Terms of Reference

Post-drought needs analysis with a focus on Loss and Damage

SOM2601

Somalia

V.1

REACH Informing more effective humanitarian action

1. Executive Summary

Country of intervention	Somalia					
Type of Emergency	x	Natural disaster	□	Conflict	□	Other *(specify)*
Type of Crisis	□	Sudden onset	x	Slow onset	x	Protracted
Mandating Body/ Agency	OCHA					
IMPACT Project Code	*27BEG*					
Overall Research Timeframe	March – May 2026					
Research Timeframe	1. Pilot/ training: 01/04/2026			6. Preliminary presentation: 11/05/2026		
	2. Start collect data: 12/04/2026			7. Outputs sent for validation: 16/05/2026		
	3. Data collected: 26/04/2026			8. Outputs published: 31/05/2026		
	4. Data analysed: 03/05/2026			9. Final presentation: 31/05/2026		
	5. Data sent for validation: 03/05/2026					
Number of assessments	X	Single assessment (one cycle)				
	□	Multi assessment (more than one cycle)				
Humanitarian milestones	**Milestone**			**Deadline (can be tentative)**		
	x	Donor plan/strategy		September 2026		
	x	Inter-cluster plan/strategy		May 2026 (post-shock update according to the HNRP methodology)		
	□	Cluster plan/strategy				
	□	NGO platform plan/strategy				
	□	Other (Specify):				
Audience Type & Dissemination	**Audience type**			**Dissemination**		
	x Strategic x Programmatic □ Operational □ [Other, Specify]			x General Product Mailing (e.g. mail to NGO consortium; HCT participants; Donors) □ Cluster Mailing (Education, Shelter and WASH) and presentation of findings at next cluster meeting □ Presentation of findings (e.g. at HCT meeting; Cluster meeting) □ Website Dissemination (Relief Web & REACH Resource Centre) □ [Other, Specify]		
Stakeholder mapping	x	Yes		□	No	
General Objective	This assessment attempts to achieve three core objectives:					

	- To provide an overview of the current humanitarian needs and gaps by sector and across sectors of the population living in severely drought-affected areas and displaced population from those living in arrival districts due to the November 2025 declared drought. - Pilot the assessment of economic and non-economic losses and damages experienced by households (both drought-internal displaced and drought-affected people) due to the November 2025 declared drought, to complement the country-level loss and damage assessment efforts in Somalia and inform programmatic and governmental humanitarian adaptive planning and interventions.
Specific Objective(s)	• Identify multisectoral needs of drought-affected people in the most drought-affected districts in the country. • Identify multisectoral needs of internal displaced population displaced by drought in the main arrival areas. Specifically multisectoral needs include: o Shelter conditions, and NFI needs o Education access o Food security needs and access to markets o Health access o Protection needs o WASH needs • To understand the movement patterns of drought-affected people due to drought/lack of rain • To identify the economic and non-economic losses and damages post-drought at household level (both displaced and host population households). Specifically, losses and damages will include a multisectoral approach: o Shelter issues caused by the drought, reparations and costs o Livelihoods damages and losses and changes due to the drought and costs o Education access affected by the drought o Food security needs, expenditure and access to markets o Health needs, access and expenditure due to the drought o Water and sanitary access and changes due to the drought o Household resilience upon coming droughts perceived o Non-economic losses perceived • To quantify economic losses and damages in the agriculture and WASH sectors at country and priority district level through geospatial remote sensing and secondary data analysis, addressing existing evidence gaps on the scale and distribution of drought impacts through consolidated, PDNA-aligned methods. • To examine the relationship between aggregate sector-level loss estimates and losses and damages reported at the household level, contributing to the validation and cross-scale interpretation of Loss and Damage evidence.
Research Questions	• What are the current multisectoral needs drought-affected people face living in severely affected-by-drought areas? • What are the current multisectoral needs drought-affected internal displaced people face in the arrival districts? • What are the movement intentions and patterns of drought-affected people driven by drought? • What are the non-economic and economic losses and damages drought-affected households (both drought internal displaced and drought -affected households) identified due to the drought/lack of rain in the districts affected by drought and arrival districts?

	• What are the aggregate economic losses and damages in the agriculture and WASH sectors at country and priority district level, as estimated through geospatial remote sensing and secondary data analysis? • To what extent do sector-level aggregate loss estimates correspond with economic losses and damages reported at the household level?

Geographic Coverage Data collection will be conducted in 31 districts in Somalia. These include: districts affected by drought (= **drought-affected districts**) and districts hosting people who were displaced due to the drought (= **arrival districts**).	State(admin2)	District (admin3)	State(admin2)	District (admin3)
	Bakool	Waajid	Gedo	Luqq
	Bakool	Ceel Barde	Hiraan	Belet Weyne
	Banadir	Daynile/Kahda	Lower Juba	Afmadow
	Bari	Bossaso	Lower Shabelle	Qoryooley
	Bari	Caluula	Lower Shabelle	Afgooye
	Bay	Diinsoor	Lower Shabelle	Marka
	Bay	Buur Hakaba	Lower Shabelle	Baraawe
	Bay	Baydhaba	Middle Shabelle	Jowhar
	Bay	Qansax Dheere	Mudug	Hobyo
	Gedo	Baardheere	Nugaal	Eyl
	Gedo	Ceel Waaq	Nugaal	Burtinle
	Gedo	Garbahaarey	Nugaal	Garoowe
	Gedo	Belet Xaawo	Woqooyi Galbeed	Berbera

Secondary data sources	IASC. Multi-sectoral Initial Rapid Assessment (MIRA) Tool. 2015. CCCM data (September 2025) IOM DTM (September, 2025) Damage, Loss and Needs Assessment – Guidance notes (world Bank, 2010) Assessing Climate change-driven losses and damages (ICAT, 2023) Impact of climate hazards on Livelihoods and access to services among refugees and host communities- Kenya and Uganda (IMPACT, 2025)) Somalia's Third Generation National Determined Contribution (NDC 3.0), 2025 Somalia's National Adaptation Plan (NAP) Framework (2022) FAO SWALIM (2026) FEWSNET (2026) Technical guide on integrating human mobility and climate change linkages into relevant national climate change planning processes (UNFCCC, 2024)

Population(s)				
	x	IDPs in camp	x	IDPs in informal sites
	x	IDPs in host communities	□	IDPs [Other, Specify]
	□	Refugees in camp	□	Refugees in informal sites
	□	Refugees in host communities	□	Refugees [Other, Specify]
	x	Host communities	□	[Other, Specify]

Stratification						
	x	Geographical #: 27 districts Population size per strata is known? x Yes □ No	x	Population group #:02 Affected population Internal Displaced Population Population size per strata is known? x Yes □ No	x	*Other* #: _ _ Population size per strata is known? □ Yes □ No

Data collection tool(s)				
	x	Structured (Quantitative)	□	Semi-structured (Qualitative)

	Sampling method	**Data collection method**
Structured data collection tool # 1	□ Purposive □ Probability / Simple random □ Probability / Stratified simple random □ Probability / Cluster sampling x Probability / Stratified cluster sampling □ [Other, Specify]	□ Group discussion (Target #):_ _ _ _ _ X Household interview (Target #): 3800 approx. 135 per district □ Individual interview (Target #):_ _ _ _ _ □ Direct observations (Target #):_ _ _ _ _ □ [Other, Specify] (Target #):_ _ _ _ _

Target level of precision if probability sampling	90% level of confidence			10+/- % margin of error		
Disaggregation by gender and age	Gender			Age		
	X	Yes		X	Yes	
	□	No		□	No	
Data management platform(s)	x	IMPACT		□	UNHCR	
	x	OCHA				
Expected ouput type(s)	□	Situation overview #: _ _	x	Report #: _01	□	Profile #: _ _
	x	Presentation (Preliminary findings) #: 01	□	Presentation (Final) #: _ _	x	Factsheet #: 01
	□	Interactive dashboard #:_	□	Webmap #: _ _	X	Map #: 5
	□	[Other, Specify] #: _ _				
Access	x	Public (available on REACH resource centre and other humanitarian platforms)				
	□	Restricted (bilateral dissemination only upon agreed dissemination list, no publication on REACH or other platforms)				
Visibility	***REACH***					
	Donor: *Department of State*					
	Coordination Framework: *Inter-Cluster Coordination Group (ICCG) regarding the needs assessment; Ministry of Environment and Climate Change (MOECC) and Somali Disaster Management Agency (SODMA) regarding the loss and damage component*					
	Partners:					
Acronyms	*Loss and Damage (L&D)* *Economic Losses and Damages (ELD)* *Non-Economic Losses (NEL)* *Non-Economic Losses and Damages (NEL&D)* *Displacement Tracking Matrix (DTM)* *Internal Displaced Population (IDP)* *Emergency Trend Tracker (ETM)* *Camp Management Cluster (CCCM cluster)*					

