

Research Terms of Reference

Area-Based Risk Assessment (ABRA) Căușeni

MDA2406

Republic of Moldova

[18/09/2024]

[2]

REACH Informing
more effective
humanitarian action

1. Executive Summary

Country of intervention	Republic of Moldova					
Type of Emergency	<input checked="" type="checkbox"/>	Natural hazard	<input type="checkbox"/>	Conflict	<input type="checkbox"/>	Other (<i>specify</i>)
Type of Crisis	<input checked="" type="checkbox"/>	Sudden onset	<input checked="" type="checkbox"/>	Slow onset	<input checked="" type="checkbox"/>	Protracted
Mandating Body/ Agency	USAID BHA					
IMPACT Project Code	67 FYO QD8					
Overall Research Timeframe (<i>from research design to final outputs / M&E</i>)	01/07/2024 to 31/12/2024					
Research Timeframe <i>Add planned deadlines (for first cycle if more than 1)</i>	1. Pilot/ training: N/A		6. Preliminary presentation: 15/10/2024			
	2. Start collect data: 01/08/2024		7. Outputs sent for validation: 15/11/2024			
	3. Data collected: 01/09/2024		8. Outputs published: 15/12/2024			
	4. Data analysed: 01/11/2024		9. Final presentation: TBC			
	5. Data sent for validation: 15/11/2024					
Number of assessments	<input checked="" type="checkbox"/>	Single assessment (one cycle)				
	<input type="checkbox"/>	Multi assessment (more than one cycle)				
Humanitarian milestones <i>Specify what will the assessment inform and when</i> <i>e.g. The shelter cluster</i>	Milestone		Deadline (can be tentative)			
	<input checked="" type="checkbox"/>	Donor plan/strategy	31/12/2025			
	<input type="checkbox"/>	Inter-cluster plan/strategy	_ / _ / _ _ _ _			
	<input checked="" type="checkbox"/>	Cluster plan/strategy	31/12/2024			
	<input type="checkbox"/>	NGO platform plan/strategy	_ / _ / _ _ _ _			

<p><i>will use this data to draft its Revised Flash Appeal;</i></p>	<p>X</p>	<p>Other: DRR activities of implementation partners</p>	<p>31/08/2024</p>
<p>Audience Type & Dissemination Specify <i>who</i> will the assessment inform and <i>how</i> you will disseminate to inform the audience</p>	<p>Audience type</p> <p>X Strategic</p> <p><input type="checkbox"/> Programmatic</p> <p><input type="checkbox"/> Operational</p>		<p>Dissemination</p> <p>X General Product Mailing (e.g. mail to NGO consortium; HCT participants; Donors)</p> <p>X Cluster Mailing (Livelihoods, Shelter, Protection, Accountability to Affected People (AFP), and Water, Sanitation and Hygiene (WASH))</p> <p>X Presentation of findings (e.g. at Information Management Working Group (IMWG) and Refugee Coordination Forum (RCF))</p> <p>X Website Dissemination (Relief Web & IMPACT Resource Centre)</p> <p>X Distribution to relevant ministries (e.g., agriculture, environment), General Inspectorate for Emergency Situations (IGSU), and local authorities</p>
<p>Stakeholder mapping <i>Has a detailed stakeholder mapping been conducted during research design to identify all actors that could contribute to and/or benefit from the research?</i></p>	<p>X</p>	<p>Yes</p>	<p><input type="checkbox"/> No</p>
<p>General Objective</p>	<p>To better understand the climate-related hazards and climate variabilities in local community and identify the community-based coping strategies to inform humanitarian and development actors implementing climate-related programmes as well as advocate for localized climate adaptation action.</p>		
<p>Specific Objective(s)</p>	<ul style="list-style-type: none"> • Analyze climate-related hazards and climate variability patterns in the Căușeni area using long-term remote sensing observation • Analyze climate-related hazard impacts on the community using hazard exposure mapping and zooming into the recent shocks (e.g.: drought events in 2022) • Understand vulnerabilities of the refugee and host communities to such hazards, including existing coping mechanisms and opportunities to mitigate climate-related risks using ABA KIs 		
<p>Research Questions</p>	<ol style="list-style-type: none"> 1. What are the climate-related hazards and how do they vary across the raion? Has climate change increased their frequency or intensity? 2. What impacts have these hazards had on communities, is there variability across the raion, and which recent events have had an impact on communes and communities? 3. What are the vulnerabilities of the refugee and host communities, and what are the unique vulnerabilities per community and household? What coping strategies and 		

