyumanzi will be available in printed form for the group to add to it.

- Activity 2. Seasonal Calendar - Develop seasonal calendars to document and discuss patterns of climate impacts and traditional coping strategies throughout the year. The seasonal calendar will also encompass important sociocultural events and practices, such as wedding seasons, burials, festivals and celebrations, agricultural cycles, and traditional ceremonies. A printed matrix will be made available to be filled out by the Field Officer based on the feedback from the participants. Important terms will be noted in their local/indigenous language.
- Activity 3. Problem Tree – Problem trees will be developed for at least three major climate risks: extreme heat, floods, and drought. If time permits, and additional climate risks are identified, further problem trees will be created. The goal is to examine why these hazards are critical issues across various sectors, such as education, health, shelter, and markets. The process will involve understanding the impacts of these hazards, analysing the current coping and adaptation mechanisms in place, and identifying ideal strategies to better manage these challenges.

Focus Group Discussions

FGDs are structured group interviews designed to explore participants' attitudes, perceptions, and experiences in depth. In this study, 2 FGDs will be conducted, targeting the elders/elderly people of the refugee and host community. For each FGD, the Field Officer will lead a group of 6 to 8 participants in a discussion about adaptation to climate-related risks and will use a set of predefined questions or topics to guide the discussion. The transcripts of the FGDs will be analysed by the Senior Field Officer using MAXQDA, a qualitative data analysis software. This software enables the identification and interpretation of trends and patterns in the data. The final output will be a Data Analysis and Saturation Grid (DSAG), which will systematically present the findings.

Elders/elderly people are defined as individuals aged 60 and above, although younger individuals may be included if they are recognized as elders by the local authority due to their extensive knowledge and social status. This approach acknowledges the role of traditional authority and respect in defining elder status. Elders possess valuable traditional knowledge and historical perspectives on climate patterns and environmental changes. They can offer insights into how climate change impacts culturally significant practices and community cohesion and help identify traditional coping strategies and community norms that can be integrated into modern adaptation strategies.

Key Informant Interviews

KIIs involve in-depth, one-on-one interviews with individuals who have specialized knowledge or expertise on a particular topic. KIIs are conducted with individuals who are considered key sources of information due to their experience, role, or knowledge. The Field Officer will conduct at least 20 KIIs with individuals who have experience in Nyumanzi settlement. Depending on the availability and willingness of participants, as well as research time constraints, additional KIIs may be conducted. These interviews will primarily target sectoral specialists such as healthcare/education staff. Similarly to the FGDs, transcripts will be analysed with MAXQDA and the DSAG will serve as the final output for this exercise.

- To comprehensively address the human systems outlined by the IPCC, KIIs will be conducted with:
 - Education: Teachers can provide perspectives on how climate change impacts educational institutions, learning environments, and access to education. This would also include education staff such as teachers in addition to education specialists in the response.

- **Physical Health:** Health professionals can explore how climate change affects physical health, including the prevalence of climate-related diseases, heat stress, respiratory issues, and overall community health. This will include interviews with traditional healers as well as pharmacists or doctors in addition to health specialists from the response.
- **Farmers' Associations:** Representatives from farmers' associations can offer insights into how climate variability affects agricultural production, food security, and livelihoods. They can also share current and potential adaptation strategies for managing changes in rainfall patterns, droughts, and extreme heat, as well as the role of agricultural support systems.
- **Persons with Disabilities (PwD's):** Persons with disabilities can provide a unique perspective on how climate hazards disproportionately impact them, from access to healthcare and shelter to mobility and communication in times of crisis. Engaging with PwDs or organizations representing them will highlight gaps in current adaptation efforts and help identify inclusive solutions.
- **Market Vendors:** Market vendors can speak to how climate-related events affect supply chains, food availability, and prices, and how extreme weather disrupts the functioning of local markets. Their experiences can provide inputs on economic resilience and potential adaptation mechanisms to stabilize food security and livelihoods in the face of climate risks.

Sampling – For all three types of qualitative surveys, the participants will be purposively sampled leading to findings that are indicative only. The number of KIIs will depend on factors such as availability of participants, financial constraints, and time limitations. Ideally, the aim is to conduct as many KIIs as feasible within these constraints to gather comprehensive data. Minors will not be sampled or participate in any of the exercises. For the PWs and FGDs, efforts will be made to include participants from diverse tribes and countries of origin (for refugees) to ensure a broad range of perspectives.