2. Rationale

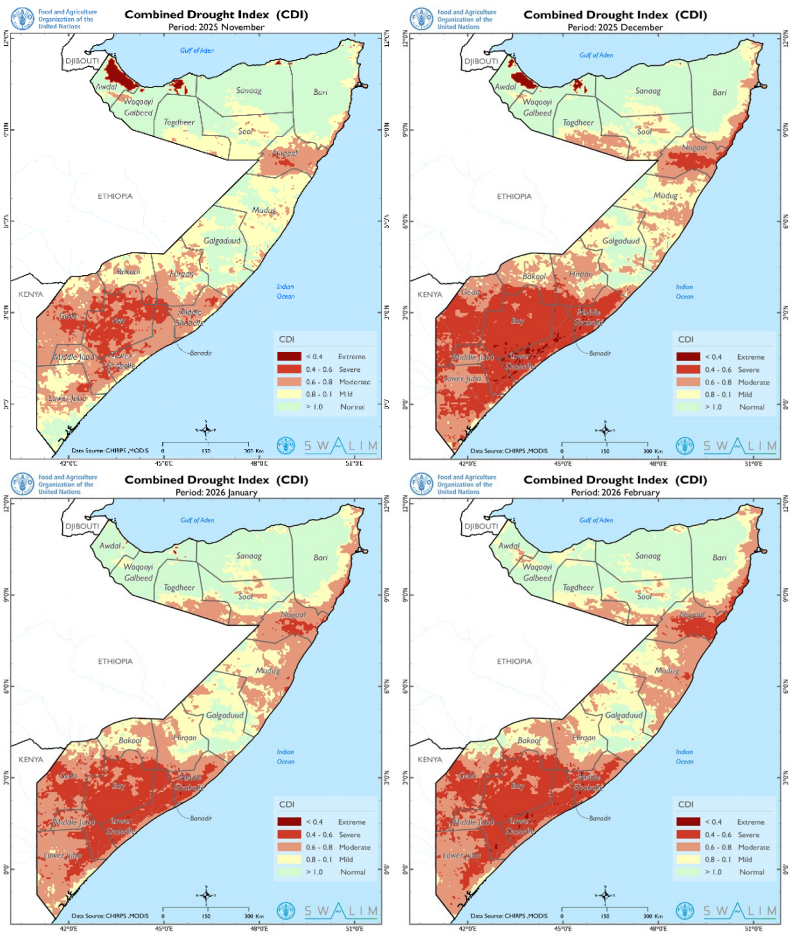
2.1 Background

Since the 2010, drought has been a persistent challenge in the Somali context as the humanitarian situation in the Horn of Africa is increasingly shaped by climate shocks (droughts and floods)[1]. Notably, Somalia is now ranked the second most vulnerable country in the world on the Index to climate change and other global challenges[2]. From 2021 to 2023, Somalia experienced the longest drought in over 40 years, a result of five consecutive below average rainy seasons[3]. Accordingly, the impact of drought continues to cause mass displacement, loss of livelihoods and the exacerbation of existing conflict and insecurity across Somalia. As of 2025, according to the HRNP-2025, 47% of Somalia's population is affected by a range of crises, including conflict, floods, drought, and disease outbreaks such as AWD/Cholera and measles[4]. Recurrent shocks and increasingly short time periods between flooding and drought is creating severe challenges for Somali livelihoods and food security[5].

[1] World Bank, 2025 & UNSOM – WHO 2022
[2] The Interactive Country Fiches, EU, 2026
[3] Ibid.
[4] UN OCHA (2025)
[5] Ibid

The two main rainfall seasons in Somalia are between April and June (Gu) and October and December (Deyr)[6]. Somalia experienced three consecutive poor seasons of rainfall since 2020, leading the last most severe protracted droughts from October 2021 until February 2023[7] and, the most recent one, from November 2025 and still ongoing[8]. Drought conditions have been worsening since August 2025. The Combined Drought Index (CDI) analysis clearly demonstrates the rapid escalation of drought conditions in many parts of Somalia[9] At the beginning, Northern coastal belt was abnormally affected and by November, when the Federal Government of Somalia formally declared a drought emergency and appealed for urgent international assistance, the conditions continued to deteriorate across northern, central and southern regions. Some of the most affected states were Awdal, Woqooyi Galbeed, Sanaag, Bakool, Bay, Gedo, Juba, Shabelle, Mudug, and Nugaal[10]. OCHA reported on December 2025 that 4.61 million people have been affected by the drought across the country, at least 120,000 people have been displaced out of the most affected areas between September and December 2025, and at least 75,000 students were forced to drop out of schools[11]. Please below see the evolution of the CDI from October 2025 to February 2026.

Figure 1 FAO CDI evolution from November 2025 - February 2026



Based on Somalia's National Determined Contribution 3.0[12] (NDC), and the National Adaptation Plan (NAP)[13], Somalia's Government has estimated past climate losses at 3.3% of GDP but acknowledges that these aggregated figures often mask the devastating impact on pastoral and agropastoral households. The NAP explains that recent droughts force households into negative coping mechanisms, which lead to long-term poverty traps, and they should be documented to measure effectiveness of adaptation interventions. The same is emphasized for other impacts such as education outcomes or school dropout, loss of traditions or cultural knowledge, livestock mortality, water trucking expenditure, economic exhaustion, health issues and mortality, etc. There is a lack of granular household-level data for both economic and non-economic losses and damage that is needed to inform accurately social protection and adaptative interventions or policies, such as insurance schemes, investment in resilient infrastructure, cash transfers for veterinarian costs, livestock replacement, etc. Lastly, the NDC calls explicitly for disaggregated data on economic and non-economic losses and damages at the community level to ensure access to the Loss and Damage (L&D) and climate funds to reach the most vulnerable.

Considering this context, REACH will conduct a household-level quantitative needs assessment in drought-affected and in Internal Displaced Population (IDP) (drought-affected internal displaced population) arrival districts to better understand their current needs and quantify and describe the non-economic and economic losses and damages experienced as a result of

[6] FSNAU- SWALIM, 2025
[7] UN OCHA, 2022
[8] FSNAU – SWALIM , 2025
[9] CDI – FAO -SWALIM, 2026
[10] FSNAU – SWALIM , 2025
[11] OCHA, 2025
[12] NDC,2025
[13] NAP 2022 – 20230

the prolonged drought. REACH will also conduct a L&D assessment of economic losses and damages related to the drought, including an optional climate change attribution component, using remote sensing/ GIS modelling complemented by HH level observations to assesses the drought impact and estimate the cost of losses and damages due to drought. This will be a unique opportunity to pilot for the first time in the region L&D indicators at a bottom-up approach.

2.2 Intended impact

This assessment aims, on the one hand, to inform the humanitarian community providing an overview of drought-affected population needs, to feed into humanitarian planning and prioritisation. On the other hand, the assessment is a pilot for a household-level data collection to identify, document and quantify the residual losses and damages after the most recent drought in Somalia. This last objective pretends to inform national authorities and other durable solutions, climate and development actors to complement the country-level available documentation in the field.

Current L&D monitoring systems in climate-vulnerable countries are primarily designed to quantify direct, post-disaster economic damages at institutional level, such as destroyed infrastructure, collapsed wells, or lost crop yields. However, global assessments repeatedly highlight that **these systems systematically fail to capture indirect, cumulative or slow-onset losses experienced at household level**, **particularly in drought-affected and agricultural communities**. For example, while institutional systems may record "reduced sorghum yields", they do not capture household realities such as the rising cost of drought-resistant seeds, the need to dig deeper or travel farther for water, loss of breeding livestock due to poor forage, or the financial stress of installing small-scale irrigation. These constitute significant climate-induced economic and non-economic losses borne directly by households, that are identified as one of the major blind spots that inhibit effective climate-risk governance[14] .

L&D monitoring systems sometimes also fall short when attempting to quantify direct economic losses, as particularly in agriculture, remote sensing and geospatial analysis, the most capable methods of producing spatially explicit, timely estimates, face fundamental constraints in data scarce areas that may undermine their operational credibility. Translating satellite-derived vegetation anomalies into defensible crop production loss figures requires multi-year baseline datasets of subnational yield statistics, crop-type maps that distinguish between the region's intercropped smallholder systems, and locally calibrated relationships between vegetation indices and actual harvest outcomes. In practice, some of these prerequisites are not fully present. As confirmed by Somalia's NDC 3.0, the region sometimes lacks sub-national**, spatially disaggregated, high-resolution data needed to perform comprehensive L&D assessments, while fragmented monitoring systems and weak institutional data-sharing mechanisms further constrain the evidence base available for geospatial analysis** (NDC, 2025).