	mechanisms exist, what are emergency preparedness strategies, and how are they impacted by climate-related hazards?		
Geographic Coverage	Căușeni raion with specific attention to 4 settlements in Căușeni, including: one urban: Căușeni City and three rural: Chircăiești, Pervomaisc & Ucraina		
Secondary data sources	See Annex 1.		
Population(s)	<input type="checkbox"/>	IDPs in camp	<input type="checkbox"/>
<i>Select all that apply</i>	<input type="checkbox"/>	IDPs in host communities	<input type="checkbox"/>
	<input type="checkbox"/>	Refugees in camp	<input type="checkbox"/>
	X	Refugees in host communities	<input type="checkbox"/>
	X	Host communities	<input type="checkbox"/>
Stratification <i>Select type(s) and enter number of strata</i>	X	Geographical #:2 Urban: Căușeni City Rural: Chircăiești, Pervomaisc & Ucraina Population size per strata is known? X Yes <input type="checkbox"/> No	X Group #:2 1. Refugee families living outside of Refugee Accommodation Centres (RACs) 2. Host community Population size per strata is known? 1. <input type="checkbox"/> Yes X No ¹ 2. X Yes <input type="checkbox"/> No
			<input type="checkbox"/>
			<i>[Other Specify] #:</i> _ _ Population size per strata is known? <input type="checkbox"/> Yes <input type="checkbox"/> No
Data collection tool(s)	X	Structured (Quantitative)	<input type="checkbox"/>
			Semi-structured (Qualitative)
	Sampling method		Data collection method
Structured data collection tool # 1 <i>Structured tool to assess emergency shelters (including a structured KI component)</i>	<input checked="" type="checkbox"/> Purposive <input type="checkbox"/> Probability / Simple random <input type="checkbox"/> Probability / Stratified simple random <input type="checkbox"/> Probability / Cluster sampling <input type="checkbox"/> Probability / Stratified cluster sampling <input type="checkbox"/> Snowballing		<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 #):_ 7 _ _ _ _ <input checked="" type="checkbox"/> Direct observations (Target #): 7 <input type="checkbox"/> [Other, Specify] (Target #):
Structured data collection tool # 2 <i>Processed datasets publicly available for download</i>	<input type="checkbox"/> Purposive <input type="checkbox"/> Probability / Simple random <input 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 type="checkbox"/> Individual interview (Target #):_ _ _ _ _ <input type="checkbox"/> Direct observations (Target #):_ _ _ _ _ <input checked="" type="checkbox"/> [Other, Specify] (Target #):_ Remotely-sensed imagery, no population target
Target level of precision if probability sampling	N/A		N/A
	Gender		Age

¹ For the refugee population, only estimates are available.