Tools – The qualitative tools used for the FGDs and the KIIs are semi-structured tools which include a set of core questions prepared in advance to ensure that key topics are covered across all interviews. The Field Officer, however, can deviate from the prepared questions to probe further based on the participants' answers. In contrast, the tools used for the PWs are structured as matrices, which help in systematically capturing and organizing participants' inputs, insights, and knowledge through collaborative activities. These matrices provide a clear framework for documenting and analysing the outputs from the participatory workshops. Participants will also be given a printed base map on which they can add information which they find relevant such as essential cultural sites and whether these are not accessible anymore if/when e.g. in the case of flooding.

Triangulation / Briefing and debriefing of Senior Field Officer – As with the quantitative data, bi-weekly meetings will be organized between the Senior Field Officer, who will lead the qualitative interviews, and the Associate Research Manager in Kampala to debrief on the qualitative research activities. Additionally, a debriefing form will be completed at the end of each qualitative interview to assess the process and identify any issues encountered.

3.5 Data Processing & Analysis

3.5.1 Quantitative

As per the triangulation section above, data quality will be closely monitored during data collection. The scripts used for quantitative data collection will be used after data collection to do the data cleaning, as per IMPACT's Data Cleaning Minimum Standards Checklist. Data cleaning will focus on correcting logical errors where necessary,

deleting surveys that are too short or submitted by enumerators who for whatever reason are not trusted, and dealing with 'other' responses in the survey. The cleaning log will serve to track any changes that need to be made. The cleaning log will then be used to update the raw data and produce the clean dataset.

Analysis of the quantitative data will also be done in R, in line with the analysis and indexing strategy highlighted in the methodology section. All the indicators will be disaggregated by gender if the sampling allows and per displacement status as these groups may have distinct household roles and knowledge regarding climate change/variability and adaptation. Furthermore, indicators will be disaggregated per age groups as it is expected that different generations may have different attitudes towards climate change. Depending on the sensitivity of the issue, the results may also be disaggregated per ethnic group. These disaggregations by age and ethnic group will not lead to representative data and should be considered as indicative only. The strata for which representation will be achieved are: refugees, host communities, women, men, female refugees, female host community members, male refugees, male host community members. This means that the findings of this study can be applied to the broader population of the settlement beyond the specific sample used in the research.

3.5.2 Qualitative

Anonymised transcripts of the FGDs and the KIIs will be analysed using the MAXQDA software of which the output will be formatted into a Data Saturation Analysis Grid (DSAG). The grid allows to systematically track the recurrence of themes, concepts, or codes across interviews. Qualitative inputs will serve to update the basemap and make it a more holistic representation of the settlement and its surrounding according to what is important to the workshop participants. Finally, a seasonal calendar will be produced in excel by creating matrix with the relevant events per month.

3.6 Limitations

- Context:
 - o The presence and influence of non-governmental organizations (NGOs) in the area may introduce another layer of complexity. NGOs often play a critical role in raising awareness about climate change and its impacts. However, their efforts might inadvertently shape or skew the local population's perceptions. Communities might attribute various climatic events directly to climate change due to the emphasis placed by NGOs on this issue, even when such events could be part of natural climate variations.
 - Mitigation measure: This assessment will focus on the impact of climate-related hazards and climate variability on the community, regardless of whether these events are scientifically linked to human-induced climate change or are part of natural climate variations. The primary objective is to understand and document the adverse effects these extreme climate conditions have on the population and to analyze their adaptation strategies. By concentrating on the tangible impacts and the community's responses, we aim to gather insights into how individuals and households are coping with and adapting to these challenges. This approach ensures that the research remains relevant and practical, providing actionable information that can be used to support and enhance local adaptation efforts, regardless of the broader scientific debates about the attribution to climate change.
 - o The terminology associated with climate change can be technical and may not always align with how local communities understand or use these terms. For instance, terms such as "drought" and "deforestation" may be part of everyday language in these communities, yet their local definitions might differ significantly from scientific definitions. This discrepancy can lead to challenges in accurately assessing and interpreting community perceptions and experiences of climate change.