These technical gaps mean that even the more "direct" economic losses reported by institutional systems may carry significant methodological uncertainty. A reality that could be addressed through sustained investment in agricultural data infrastructure, geospatial capacity, and interoperable monitoring systems if L&D evidence from the Intergovernmental Authority on Development (IGAD) region is to meet the evidentiary standards emerging under the Fund for Responding to Loss and Damage (FRLD) and broader climate finance architecture.

Since **damages occur at the level of individual assets**, a national-level assessment of damages could be built from the bottom up, by adding up assessments of damages occurred at the level of individual assets. In practice, however, lack of data at the level of individual assets means that, in most cases**, assessments will be built from the top down, by comparing aggregated data of actual (or likely-future) damages with aggregated counterfactuals** .[15] Moreover, this top down approach prevents for capturing those **community-level non-economic losses that remain as a gap in the literature**.

The proposed project will generate globally relevant evidence by demonstrating how household-level economic and non-economic L&D data can be systematically integrated into national L&D architecture, including Somalia's National Measurement, Reporting and Verification (MRV) systems, disaster tracking tools (Disaster Tracking Matrix (DTM) /Emergency Trend Tracking (ETT)), and guide equitable and effective recovery financing. Such integration directly responds to international research emphasizing that **L&D valuation must move beyond aggregated institutional losses toward granular**, **bottom-up, climate-attributable household data, particularly for vulnerable rural economies and**

[14] UNDRR, 2024
[15] ICAT, 2023

households[16]. Through rigorous household level assessments, international organisations' technical support, and institutional embedding, the project attempts to provide a replicable model for other countries, improving global methodologies for data collection, attribution, and reporting on both rapid and slow-onset climate impacts, especially over the most vulnerable populations.

3. Methodology

3.1 Methodology overview

The assessment employs mainly quantitative methods, including primary data collection and secondary data analysis and the utilisation of remote sensing tools (all quantitative information). First, quantitative data will be collected via a structured household-level survey focusing on needs and drought loss and damage costing. In an ideal scenario, non-economic losses (NEL) would be inquired using qualitative and, preferably, participatory methods. Nevertheless, the Somali context and the timeframe of this assessment prevent the adoption of this approach and the guarantee of data quality. Consequently, the quantitative questionnaire will be piloted to incorporate open-ended questions and Likert scales, with the objective of comprehensively capturing the nuances of non-economic losses. On the other hand, secondary quantitative data, including statistical records and remote sensing imagery, provides inputs to calculate economic losses and damages (EL&D) and triangulates with the information provided by households.

Table 1 Methodology overview

Methodological approach	**Household Surveys**			**Secondary Data, remote sensing and GIS**
Thematic component	Loss and Damage & Needs Assessment			Loss and Damage
Geographical Coverage	Drought-affected districts	Arrival districts	Both (drought-affected and arrival districts)	Drought-affected districts
Population	Drought-affected population	Drought-affected IDPs (<6 months)	Drought-affected population Drought-affected IDPs (<6months)	N/A

Given that the drought was more acute in certain districts and people was forced to displace to others, for the primary data collection, REACH will conduct household level surveys in drought-affected districts and districts where people were displaced by the drought (hereinafter referred as arrival districts). As explained in the ***Population of Interest*** section below, following district identification, a third category of districts will be considered: districts that are both drought-affected and function as arrival districts. Across these three types, REACH will interview two population groups: 1) **drought-affected population**, defined as people who have been in the district for at least the last six months since the declaration of the drought in November 2025; and 2) **drought-affected Internal Displaced Population (IDPs)**, defined as people who displaced from drought-affected areas due to the drought and arrived to the arrival district less than six months ago.

Data will be collected through in-person household interviews conducted by trained REACH enumerators. The questionnaire for each population profile will depend on the initial identification, either if people are identified as drought-affected IDP or drought-affected population, and the area where information is being collected. The data will be representative with a confidence level of 90% and margin of error of 10% at district level per population. To meet the required sample sizes for representativeness, a 10% buffer will be added to the minimum calculated sample. Sampling for affected population and Internal Displaced Population (IDPs) will use DTM information Round 3 from 2024. Unfortunately, DTM information from 2025 and 2026 has had a very limited scope in terms of districts and restricts the sampling. As the DTM information contains

[16] International Institute for Applied Systems Analysis (IIASA), 2024

information from both, host community and IDPs, it will allow to group under affected population IDPs that have been in the area from more than three years and host population, and then, IDPs under three years of displacement will be the population to sample with for IDPs.

The household questionnaire includes both a Needs component and a Loss and Damage (L&D) component. The Needs component is based on the MIRA-based RNA tool designed last year by REACH, OCHA, and iMMAP[17]. While this tool was initially designed as a key informant interview and, it has been adapted for this assessment for use at the household level. The interview included sectoral questions and aimed to quantify the number of displaced population and affected population in the area. In this case, the survey will also follow a sectoral structure and will ask about current needs people are facing in drought-affected and arrival districts.

The Loss and Damage Household level component is embedded within the sectoral sections and captures information on damages and losses, expenses incurred by households, and coping strategies adopted in response to the drought. It also examines the impacts of drought on livelihoods, shelter, health, children's education, and water and sanitation facilities, etc. The tool applies a retrospective lens, asking respondents about expenses, income, and household conditions either one year prior or six months prior (when the drought was declared) in order to estimate household-level economic losses and damages, as well as to capture non-economic losses and damages. Specifically, the tool will include open-ended questions to ask about the perceived non-economic losses, alongside other closed-ended questions in aspects as family separation, health, friends and family support, education time, etc. Please see the table underneath for more detail.

This tool was built taking into account considerations mentioned on the methodology described by the Initiative for Climate Action Transparency (ICAT), together with a previous REACH assessment conducted in Uganda and the Household Economy Approach.

Table 2. Household questionnaire overview

Sector	Needs component	Loss and Damage component
Displacement	-	Family separation, assets loss
Shelter	Current shelter conditions, risk of eviction, NFI needs	Issues (perceived as caused by the drought), reparations, costs and expenditure
Livelihoods	-	By livelihood à damages and losses and coping strategies
Food Security	Sources of food and rCSI	Expenditure and rCSI
Education	Current access and main needs	Losses and barriers to access education Hours of education understood as a non-economic loss
Health	Access to health	Health damages and losses and life losses (non-economic losses), barriers to access health facilities because of damages, and expenditure
WASH	Current water, sanitation and menstrual hygiene needs	Access to water, coping strategies, changes in water sources, and sanitary facilities changes due to the drought.
Protection	Current protection risks	
AAP	Assistance experience and perceptions	
Resilience and NEL	-	Resilience capacity score (RCS – WFP) and Non-economic losses discussion

In regard the secondary data approach, REACH will conduct the analysis using national statistics, geospatial data and analyses, and other secondary data sources to compute the event attribution, climate change attribution, quantification of impacts, valuation of the EL&D for the main drought-affected sectors such as agriculture (and key sub-sectors such as livestock productivity), WASH, and water-related infrastructure.

[17] REACH SOM (2025)

For clarity across the assessment, we will stick to the following definitions:

Damages (ICAT, 2023): residual climate change impacts that lead to reparable negative shocks. There are damages of infrastructure (water and sanitation, power generation, transport, telecommunications, education, health, housing) and damages of economic activities (agriculture, manufacturing, services, tourism).

Losses: residual climate change impacts that lead to irreversible and irreparable negative shocks The assessment will use the category framework explained on ICAT (2023):

- Human mobility and territory.
- Cultural Heritage and traditional knowledge.
- Life and Health.
- Biodiversity and ecosystem services.
- Sense of place and social cohesion.

Economic loss and damage[18] :: those resources, goods and services that are commonly traded in markets, which can be evaluated using market prices. Economic loss and damage could be damage to crops, homes or infrastructure, etc.

Non-economic loss and damage (NELD) [19]:Those that are not so easily quantified in financial terms. This makes it difficult to perform consistent and accurate evaluations of NELD that reflect the many forms of harm, and the severity of harm, experienced by local actors. Ultimately, there is no comprehensive, widely agreed definition of loss and damage or, by extension, of NELD specifically.