Disaggregation by gender and age <i>Are you planning to conduct sex/age disaggregated analysis?</i>	<input checked="" type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	Yes		
	<input type="checkbox"/>	No	<input type="checkbox"/>	No		
Data management platform(s)	<input checked="" type="checkbox"/>	IMPACT	<input type="checkbox"/>	UNHCR		
	<input type="checkbox"/>	[Other, Specify]				
Expected output type(s)	<input type="checkbox"/>	Situation overview #:	<input checked="" type="checkbox"/>	Report #: 1__	<input type="checkbox"/>	Profile #: __
	<input type="checkbox"/>	Presentation (Preliminary findings) #: __	<input checked="" type="checkbox"/>	Presentation (Final) #: 1	<input type="checkbox"/>	Factsheet #: __
	<input type="checkbox"/>	Interactive dashboard #:_	<input type="checkbox"/>	Web map #: __	<input checked="" type="checkbox"/>	Map #: 15
	<input type="checkbox"/>	[Other, Specify] #: __				
Access	<input checked="" type="checkbox"/>	Public (available on REACH resource centre and other humanitarian platforms)				
	<input type="checkbox"/>	Restricted (bilateral dissemination only upon agreed dissemination list, no publication on REACH or other platforms)				
Visibility <i>Specify which logos should be on outputs</i>	REACH					
	Donor: USAID BHA					
	Coordination Framework: TBC					
	Partners: n/a					

2. Rationale

2.1 Background

The Republic of Moldova ranks in the top ten countries in the world when it comes to the highest proportion of people affected by natural hazards, which are exacerbated by the recent severe droughts as well as threatened by ongoing climate change.^{2,3} Given that agriculture constitutes a significant portion of the economic output of Căușeni,⁴ the possible loss and damage to this sector, caused by natural hazards, has the potential to have a disproportionate impact on the economic wellbeing of the entire raion. Indeed, this is exemplified by the fact that, across Moldova, about 90 percent of crop production in the country is rainfed, rendering the sector highly susceptible to climate variability.⁵ Certainly, the fallout from drought in 2020 is indicative of the extent of loss which can occur due to challenging climatic conditions; in this case, drought was reported to have compromised yields of sunflowers and corn in Central and Southern Moldova by 80% and 100% respectively.⁶ In a wider country context, as the conflict in Ukraine is at risk of transitioning into a protracted crisis,⁷ humanitarian actors, much like development actors, are likewise being obliged to reconsider present strategies in Moldova in response to changing circumstances. Here, the new humanitarian focus on the creation of longer-term, durable solutions which can facilitate sustainable management of the refugee crisis resonates with the logic of the area-based risk assessment (ABRA) which involves collaboration with local-crisis responders and service providers to ensure a participatory approach to longer-term humanitarian interventions.⁸

² FAO, Comprehensive Analysis of the Disaster Risk Reduction System for the Agriculture Sector in the Republic of Moldova, Budapest, 2023, vii.

³ The World Bank, Moldova Special Focus Note: Moldova's Vulnerability to Natural Disasters and Climate Risks, 2021.

⁹ Republica Moldova Consiliul Raional Căușeni, Local Economic Development Plan 2019-2021, consulted 19/03/2024.

¹⁰ FAO, Comprehensive Analysis of the Disaster Risk Reduction System, 7.

¹¹ *Ibid.*, 8.

¹² Lizz Harrison, "Ukraine Humanitarian Crisis – 2 Years On", Reliefweb, consulted: 04/04/2024

The conflict in Ukraine, which escalated in February 2022, has resulted in the mass displacement of people internally and across international borders.⁹ As of 18 June 2024, a total of 6,554 million refugees have left Ukraine and have entered into neighbouring countries, including Moldova.¹⁰ According to the Government of Moldova, almost 120,472 Ukrainian nationals and 9,891 third-country nationals have settled in the country as of 18 June 2024.¹¹ 84% of this figure are women and children, with women representing 38% of the displaced and children representing 46% of the displaced.¹² Estimations made by the REACH Moldova team further indicate that around 361 refugees have settled in the Căușeni raion.¹³ Refugees are also more vulnerable to the effects of disasters, as they are less likely to have a local network to rely on, may lack language skills to understand emergency directions or warnings, and may have fewer resources which to cope with long-term effects of climate change.