- Mitigation measure: Enumerator teams will undergo a comprehensive two-day training session, during which they will receive extensive explanations of relevant concepts. These definitions will also be incorporated into the survey tool and provided as printed materials for reference. However, the primary mitigation measure will involve avoiding the use of potentially confusing concepts in the survey questions. Instead, the questions will be rephrased to ensure clarity and relevance. For example, rather than asking households how they adapt to drought, the survey will ask what specific actions they take to protect their crops if they anticipate drought-related damage. Additionally, the term "drought" will be defined according to the community's perceptions and understanding of the concept. This approach ensures that the questions are framed in a way that is meaningful and comprehensible to respondents.
- There is a significant challenge in accurately understanding and interpreting the concept of climate "adaptation" within the community. From the scoping exercise, it became apparent that "adaptation" is frequently confused with "mitigation." Additionally, there is a prevalent misconception that "adaptation" efforts must be large-scale, successful initiatives typically implemented by organizations. Adaptation can encompass "maladaptation" and often occurs on a household level, which may not be recognized as such by the community. This misunderstanding can lead to an underreporting or mischaracterization of local adaptation strategies.
 - Mitigation measure: The survey language will be revised to ensure that it is clear and straightforward. We will avoid using technical terms like "adaptation" and "mitigation" directly. Instead, practical, everyday language that reflects the community's experiences and actions will be used. For example, the survey questions will focus on specific actions taken during different climate events rather than abstract concepts.
- The data collection is scheduled for October, which is typically the peak of the rainy season in the region. While this timing will likely yield extensive information on flooding and related issues, it may limit the accuracy of data concerning the dry season. Respondents may not recall or report conditions and challenges faced during the dry season with the same accuracy, potentially skewing the research findings towards the impacts of the rainy season.
 - Mitigation measure: This seasonal bias must be accounted for when analyzing and interpreting the data to ensure a comprehensive understanding of climate impacts across different seasons. The seasonal calendar created during the workshops will serve as a triangulation method.

4. Key ethical considerations and related risks

The proposed research design meets / does not meet the following criteria:

The proposed research design...	Yes/ No	Details if no (including mitigation)
... Has been coordinated with relevant stakeholders to avoid unnecessary duplication of data collection efforts?	Yes	
... Respects respondents, their rights and dignity (<i>specifically by: seeking informed consent, designing length of survey/ discussion while being considerate of participants' time, ensuring accurate reporting of information provided</i>)?	Yes	
... Does not expose data collectors to any risks as a direct result of participation in data collection?	Yes	

... Does not expose respondents / their communities to any risks as a direct result of participation in data collection?	Yes	
... Does not involve collecting information on specific topics which may be stressful and/ or re-traumatising for research participants (both respondents and data collectors)?	No	Recalling climate-related hazards may evoke unpleasant or traumatic memories. To address this, we will implement necessary measures such as providing the UNHCR hotline at the end of the survey and training enumerators to pause or stop the survey if it becomes too distressing for the participant.
... Does not involve data collection with minors i.e. anyone less than 18 years old?	Yes	
... Does not involve data collection with other vulnerable groups e.g. persons with disabilities, victims/ survivors of protection incidents, etc.?	Yes	
... Follows IMPACT SOPs for management of personally identifiable information ?	Yes	

5. Roles and responsibilities

Task Description	Responsible	Accountable	Consulted	Informed
<i>Research design</i>	ARM*	ARM	CR*, HQ-Research, U-Learn	
<i>Supervising data collection</i>	ARM	ARM	CR	U-Learn
<i>Data processing (checking, cleaning)</i>	SDO*	ARM	HQ-Research	CR
<i>Data analysis</i>	SDO	ARM	CR, HQ-Research	
<i>Output production</i>	ARM	ARM	CR/U-Learn-LH, HQ-Research Reporting	U-Learn-CM
<i>Dissemination</i>	U-Learn	U-Learn	ARM/CR	
<i>Monitoring & Evaluation</i>	U-Learn	U-Learn	N/A	
<i>Lessons learned</i>	ARM	ARM	CR, HQ-Research MEL	U-Learn-LH

***ARM**: Associate Research Manager

***CR**: Country Representative

***SDO**: Senior Data Officer

Responsible: the person(s) who executes the task

Accountable: the person who validates the completion of the task and is accountable of the final output or milestone

Consulted: the person(s) who must be consulted when the task is implemented

Informed: the person(s) who need to be informed when the task is completed

6. Data Analysis Plan (DAP)

Please find the DAP on this [link](#).