3.2 Population of interest

The geographical scope combined the identification of 1) the most recently drought affected districts in the country where people are coping with the impacts and 2) the locations with high influxes of people displaced by drought/lack of rain (arrival districts). The geographical scope was determined through a three-phase prioritization process that integrated current drought severity with displacement dynamics:

1) The first phase analysed the FAO SWALIM Combined Drought Indicator (CDI)[20] at the district level as the primary remote sensing-based screening tool. The CDI was selected for its methodological breadth: by integrating both vegetation condition indices (NDVI anomalies) and precipitation-derived indicators, it captures signals of agricultural drought, through vegetation stress and crop failure, alongside meteorological drought, making it particularly suited to multi-sectoral prioritization in agropastoral contexts. February 2026 CDI values formed the basis for identifying currently affected districts; however, temporal trajectories of CDI values were also examined to detect districts exhibiting peak severity or repeated drought signals in preceding periods. The retrospective analysis began looking at districts that registered critical CDI thresholds in November 2025, when the drought was declared by the government. This approach ensured that the geographical scope extended beyond districts reflected in current indicator snapshots to encompass areas whose drought legacy continues to shape humanitarian needs, including those not yet integrated into formal humanitarian planning priorities.
2) The second phase used data from the International Organization for Migration (IOM) Displacement Tracking Matrix (DTM), Round 3 (2024), to identify districts receiving populations displaced by drought from the most severely affected areas.

   The DTM in Somalia includes a Round 3 baseline from 2024[21] that aims to quantify the presence of population categories, reasons for displacement, length of displacement, and needs within defined locations at a given time. The assessment is conducted at the settlement level (a village, a neighbourhood, an urban IDP site, a rural IDP site). This information is collected in the field through key informants' interviews and direct observations. For inaccessible locations, key informants' interviews were conducted over the phone. This specific round was

[18] What is 'non-economic' loss and damage (NELD)? - Grantham Research Institute on climate change and the environment
[19] Ibid
[20] SWALIM - Combined Drought Index
[21] Somalia — Baseline Assessment Dataset — Round 3 (February 2024 - September 2024) | Displacement Tracking Matrix

administered across 17 states and 82 districts. Coverage per district and settlements varied While these later rounds provide more recent information, relying solely on them would have significantly narrowed the geographic scope of the analysis.

The Round 3 data enabled the identification of trends in population movements, specifically cases where households reported originating from drought-affected districts and cited drought as the reason for displacement. Given that the data do not reflect the most recent drought period, the initially identified arrival districts were further validated using the Camps Coordination and Camp Management (CCCM) Cluster dashboard[22]. This allowed for confirmation of district-level hotspots for recent arrivals and triangulation with the limited DTM data, which ultimately identified only five arrival districts that overlapped with those previously selected.

3) Third phase included confirming physical access with operations and security management, as with the Field Officers.

After the scoping, three types of districts were identified:

- Districts severely affected by drought (drought-affected districts)
- Arrival districts (districts identified as the most common districts where people fleeing from the drought affected districts tended to head to)
- Districts that are at the same time drought-affected and arrival districts, which presumably receive population from rural areas within the same districts and other neighbour districts, despite the fact they are drought-affected districts.

Please see the list underneath. Consider that in this list those inaccessible districts identified on the third phase of the scoping were already excluded from the list.

Table 3 Prioritised districts

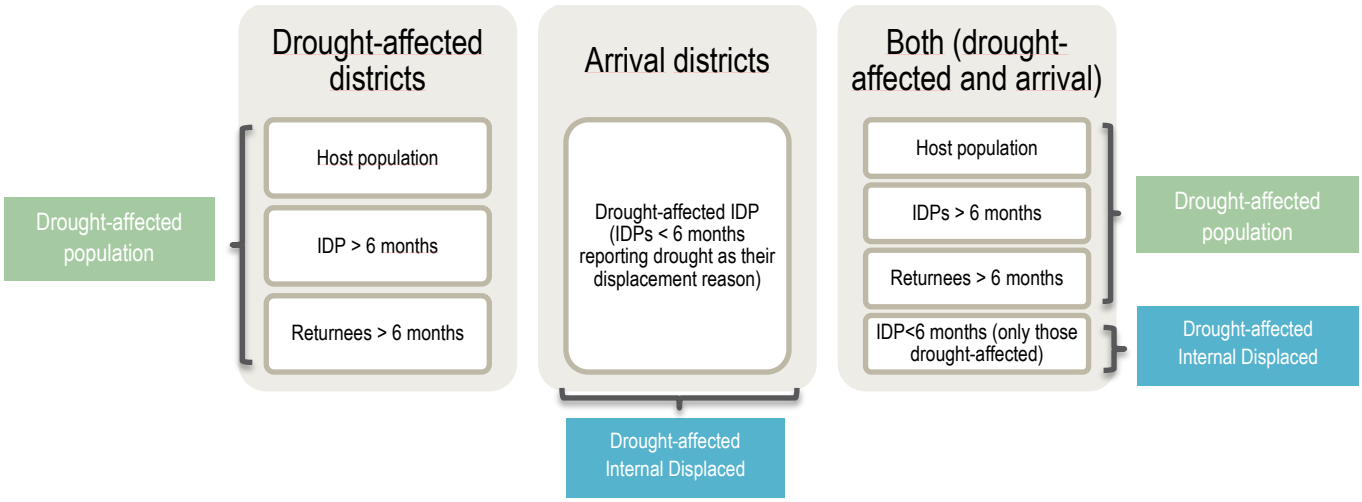
State (admin2)	District (admin3)	Type of district
Awdal	Baki	Both (drought-affected & arrival district) – Nov 2025
	Lughaye	Both (drought-affected & arrival district) – Nov 2025
Bakool	Waajid	Drought-affected
	Tayeeglow	Drought-affected
Bakool	Ceel Barde	Arrival district
Banadir	Daynile/Kahda	Arrival district
Bari	Bossaso	Arrival district
	Caluula	Drought affected – November 2025
Bay	Diinsoor	Both (drought-affected & arrival district)
	Buur Hakaba	Both (drought-affected & arrival district)
	Baydhaba	Both (drought-affected & arrival district)
	Qansax Dheere	Both (drought-affected & arrival district)
Gedo	Baardheere	Drought affected
	Ceel Waaq	Both (drought-affected & arrival district)
	Garbahaarey	Both (drought-affected & arrival district)
	Belet Xaawo	Drought-affected
	Luqq	Arrival district
Hiraan	Belet Weyne	Arrival district
Lower Juba	Afmadow	Both (drought-affected & arrival district)
Lower Shabelle	Qoryooley	Drought-affected
	Afgooye	Both (drought-affected & arrival district)
	Wanla Weyn	Both (drought-affected & arrival district)

[22] CCCM, 2025

	Marka	Drought-affected
	Baraawe	Both (drought-affected & arrival district)
Middle Shabelle	Balcad	Both (drought-affected & arrival district)
	Jowhar	Drought-affected
Mudug	Hobyo	Drought-affected
Nugaal	Eyl	Drought-affected
	Burtinle	Both (drought-affected & arrival district)
	Garoowe	Arrival district
Woqooyi Galbeed	Berbera	Both (drought-affected & arrival district) – Nov 2025

As described in **Table 1: Methodology Overview**, two population groups will be targeted in each district type: **drought-affected populations** and **drought-affected internally displaced populations (drought IDPs)**. These populations are defined analytically based on specific characteristics that may be encountered during fieldwork. However, it is important to note that these are **not the sampling strata**. The sample will also include host community members and IDPs who were displaced more than three years ago. During data collection, households may fall into different situations that must be properly identified and classified to align them with the populations of interest. ***Figure 2*** provides a detailed representation of these population categories.

Figure 2 Population of interest according to the type of district



Drought-affected population: Population who has been affected by November 2025 declared drought. This means people who have been living in drought affected areas (according to the FAO-SWALIM CDI) for at least the past six months or more. This includes host population in the drought-affected districts, IDPs that have been in the area for more than 6 months, and returnees who returned more than six months ago to the drought-affected districts. In for *Both* districts, the drought-affected population includes host population, IDPs and returnees who have been in the area for more than six months.

Drought-affected Internal Displaced Population (drought IDPs): Population displaced due to the drought within the past six months, following the official declaration of the drought. This includes internally displaced persons (IDPs) in arrival districts who were displaced less than six months ago and explicitly reported drought as the cause of displacement, as well as IDPs in districts classified as both drought-affected and arrival districts who were displaced within the same time frame and identified drought as the reason for their displacement.

According to the Guiding Principles on Internal Displacement, IDPs are defined as "persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized state border".