2.2 Intended impact

The ABRA is intended to compile and analyse information on major hazard risks in the target area (Căușeni raion), population hazard exposure, and vulnerability. The ABRA will provide a comprehensive picture of the risks of natural hazards that the area is prone to, the population's exposure and vulnerability to them, and the exposure to the most relevant hazards to inform preparedness and risk mitigation planning by national and local authorities, communities, and international/development organizations. These results will help to a) expand the development of a strong body of evidence on hazard and disaster risk at a local scale and its impact which can then be used to inform planning, policy-making, legislation, and investment and b) focus on strengthening community and civil society engagement and preparedness to risks.

Furthermore, given the accented focus on sustainable and resilient development, this assessment will also appraise the extent to which both refugees and host communities are exposed to natural hazards. Food and environmental security, which encompass access to water, electricity, heating, and foodstuffs, was seen to be positively correlated to the attitudes of Moldovans towards Ukrainian refugees.¹⁴ With the significant exposure of Moldova to a variety of natural hazards, including drought and flood, an understanding of the capacities and gaps of local authorities to reduce and manage the consequences of disasters can direct resources more effectively.¹⁵ As previously stated, Căușeni can be characterised by its high dependence on climate-sensitive economic activities, predominantly agriculture.¹⁶ Here, there is minimal understanding of how this industry, as well as the broader raion, is being prepared for increasingly volatile natural disasters.¹⁷ As such, the ABRA will use household-level data gathered in the Area-Based Assessment Căușeni to inform appropriate and effective disaster-risk reduction strategies for diverse stakeholders, including local authorities and host community-members, across Căușeni raion.

Methodology overview

The ABRA is predominantly data-driven: it uses secondary data from online sources and the approach is quantitative. Data sources are remotely-sensed images and GIS datasets. However, data from secondary sources, such as the Multi-Sector Needs Assessment (MSNA) and the ABA that is done concurrently support the

⁹ United Nations, "Ukraine Crisis: Protecting civilians 'Priority Number One', Guterres releases \$20M for humanitarian support", consulted 01/03/2024.

¹⁰ UNHCR, [Operational Data Portal – Ukraine Refugee Situation](#), consulted 18/06/2024.

¹¹ UNHCR, [Refugee Coordination Forum, Daily Trends Dashboard - Republic of Moldova](#), consulted 18/06/2024.

¹² *Ibid.*

¹³ The estimated number of refugees in Căușeni was calculated by the averaging of several figures which measured refugee numbers in the raion at settlement level. The average was derived based on figures from the following sources: the refugee population estimate of the Information Working Group (IMWG) November 2023; REACH's Area Monitoring (AM) from November/December 2023; and data from the Căușeni social assistance from January 2024.

¹⁴ WFP, [Social Cohesion and Food Security](#), December 2023, consulted 11/03/2024.

¹⁵ FAO, [Comprehensive Analysis of the Disaster Risk Reduction System for the Agriculture Sector in the Republic of Moldova](#), Budapest, 2023.

¹⁶ Căușeni Town, [Local Economic Development Plan 2019-2021](#).

¹⁷ European Environment Agency, [Extreme Weather: Floods, Droughts, and Heatwaves](#), October 2023, consulted: 19/03/2024.

vulnerability portion of the research, providing time-relevant data for analysis. A more detailed methodology for hazards can be found in **Table 3**.

The ABRA aims to have a **participative component**, as humanitarian actors and local authorities (e.g.: raionul council, Moldovagaz, Î.M. Apă-Canal Căușeni) will be consulted in the research design process, to ensure the informativeness of the findings and their relevancy in the local context. The participatory component involves feedback that was gathered in the research design phase on the planned methodology and research questions, and the findings of the assessment will be presented and discussed with involved partners, along with a distribution of physical copies of the report.

A participatory workshop is also

planned for donors, partners, and local authorities.