7. Monitoring & Evaluation Plan

IMPACT Objective	External M&E Indicator	Internal M&E Indicator	Focal point	Tool	Will indicator be tracked?
Humanitarian stakeholders are accessing IMPACT products	Number of humanitarian organisations accessing IMPACT services/products Number of individuals accessing IMPACT services/products	# of downloads of x product from Resource Center	Country request to HQ	User_log	<input checked="" type="checkbox"/> Yes
		# of downloads of x product from Relief Web	Country request to HQ		<input type="checkbox"/> Yes
		# of downloads of x product from Country level platforms	Country team		<input type="checkbox"/> Yes
		# of page clicks on x product from REACH global newsletter	Country request to HQ		<input type="checkbox"/> Yes
		# of page clicks on x product from country newsletter, sendingBlue, bit.ly	Country team		<input type="checkbox"/> Yes
		# of visits to x webmap/x dashboard	Country request to HQ		<input type="checkbox"/> Yes
IMPACT activities contribute to better program implementation and coordination of the humanitarian response	Number of humanitarian organisations utilizing IMPACT services/products	# references in HPC documents (HNO, SRP, Flash appeals, Cluster/sector strategies)	Country team	Reference_log	<i>WorkGrEEen strategy</i>
		# references in single agency documents			
Humanitarian stakeholders are using IMPACT products	Humanitarian actors use IMPACT evidence/products as a basis for decision making, aid planning and delivery	Perceived relevance of IMPACT country-programs	Country team	Usage_Feed back and Usage_Survey template	<i>U-Learn, the consortium for this exercise, deploys satisfaction surveys that will be used to also inform the perceived relevance of the exercises that IMPACT is also involved with.</i>
	Number of humanitarian documents (HNO, HRP,	Perceived usefulness and influence of IMPACT outputs			

	cluster/agency strategic plans, etc.) directly informed by IMPACT products	Recommendations to strengthen IMPACT programs			
		Perceived capacity of IMPACT staff			
		Perceived quality of outputs/programs			
		Recommendations to strengthen IMPACT programs			
Humanitarian stakeholders are engaged in IMPACT programs throughout the research cycle	Number and/or percentage of humanitarian organizations directly contributing to IMPACT programs (<i>providing resources, participating to presentations, etc.</i>)	# of organisations providing resources (i.e.staff, vehicles, meeting space, budget, etc.) for activity implementation	Country team	Engagement_log	X Yes
		# of organisations/clusters inputting in research design and joint analysis			X Yes
		# of organisations/clusters attending briefings on findings;			X Yes

ANNEX 1: SECONDARY DESK REVIEW

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ANNEX 2: NEGATIVE CLIMATE CHANGE IMPACT NOTED BY THE IPCC FOR AFICA

The negative impacts of climate change can be observed in most development and humanitarian sectors. More specifically, the IPCC has taken stock of the following climate change impacts and adaptation measures in Africa:⁶²

- Agriculture:

⁶² IPCC, [Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change](#), June 2023

Irrigation is largely unaffordable for smallholder farmers and covers only a negligible proportion of cultivated land. However, small-scale irrigation methods, such as digging ditches and depressions to collect rainwater, are widely adopted to support national food security. African farmers also diversify their income sources to cope with reduced yields or crop losses by engaging in off-farm work or migrating seasonally. **Off-farm activities provide essential financial resources for rural households to manage climate variability but can be maladaptive**, such as charcoal production contributing to deforestation. Historical climate adaptation through crop migration is limited by risks to biodiversity and water resources, with certain crops like maize facing constraints due to shifting suitable climates across borders and limited available land. During the scoping phase, it was reported that refugees were bringing seeds from South Sudan as these were better adapted to high temperatures.

- Livestock:

Pastoralists in Africa are experiencing noticeable climate changes, such as more erratic and reduced rainfall, prolonged droughts, and rising temperatures, leading to significant impacts on livestock. These changes result in reduced milk production, increased deaths, and disease outbreaks in herds due to malnutrition and starvation from forage and water shortages. Fodder quality is also declining due to climate change, with elevated temperatures and CO₂ levels reducing the nutritional content of important grasses and fodder crops. Heat stress, exacerbated by climate change, is a major factor affecting livestock production, particularly in the tropics, and is projected to worsen. **The IPCC noted that more research is needed to quantify the impact of heat stress on livestock production and address the associated challenges.** Furthermore, diseases like African Rift Valley Fever (RVF), linked to extreme climate events, are expected to expand their range due to climate change.⁶³ Fodder availability is also being impacted by woody plant encroachment -the increase in shrub and tree cover-, already observed in Mbarara in Southwest. The lack of grasses for livestock and shelter was reported during IMPACT's scoping in Adjumani in June 2023.