In the context of Somalia, the country's National Policy on Refugee-Returnees and Internally Displaced Persons defines IDPs as:

- *Persons or groups of persons who have been forced or obliged to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, clan-based or other forms of generalized violence and insecurity, violations of human rights of natural or human-made disasters, and who have not crossed an internationally recognized state border.*
- *Persons or groups of persons who are evicted from their settlement and who have not received adequate housing and/or land alternative or appropriate compensation allowing them to restore their lives in a sustainable manner; and*
- *Pastoralists who have lost access to their traditional nomadic living space through loss of livestock, or loss of access to grazing and water points or markets and have therefore left their habitual living space.*

As explained in the sampling section below, DTM provides data on both internally displaced persons (IDPs) and the host population, allowing for district-level stratified sampling. For the drought-displaced IDP population, the sample will include IDP households that were displaced less than three years prior to the time of DTM data collection. The drought-affected population will consist of the host population combined with IDP households that were displaced more than three years ago.

The household survey will be the same one for both populations and districts, however for drought IDPs, there will be some questions related to their house and situation back in the drought area. And the unit of analysis will be household.

3.3 Secondary data

Secondary data includes contextual information, to contextualise the scoping and the assessment methodology and context and, for the further analysis, it will allow to triangulate households reports with other information sources, such as administrative records, weather forecasts, prices, livestock and crops information, MSNA 2025, Integrated Food Security Phase Classification (IPC) 2025 and 2026, Famine Early Warning Systems Network (FEWSNET).

L&D methodological guidance and climate resilience literature have informed the methodological approach for both the HH level survey and the SDA. In particular for the scoping and sampling, the Combined Drought Index (CDI) produced by FAO SWALIM was used to monitor the extent of drought/lack of rain as it evolved, together with the International Office of Migration Displacement Tracking Matrix (IOM DTM) to understand human mobility trends and sample.

Table 4 Secondary Data Sources

Secondary source	Information used	Purpose of source
IASC. Multi-sectoral Initial Rapid Assessment (MIRA) Tool. 2015.	KII tool was based on the MIRA The HH version is the adaptation of the KII one	Inform methodology
WHO Public Health Information Services toolkit (PHIS)	Tools used for different assessments where public health information is collected or managed	Inform methodology
CCCM data (September, 2025)	Sampling	Inform methodology
IOM DTM (September, 2025)	Sampling & scoping	Inform methodology & Contextualise assessment
Damage, Loss and Needs Assessment – Guidance notes (world Bank, 2010)	L&D Methodology	Inform methodology
Assessing Climate change-driven losses and damages (ICAT, 2023)	L&D Methodology	Inform methodology
Impact of climate hazards on Livelihoods and access to services among refugees and host communities- Kenya and Uganda (IMPACT, 2025)	Inform the tool and potential impacts of drought faced by HH.	Inform methodology
Resilience Capacity Score (WFP, 2025)	Inform the tool and instrumentalise current resilience capacity in future events. Allows to trigger conversation about their losses that strength resilience	Inform methodology

Somalia's Third Generation National Determined Contribution (NDC 3.0), 2025	Rationale	Contextualise assessment
Somalia's National Adaptation Plan (NAP) Framework (2022)	Rationale	Contextualise assessment
FAO SWALIM	Scoping and context	Contextualise assessment and analysis
FEWSNET	Triangulation with HH level information provided	Analysis
Technical guide on integrating human mobility and climate change linkages into relevant national climate change planning processes (UNFCCC, 2024)	L&D + displacement	Contextualise assessment and analysis
Household Economy Assessment Baseline Somalia– Save the Children 2020	Livestock and income L&D	Contextualise assessment and analysis

3.4 Secondary Loss and Damage, remote sensing and geospatial data

Table 5 GIS and Remote sensing secondary Data sensing sources

Data source & link	Purpose	Data type	Date	Limitations & mitigation
Sentinel 2 surface reflectance imagery	To calculate the Normalized Difference Vegetation Index (NDVI) anomaly and understand drought conditions.	Satellite imagery	April -June 2025	Cloud cover may affect imagery. Will use cloud masking and make seasonal composite.
CHIRPS rainfall data	To calculate SPI during rainy season and understand rainfall anomalies.	Raster	March-May 2025	Accuracy may be low where there are fewer weather stations. Using with NDVI will identify actual impacts of rainfall anomalies on vegetation.
SWALIM CDI	Time-series data used in climate change attribution	Raster-based Index	20–30-year timeseries	Short-term time-series if compared to larger climatological time-series. Recent time-series already have high incidence of extreme events, which quantitively makes events more difficult to link to climate change.
SPI	Time-series data used in climate change attribution	Raster-based Index	20–30-year timeseries	Likely derived from CHIRPS. Same limitations apply.
ERA5	Time-series data used in climate change attribution	Raster-based Index	20–30-year timeseries	Supporting evidence compared to precipitation.
REACH KI data at settlement level	Will join summarised data on reported drought	CSV	June 2025	Some settlement locations may be missing or imprecise

	shocks to settlement locations and overlay on maps			– will aggregate to hexagon or admin/livelihood zones.
Sub-national Statistics on Agricultural Yield/Productivity	Baseline data for historical productivity. Baseline data for historical and recent crop type dynamics (predominant cereals by sub-national areas).	CSV	As far back as data allows. 15-year time-series minimum.	TBD upon investigation of methodology (if available).
Sub-national Statistics on Agropastoral/Livestock Productivity	Baseline data for historical productivity.	CSV	As far back as data allows. 15-year time-series minimum.	TBD upon investigation of methodology (if available).
FSNAU Crop Production (Metric Tonnes)	Baseline data for historical productivity. Baseline data for historical and recent crop type dynamics (predominant cereals by sub-national areas).	CSV	As far back as data allows. 15-year time-series minimum preferred.	TBD upon investigation of methodology (if available).
Cropland or crop type land cover mask	Data to limit geospatial boundaries of analysis	Raster	Preferably created within the last 5 years	TBD upon investigation of methodology (if available).
Planted and natural grassland land cover mask	Data to limit geospatial boundaries of analysis	Raster	Preferably created within the last 5 years	TBD upon investigation of methodology (if available).
Historical information on surface water, and aground water availability, and reservoirs volume	Baseline data for historical availability of water-related resources.	CSV	Preferably time-series data before September 2025	
WASH data on number of functional water points/boreholes	Baseline data for historical availability of water-related resources.	TBC	Preferably time-series data before September 2025	TBC

FSNAU Market Data - Commodity Price	Baseline information of prices before drought. Valuation of total losses after drought.	CSV	Monthly time-series data 1995 - 2026	TBD upon investigation of methodology (if available).

3.5 Primary Data Collection

Primary data collection will include structured household surveys in the three types of districts, arrival, drought-affected and both (arrival and drought-affected) districts. The target population to be assessed is drought-affected population and drought-affected IDPs. Primary data collection will be conducted face-to-face in accessible locations by REACH enumerators. This assessment will use a representative sampling methodology, with 90% level of confidence and 10% of margin error at a district level per population. In addition to the surveys, enumerators will be asked to take pictures from the visited areas, including the water boreholes, dry soil, and, if possible, from the farming land, people owned to have visual evidence from reported details by households.

Sampling methodology

The sampling design adopts a two-stage cluster sampling approach based on probability techniques. This ensures that the findings are representative for IDPs and the affected population at the district level, as well as for each population group within the district. This methodology is designed to generate disaggregated results by population groups, including affected population and IDPs, while maintaining a 90% confidence level and a 10% margin of error. Then, these populations in the field will be able to be classified as drought-affected population and drought-affected IDPs, with the district type, time of displacement and reason of displacement. The sampling methodology relies on advanced tools such as the HQ sampling platform and geospatial population data provided by REACH. This ensures rigor in both sampling and field-level implementation.

Taking into consideration the districts classification explained above, for the sampling it will be important to take into account:

Drought-affected districts: these are locations classified as having no presence of internally displaced people (IDPs) arrived less than six months ago, meaning only host communities reside there (IDP who arrived more than 6 months ago will be included among those). In these sites, 100% of the sample is drawn from affected host population households and is considered part of the affected population strata. With affected population meaning DTM host population and more than three years of displacement IDPs.

Arrival districts: In these sites, 100% of the total surveys are allocated to IDP households displaced for less than 6 months and those who report the drought being the main reason of displacement. The total population size considered is limited to accessible areas, enabling a focused extrapolation of needs within those locations. The same here is drown from the DTM IDP who were displaced less than three years ago.

Both (drought-affected & arrival district): These areas include both host communities and IDPs (less than 6 months of displacement). In these cases, sampling is done in equal proportions, depending on the population distributions, between host and more than three years of displacement IDPs and less than three years of displacement IDP households to ensure balanced representation.

For affected population and IDP population, a two-stage sampling process is applied. In the first stage, using DTM R3 2024 information, clusters, defined as villages or IDP camps in the dataset, are randomly selected using Probability Proportional to Size (PPS) sampling through the HQ sampling tool, which considers cluster population density. At a second stage, within each selected cluster, households are then randomly selected for interviews using simple random technique, with minimum 5 households per cluster. The number of households selected depends on the size of the cluster. This sampling design ensures consistency with the target confidence level and margin of error, allowing for comparability across population groups. This two-stage approach ensures that household-level data collected is representative of the wider affected population and IDP population across all participating districts.

As mentioned before, the affected population uses the portion of the DTM information that includes host population and IDPs displaced for more than three years from the end of R3 data collection in 2024; and IDPs population uses IDPs displaced for less than three years from the end of R3 data collection in 2024.

After second stage GPS-Based Point will be generated for both sampling strategies; the physical location of each interview is determined through GPS-based random point selection. These points are generated within the boundaries of the selected clusters. Enumerators navigate to the GPS coordinates using mobile applications such as Maps.me and conduct interviews with the nearest household. Enumerators are allowed to select a household either to the right or left of the randomly assigned point, within a defined radius of 100 meters. This approach aims to preserve the representativity of the sample while ensuring that enumerators can efficiently locate households that meet the criteria, optimizing the use of available resources. This methodology ensures spatial randomness and minimizes selection bias. To successfully implement this approach, the following are required:

- Accurate and current shapefiles for administrative boundaries.
- Reliable population distribution and density data.
- Well-trained data collection teams proficient in using digital navigation tools.

It could be cases in which the sampled cluster seem to don't exist, according to Field Officers or the maps available. In those cases, we will compare with the updated CCCM Site Master list and confirm is this is still an IDP camp or site.

Addressing Probable Implementation Challenges:

1. Absent Households: If a selected household is found to be vacant during the initial visit, the neighbouring household will be surveyed.
2. Unforeseen Obstacles: In situations where the predetermined route is obstructed due to unforeseen circumstances (e.g., construction work), the field team will document the obstacle and deviate slightly to maintain the systematic selection by following the next available pathway within the target site.

Table 6 Sampled districts, population size and sample size

State	District	Population	Total pop HH	# sampled cluster	# sampled size
Bakool	Ceel Barde	IDP	100	12	2228
	Waajid	Affected population	1046	11	105
Banadir	Danyiile	IDP	45827	17	90
	Kadha	IDP	54674	18	90
Bari	Bossaso	IDP	6182	12	105
	Caluula	Affected population	6867	13	105
Bay	Buur Hakaba	IDP	313	4	65
		Affected population	5049	8	140
	Baydhaba	IDP	90	17	16628
		Affected population	95	15	9927
	Diinsoor	IDP	72	7	710
		Affected population	125	9	6432
	Qansax Dheere	IDP	90	14	3129
		Affected population	110	13	4315
	Baardheere	Affected population	95	15	15020
	Belet Xaawo	Affected population	110	11	6918
Gedo	Ceel Waaq	IDP	72	4	696
		Affected population	95	15	3202
	Garbahaarey	IDP	67	6	382

		Affected population	95	15	7919
	Luqq	IDP	95	14	5147
Hiraan	Belet Weyne	IDP	95	15	11433
Lower Juba	Afmadow	IDP	100	13	4499
		Affected population	95	15	32850
	Afgooye	IDP	90	17	6856
		Affected population	90	17	29292
Lower Shabelle	Baraawe	IDP	100	11	1502
		Affected population	105	14	7068
	Marka	Affected population	100	15	15420
	Qoryooley	Affected population	95	17	20507
Middle Shabelle	Jowhar	Affected population	95	17	20731
Mudug	Hobyo	Affected population	100	14	4762
Nugaal	Burtinle	IDP	110	8	431
		Affected population	95	16	14112
	Eyl	Affected population	95	14	6722
	Garoowe	IDP	105	12	5884
Woqooyi Galbeed	Berbera	IDP	190	5	293
		Affected population	105	14	10871
Total	27 districts	-	3776	38	395844

Two full days of training for enumerators will aim to present, explain, and test the tool before data collection. Following the training, a pilot data collection will be conducted. This will allow the examination of the enumerators' understanding of the content of the questions and functionalities of the tool, through feedback sessions with the field officers (FOs) and analysis of the data. Results of the data collection pilot can also be shared with the clusters to keep them informed and have them support in adjusting the tool if required. Following this, data collection will commence. Enumerators will use the Map.me app with pre downloaded offline maps and pre-loaded household location data (CSV or KML) to navigate to assigned households via GPS coordinates. However, throughout data collection, REACH FOs will review the targeted locations within each district. In case of an inaccessible location, the FOs will immediately communicate this to the data officers to rerun the sampling for that district. Households will be randomly selected according to the final sampling framework, with the questionnaire being administered either to the head of the household or anyone else able to communicate on behalf of the household.

The questionnaire will be coded on the Kobo tool and be accessible to all enumerators on REACH data collection smartphones. Enumerators will begin the interview by introducing themselves and requesting the respondents' informed consent to proceed. As FOs will not be able to accompany all enumerator teams on the ground, they will identify team leaders in each team to supervise the progress of data collection and ensure regular communication with their referral FO. Each day, enumerators, under the supervision of their team leader and/or of the FO, will upload the survey forms and debrief the team leader and/or the FO of any issues encountered during data collection. The FOs, Data Officer, and the research team are responsible for data checking and cleaning procedures at the end of each day and for communicating feedback to the enumerators and team leaders.

3.6 Data Processing & Analysis

At the end of each day, the team leaders will oversee the uploading of collected data from enumerators' smartphones to REACH's KoBo Collect server. The REACH data team will then retrieve all datasets for spatial verification, a crucial step involving cross-examination of GPS coordinates of the completed surveys, to ensure they fall within a predetermined radius of the target settlement. Any surveys failing to meet this criterion, in addition to the surveys completed in a short period of time, will be flagged for further attention by field officers.

Upon completion of the preliminary verification, the data team will remove all personally identifiable information (PII) and disaggregate datasets by districts. Any outliers in the data, including translation of any required "other" responses from Somali to English is then reviewed and cross-checked by the field officers. Once cleaned, the data is checked by the assessment team for a secondary review based on logic checks, during which any additional recommendations or follow-ups are communicated to the field officers and enumerators for their daily briefings. Additionally, as part of the quality assurance process, all changes and cleaning made to the submitted surveys are tracked in a comprehensive data cleaning log. The Standard Operating Procedure (SOP) for data cleaning will be used to standardise this process. This is a step-by-step guide for key data cleaning issues, including checking the time stamp of each survey, issues with skip logic and outliers. The SOP will be developed based on the RN L&D survey tool and REACH's Data cleaning standards checklist.

If the data quality allows, the analysis will be further disaggregated by demographic characteristics such as Age, Gender, and Disability (AGD). This will provide a more nuanced understanding of how the data varies across different demographic sub-groups. However, since the samples were not specifically generated considering the AGD component, any analysis based on these demographics will be indicative of household's situation. Finally, the analysis results will be presented in a clear and organized manner, separated by sector. Each sector's findings will be further segregated based on the previously mentioned strata.

All answers to the open-ended questions will be translated from Somali to English and then, analysed as qualitative information using a data saturation table, using coding categories and quantifying the number of interviewees who referred to all identified topics.

3.7 Loss and Damage sectoral analysis from secondary data - Remote sensing and geospatial methods

The geospatial analysis will generate district-level and, where data resolution allows, sub-district-level indicators of drought severity and sectoral impacts to complement and triangulate household-level findings. While the analytical framework is technically replicable across the country, implementation will focus on the priority districts covered by the household assessment to ensure direct spatial alignment and validation. National-level analysis will be applied selectively to establish climatic baselines and contextual benchmarks, while district-level outputs will form the basis for Loss and Damage quantification. The geospatial component is structured to support three functions: (i) hazard characterization, (ii) spatial quantification and valuation of impacts, and (iii) triangulation of household-reported losses. The methodology distinguishes between core analytical components required for quantification of losses and damages and complementary analyses that provide support and granularity for attribution, validation, and interpretation.

Agricultural production loss estimation is a central quantitative component of the assessment, producing district-level estimates of affected area (hectares), yield reduction (%), and total production loss (tons). For the remote sensing and secondary data component of the agricultural EL&D impact quantification, two complementary geospatial approaches will be explored depending on the availability and quality of subnational agricultural data. A similar method to the second approach will be explored for livestock based on available data time-series data and indicators. The analysis for crop production losses will be aligned to the Deyr cropping season, consistent with the temporal structure of FSNAU crop production data. All primary indicators for loss estimation (vegetation dynamics, cultivated area, and yield proxies) will therefore be computed over the Deyr seasonal window (October to December). In addition, an extended 6–8-month observation period may be analysed to assess broader vegetation dynamics and detect prolonged drought impacts. While this extended interval can support interpretation of drought-related stress and changes in cultivated area, it will not be directly used for regression calibration due to misalignment with seasonal production data.