- Fisheries

Climate change significantly threatens Africa's marine and freshwater fisheries and aquaculture. By the end of the 21st century, 55–68% of inland fish species are at risk of extinction under 2.5°C global warming, and 77–97% under 4.4°C global warming. Effective interventions should combine scientific and Indigenous Knowledge and Local Knowledge (IKLK), with a focus on vulnerable groups. **While some artisanal fishers adapt by changing gear and target species, many expand their fishing range or increase effort.**

- Climate information services

Farmers are increasingly using weather and climate information, especially for short- and medium-term planning. Digital services can promote sustainable food production, **but it's important to understand the conditions for widespread adoption in Africa.** Often, the available information does not match farmers' needs or their methods of accessing and processing it.

- Human settlements

Flooding hampers economic activities, transportation, and access to essential services like healthcare and education. It poses the highest risk to transport infrastructure, threatening food security, communication networks, and regional economies. Climate-related road damage will be costly to repair, varying based on flood risk, existing infrastructure, topography, and rural connectivity.

- Extreme heat

⁶³ Since March 2016, Uganda has faced multiple Rift Valley Fever (RVF) outbreaks, beginning with human and livestock cases in Kabale after a long period without incidents. The transmission of RVF is intricate and not well-documented, involving several mosquito species and various mammalian hosts, including humans. Dan Tumusiime et al., [Mapping the risk of Rift Valley fever in Uganda using national seroprevalence data from cattle, sheep and goats](#), May 2023

The African population's exposure to compound climate extremes, such as simultaneous heat waves and droughts or rapid shifts from drought to intense rainfall, is projected to increase significantly by 2070–2099. Under scenarios of high population growth and substantial global warming, exposure could rise 47-fold compared to levels from 1981–2010. Regions in west, central-east, northeastern, and southeastern Africa are particularly vulnerable. Coincident heat waves and droughts are expected to affect billions of people by the end of the century.

- Physical Health

Climate change is already impacting health outcomes in Africa, increasing temperature-related mortality and exacerbating risks for vulnerable groups such as young children, the elderly, pregnant women, and those with existing health conditions. There is robust evidence that these impacts disproportionately affect the poorest populations and children, with potential variations by gender and age. Climate variability contributes to the spread of diseases like malaria and diarrheal illnesses through changes in mosquito vector habitats, droughts, and flooding affecting water and food safety. Indirectly, climate shifts influence HIV transmission patterns, affecting migration and socio-economic activities such as transactional sex, especially among women facing poverty, inequity, and gender-based violence.

- Mental health

High temperatures in South Africa are strongly linked to poor mental health and increased suicide rates. Exposure to extreme heat directly affects emotional control, aggression, and violent behaviour, leading to higher rates of interpersonal violence, including a significant rise in homicides during hot weather. Extreme weather events also have severe impacts on mental health, causing elevated levels of anxiety, post-traumatic stress disorder, and depression, particularly affecting youths. Among farmers, the loss of livestock due to disease or lack of adequate pastures is closely tied to deteriorating mental health. **The IPCC notes that the mental health effects of climate change on refugees are concerning but remain insufficiently researched.**

- Education

Several studies indicate that experiencing low rainfall, warming temperatures or extreme weather events reduce education attainment and that future climate change may reduce children's school participation, particularly for agriculturally dependent and poor urban households. In Uganda, low rainfall reduced primary school enrolment by 5% for girls. More research is needed on climate change impacts on education in Africa. This information can help ensure families keep children in school amid climate-related income shocks.

- IKLK

In developing contexts, particularly in Africa where advanced technology for prediction and modelling is scarce, a strong integration of scientific and IKLK is essential. Farmers rely on locally acquired knowledge, passed down through generations, to navigate climate challenges. This includes indigenous systems for weather forecasting, agroecological farming methods, and monitoring natural climate indicators. Practices like biodiversity and crop diversification serve as safeguards, ensuring resilience against environmental stresses. Local insights into seasonal patterns and weather conditions guide farming decisions. Collaborative efforts between researchers, agricultural extension services, and local communities are essential to co-produce knowledge for effective climate adaptation policies and practices across Africa.

- Gender

Rural African women face multiple challenges in adapting to climate change, exacerbated by traditional patriarchal decision-making processes and limited access to land. Factors such as kinship systems (matrilineal or patrilineal), migrant status, age, household type, livelihood orientation, and disability further constrain their adaptive options. Limited access to agricultural resources and fewer benefits from agricultural policies, combined with social and cultural barriers, increase women's vulnerability to climatic risks. Kinship systems play a role in shaping women's

resilience; those in matrilineal systems often have better access to resources and greater bargaining power compared to those in patrilineal systems.