The first approach estimates agricultural area reduction by comparing current-season cultivated extent against a multi-year cropland baseline. This also captures losses from the land that was not planted or was abandoned due to drought and converting the area deficit into production loss using average baseline productivity values from national statistics. This area-

based method is less data-intensive and avoids the need for direct NDVI-to-yield calibration, though it does not capture yield depression on land that remained under cultivation. The primary outputs of this method are (i) hectares of unplanted or abandoned cropland and (ii) associated production loss derived from baseline productivity values.

The remote sensing and secondary data methods proposed for this assessment are grounded in the FAO Damage and Loss Assessment methodology for agriculture (Conforti, Markova & Tochkov, 2020), the ECLAC/World Bank DaLA framework (GFDRR, 2010), and operational drought monitoring approaches. The methods are adapted to the data-constrained environment, where subnational agricultural statistics are often incomplete and high-resolution crop-type data is largely unavailable (IGAD, 2026), requiring pragmatic analytical choices that balance methodological rigour with operational feasibility.

Due to time and capacity limitations, there were other analyses that were discussed and remained as potential analyses to explore or pilot. Please see those on the Annex 1. Of this ToR.

Agricultural Crop Productivity Losses

Crop and livestock production loss estimation is the central quantitative component of the EL&D assessment. Two complementary geospatial approaches will be explored, with the emphasis on each determined by the availability and quality of subnational agricultural data investigated during the inception phase. Both follow the core logic of the FAO Damage and Loss methodology: estimating the difference between expected and observed agricultural production, valued at market prices (Conforti et al., 2020).

Method 1: Cropland Area Change Detection. This approach compares current-season cultivated cropland extent against a multi-year baseline of normal cropped area derived from satellite imagery. The area deficit is converted to production loss using baseline productivity and price values from the FSNAU Deyr-season per-crop production values and markets datasets, applying crop composition percentages derived from the last five years of observed production. This assumes that recent cropping patterns — including adjustments made under past climatic and market conditions — are representative of current farmer decision-making. Prices may be represented either by the most recent season to reflect current market conditions, or by a short-term average to smooth volatility, depending on data availability. The approach estimates losses on the extensive margin (area not cultivated), holding crop mix and yields constant at baseline levels, and provides an approximation of foregone production and value.

The analysis uses the NASA Harmonized Landsat Sentinel-2 (HLS) dataset, combining HLSL30 and HLSS30 products at 30m resolution, which provides a harmonised multi-sensor time series with an effective revisit frequency of two to three days from 2013 onward. For each year in the assessment period, seasonal composites are generated over a September–March window, labelled by the September onset year to ensure consistent cross-year season labelling and to align with Somalia's Deyr short-rains cultivation period and the subsequent Jilaal dry season. Per-pixel NDVI is computed from surface reflectance bands following sensor-specific formulations harmonized across the HLS products, with cloud, cloud shadow, adjacent cloud, and snow pixels masked using the HLS unified Fmask band. Pixels with fewer than four clean observations within a given season are excluded to prevent noise propagation into seasonal composites.

The principal indicator is seasonal NDVI amplitude — the difference between the seasonal maximum and minimum NDVI — which captures the green-up and senescence dynamics that distinguish actively cultivated land from bare or uncultivated pixels, which is extracted over cropland areas using a land cover mask (ESA WorldCover or equivalent). A historical baseline is constructed from the available archive excluding years in which the Deyr season experienced documented widespread failure: specifically 2016, 2021, and 2022, corresponding to the severe multi-season droughts recorded by FEWSNET and FSNAU (FEWSNET, 2017 and FEWSNET, 2022). For each district, the mean and median absolute deviation of seasonal amplitude are derived across all retained baseline years. Active cultivation is defined as pixel-level amplitude falling within global amplitude ± k×std, where k is a sensitivity parameter varying from 0.25-0.75 to be calibrated against known drought seasons during the inception phase. The historical baseline cultivated area is defined as the average extent of actively cultivating pixels across baseline years. Agricultural loss is then estimated as the (negative) difference between this baseline

area and the cultivated area detected in the target season. Loss estimates are aggregated to administrative unit level and converted to production loss using baseline yield, crop area statistics, and district-relative crop percentages from most recent non-drought year.

This method is less data-intensive than regression-based alternatives: it does not require long yield time series for calibration, as yield data enters only in the final valuation step. Its attribution story is also more direct — when rainfall is well below normal and planted area drops substantially, the causal link is clear. It performs well in severe drought where widespread planting failure dominates the loss profile. However, its primary limitation is that it does not capture yield depression on land that remained under cultivation, meaning it would substantially underestimate losses in moderate drought where most land was planted but at reduced yields.

WASH and Water Losses

The WASH losses most directly experienced by households such as dry boreholes, increased water trucking costs, increased distance to water points, and reduced water quality are not detectable from satellite imagery. These will be sourced from household surveys, WASH cluster assessments, key informant data from REACH settlement-level monitoring, and water authority records. Whenever there is data available, the economic quantification will include the cost of emergency water supply interventions from government and humanitarian expenditure records, household water expenditure captured through surveys, and the cost of damaged or non-functional water reported after the drought was declared. Health-related costs from water scarcity may also be used where secondary health data is available to calculate baselines but may be reported qualitatively if robust quantification is not feasible.

Where available, SWALIM hydrological monitoring data for the Juba and Shabelle river systems will supplement the satellite analysis. Depending on the quality of the reservoir data and associated analysis, this component may serve as contextual evidence demonstrating the hydrological severity of the drought and providing the environmental explanation for infrastructure failure or a direct measure of WASH losses at household level.

Valuation

The final valuation of economic losses and damages will follow standardised production loss formulas from the FAO Damage and Loss methodology and the ECLAC/World Bank DaLA framework (Conforti et al., 2020; Jovel et al., 2010), estimating production losses as the difference between expected and observed output valued at pre-disaster market prices. Where government and partner agricultural statistics provide subnational baselines and market price data of sufficient quality, these will serve as the primary input. The principle also applies across all affected sub-sectors included in this assessment, where unit costs and replacement values will be drawn from the most reliable available source and cross-referenced against household-reported expenditures from the primary survey.

Tools

Geospatial analysis will be implemented in Python using Google Earth Engine (GEE) or cloud-based equivalent for large-scale satellite data processing, time-series extraction, and indicator calculation across the full multi-decadal archive — essential for constructing the climate and vegetation baselines and avoiding the bandwidth constraints of local imagery processing. Statistical analysis, regression modelling, and spatial calculations will be conducted in Google Colab or an equivalent Jupyter-based environment using standard geospatial and analytical libraries including geopandas, rasterio, xarray, rasterstats, and scikit-learn. Where pre-processed operational drought monitoring products are available — specifically FAO ASIS for cropland drought classification (Rojas et al., 2011), FEWS NET vegetation and rainfall products, and SWALIM drought outputs — these will be used directly rather than rebuilding from raw satellite data, as they incorporate built-in cropland masking, crop calendar alignment, and quality controls that have been operationally validated. Production-quality cartographic outputs and map products will be produced in ArcGIS Pro.

3.8 Limitations

- As explained before, several seriously drought-affected districts had to be removed from the sample, due to access restrictions for in-person data collection. This already limits L&D aggregated conclusions, as some of the most affected areas are not included in the sample. Therefore, it may be impossible to access households still living in

the worst-affected areas, so there could be a reported magnitude of need lower than the actual scale of need. To mitigate this limitation, it will be important to look into results per districts, and when looking into aggregated results considering this limitation.

- The sampling sources and approach do not follow a nationally representative Loss and Damage (L&D) scope that would allow for comprehensive representation across all populations and geographic areas of Somalia. Instead, the sampling strategy primarily targets vulnerable populations, focusing geographically on the most drought-affected districts and key displacement destinations. While this approach enables in-depth reporting on L&D experiences among these highly affected populations, it does not allow for extrapolation of estimated losses and damages to the entire Somali population. While this constitutes a limitation, it also represents a strength of the assessment, as it deliberately makes visible populations that are often overlooked in standard Loss and Damage (L&D) assessments. These populations may be under-represented in Gross Domestic Product (GDP)-based analyses, despite experiencing disproportionate losses and damages.
- Given the sampling, most vulnerable population scoped, and the fact that affected population will self-report their needs and perceived loss and damage, the assessment doesn't contemplate to do an exact calculation that could be aggregated and equalise the country level formerly conducted calculation.

3.8.1 GIS and remote sensing limitations

Cropland area change detection. This method captures losses from unplanted or abandoned land but does not detect yield reduction on land that remained under cultivation, which may lead to underestimation in moderate drought scenarios. The distinction between actively cultivated and non-cultivated land relies on vegetation index thresholds applied to satellite imagery, which in semi-arid smallholder landscapes can be affected by spectral similarity between stressed crops and natural vegetation, and by cloud cover reducing the availability of usable imagery during the growing season. The thresholds, indicators, and criteria used to determine cultivated extent can significantly alter the post-event calculation of total area and should be documented transparently.

Valuation. Market prices fluctuate during drought events, and the choice of reference price period affects loss estimates. The assessment will use pre-drought prices as the baseline, with sensitivity to price effects documented where relevant. Where third-party price sources substitute for unavailable government data, any spatial or temporal mismatches will be noted. Cross-referencing with household-reported expenditure provides an additional validation layer but is itself subject to standard survey limitations.

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** (*specifically by: seeking informed consent, designing length of survey/ discussion while being considerate of participants' time, ensuring accurate reporting of information provided*)?	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	The assessment will include questions regarding their areas of living before and after displacement and perceived conditions in that area and their movement intentions. Such questions may be stressful for respondents given past traumatic events or emotional responses to displacement and experience of drought before displacement. To minimise the impact, respondents will be informed prior to the interview that such topics will be asked about during the survey and will be informed that they can terminate the interview at any point should they so wish (informed consent). In addition, questions on sensitive topics will be phrased appropriately and will be strictly limited to the extent necessary but sufficient to answer the research questions. Furthermore, the training delivered to enumerators prior to data collection will include a do-not-harm component to avoid re-traumatisation, including a section on linkages to referral pathways for protection services.
… 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.?	No	IDPs and affected population are vulnerable as per their displacement history and current living conditions. They may be living with a disability, survivors of protection incidents etc. Data protection standards will be applied diligently to protect respondents' identity, and the protection of vulnerable groups will be a central tenet applied to the design of the survey instrument. Furthermore, the training delivered to enumerators prior to data collection will include a do-no-harm component to avoid re-traumatisation.
… Follows IMPACT SOPs for management of **personally identifiable information**?	Yes	

5) Roles and responsibilities

Task Description	*Responsible*	*Accountable*	*Consulted*	*Informed*

Research design	Assessment Specialist, Senior Assessment officer	Assessment Specialist	Data Officer, Research Manager, MoECC, SoDMA, Acted, Somalia ICCG, IMPACT HQ	Country coordination (Country Representative and Country Deputy Representative)
Supervising data collection	Field Officer	Assessment Specialist	Data Officer, Research manager	Country coordination
Data processing (checking, cleaning)	Data Officer	Assessment Specialist	Field Officer, IMPACT HQ, Research Manager	Country coordination
Data analysis	Data Officer, Senior Assessment officer	Assessment specialist	IMPACT HQ, Research Manager	Country Coordination
Output production	Assessment Specialist	Assessment Specialist	IMPACT HQ, Research Manager	Country Coordinator
Dissemination	Research Manager	Research manager	MoECC, SoDMA, ICCG	External Stakeholders Country Coordination
Monitoring & Evaluation	Research Manager	Research Manager	Research Manager	IMPACT RD & Data Unit, Country Coordination
Lessons learned	Research Manager	Research Manager	Data officer, IMPACT HQ, Country Coordination	Country Coordination

6) Data Analysis Plan

Data analysis plan here.

Administrative Data				
Research Cycle name	*SOM2601*			
Project Code	*27BEG*			
Donor	*Department of State*			
Project partners	*Inter-Cluster Coordination Group (ICCG) regarding the needs assessment; Ministry of Environment and Climate Change (MOECC) and Somali Disaster Management Agency (SODMA) regarding the loss and damage component*			
Research Contacts	*lina.camperos@impact-initiatives.org* *angie.martin@impact-initiatives.org*			
Data Management Plan Version	*Date: 25/03/2026*	*Version: 1*		
Related Policies	*IMPACT Data Management SOP*			
Documentation and Metadata				
What documentation and metadata will accompany the data? *Select all that apply*	x	Data analysis plan	x	Data Cleaning Log, including: □ Deletion Log □ Value Change Log
	□	Code book	□	Data Dictionary
	□	Metadata based on HDX Standards	□	[Other, Specify]
Ethics and Legal Compliance				
Which ethical and legal measures will be taken?	x	Consent of participants to participate	x	Consent of participants to share personal information with other agencies
	□	No collection of personally identifiable data will take place	x	Gender, child protection and other protection issues are taken into account
	x	All participants reached age of majority		[Other, Specify]
Who will own the copyright and Intellectual Property Rights for the data that is collected?	IMPACT and OCHA Somalia			
Storage and Backup				
Where will data be stored and backed up during the research?	□	IMPACT/REACH Kobo Server	x	Other Kobo Server: *OCHA Somalia Kobo server*
	x	IMPACT Global Physical / Cloud Server	□	Country/Internal Server
	□	On devices held by REACH staff	□	Physical location *[specify]*
	□	[Other, Specify]		
Which data access and security measures have been taken?	x	Password protection on devices/servers	x	Data access is limited to *[Carys Milbourn (AO), Alex Stephenson (SDO), Mohammed Hamayoon Majidi (OCHA)*
	x	Form and data encryption on data collection server	□	Partners signed an MoU if accessing raw data
	□	[Other, Specify]		

Kobo Access Rights

Account Name(s)	Person(s)	Type of Kobo access	
lina.camperos@impact-initiatives.org	*Lina Camperos*	x View x Edit	x Submit Data x Download Data
suleiman.ibrahim@reach-initiative.org	*Suleiman Ibrahim*	x View x Edit	x Submit Data x Download Data

angie.martin@impact-initiatives.org	*Angie Martin*	x View x Edit	x Submit Data x Download Data

Raw Data Access Rights

Raw Data Access	Reason	Person
Accountable	Accountable	*Suleiman Ibrahim*
Access	Assessment Specialist: monitor data collection and cleaning processes	*Lina Camperos*

Preservation				
Where will data be stored for long-term preservation?	x	IMPACT / REACH Global Cloud / Physical Server	□	OCHA HDX
	□	REACH Country Server	□	[Other, Specify]
Data Sharing				
Will the data be shared publically?	x	Yes	□	No, only with mandating agency / body
Will all data be shared?	□	Yes	x	No, only anonymized, cleaned/ and consolidated data will be shared
	□	No, [Other, Specify]		
Where will you share the data?	x	REACH Resource Centre	x	OCHA HDX
	x	HumanitarianResponse	□	[Other, Specify]
Data protection risk assessment				
Have you completed the Indicators Risk Assessment table below?	x	Yes	□	No, no information that potentially allows identification of individuals is to be collected.
	[Please complete the first 4 columns in the Indicators Risk Assessment table below]			

Risk indicator (including direct and indirect identifiers)	Type of identification risk	Disclosure implications	Benefits	**Class**	**Required mitigation**
Settlement Name	Direct identification of HH	Potential target of armed actors	Follow up for data cleaning	B1	Deleted directly after verification/ cleaning
Neighbourhood name	Direct identification of HH	Potential target of armed actors	Follow up for data cleaning	B1	Deleted directly after verification/ cleaning
Camp name	Direct identification of HH	Potential target of armed actors	Follow up for data cleaning	B1	Deleted directly after verification/ cleaning
Camp code	Direct identification of HH	Potential target of armed actors	Follow up for data cleaning	B1	Deleted directly after verification/ cleaning
Latitude	Direct identification of HH	Potential target of armed actors	Follow up for data cleaning	B1	Deleted directly after verification/ cleaning
Longitude	Direct identification of HH	Potential target of armed actors	Follow up for data cleaning	B1	Deleted directly after verification/ cleaning

HH origin location	Direct identification of HH	Potential target of armed actors	Contextualisation of findings	B1	Deleted directly after verification/ cleaning

Responsibilities	
Data collection	*Lina Camperos, Assessment Specialist, lina.camperos@impact-initiatives.org*
Data cleaning	*Sulaiman Anwary, Senior Data Officer, sulaiman.anwary@impact-initiatives.org*
Data analysis	*Sulaiman Anwary, Senior Data Officer, sulaiman.anwary@impact-initiatives.org*
Data sharing/uploading	*Angie Martin, Research Manager, angie.martin@impact-initiatives.org*
GIS & Remote sensing	*Pedro Candido, pedro.candido@impact-initiatives.org*