Key steps in the ABRA:

1. **Engagement with local authorities and the humanitarian actors in the assessed area:** Humanitarian actors and local authorities will be consulted in the research-design process, to ensure the informativeness of the findings and their relevancy in the local context.
2. **Secondary data review:** Secondary data, such as previous environmental assessments, reports on risks and natural hazards, local profiles such as the MCR2030 in Căușeni, weather and air quality reports, local energy resources, and water processing will be part of the ABRA where available and will be utilized to understand the current natural hazards situation in Căușeni raion. Remote sensing, including satellite-driven long-term precipitation and temperature datasets, will also be used, which will help to understand better the climate change trends and climate change projections at a localized level.
3. **Vulnerability assessments** will use primary data collected in the Area-Based Assessment of the same raion, collected in 2024.
4. **Hazards identification, risk and vulnerability indices:** Climate-related hazards relevant to Căușeni will be identified, along with indices that will be developed to rank areas in terms of “high” and “low” risks. Indices for vulnerability within the population will be identified and developed with regard to relevant demographic variables.
5. **Emergency shelters assessment:** On-site visits to formal (IGSU) and informal (community-identified) emergency shelters to evaluate the general accessibility and location of the shelter, involving local authorities and site managers where available.
6. **Data processing:** The remotely-sensed data will be processed to represent the spatial distribution of the natural hazard to determine its risk and population exposure to these climate-related hazards.
7. **Report production:** Analysed data will be assembled in a report to contextualize and explain the hazard, risk, and vulnerability components of the study.

3.1 Population of interest

The population of interest for this assessment comprises both refugee households, living in the community and outside of RACs,¹⁸ and households belonging to the host population of Căușeni raion. As of March 2024, there was an estimated number of 361 refugees living in the community in Căușeni, according to figures obtained from

¹⁸ As of 21/06/2024, there are 21 refugees living in a RAC in Căușeni raion, according to implementing partners.

several different sources.¹⁹ The total host population figures stand at 63,905 individuals, according to the data on usual resident population from the National Bureau of Statistics in 2023.²⁰

The assessment will particularly focus on four settlements within Căușeni raion: one urban and three rural, corresponding to the locations selected for the Area-Based Assessment (ABA) that IMPACT has recently conducted.²¹ For the urban area, the largest settlement in the raion was chosen: Căușeni city, both due to it being the location hosting the largest share of the refugee population in the raion, but also due a number of other factors, listed below. For the rural areas, three village settlements, Chircăiești, Pervomaisc, and Ucrainca, were selected according to a similar logic. These areas were assessed with Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) in the of the Căușeni raion ABA, and data from these findings are used in the ABRA.

Firstly, the selection of settlements sought to incorporate broad geographical coverage into the assessment (see *Map 1*). Secondly, increased exposure to climate related shocks and hazards was taken into account, through a consideration of incidence of wildfires, as indicated by satellite-driven data from Fire Information for Resource Management System (FIRMS), as well as through a preliminary consultation of mapping of hazards with local authorities who indicated the localities that were most affected by drought, hailstorms, and flooding. Thirdly, data on economic vulnerability and water, sanitation, and hygiene (WASH) were considered in the selection of these locations.²² Lastly, the presence of refugees in Căușeni city validated its inclusion in these assessments. While the numbers of refugees were relatively low in the city, there were extremely low numbers of refugees present in rural localities across the raion, and this issue was persistent throughout the raion. Therefore, the settlements assessed represented the highest numbers of refugees per settlement in the raion.

In the Căușeni ABA quantitative survey for the refugee and host communities, the household was the main unit of measurement, with some education, healthcare and employment indicators at individual level. These findings are used in calculations of vulnerability including lack of coping capacity, and are generalized to the household or community level (see **Annex 2**).

¹⁹ The estimated number of refugees in Căușeni was calculated by the averaging of several figures which measured refugee numbers in the raion. The average was derived from the following figures: the Information Working Group (IMWG) counted 560 in November 2023; area monitoring (AM) counted 300 in November 2023; Căușeni social assistance counted 301 in January 2024; and field-team assessments in the raion estimated 284 refugees in January 2024. This number was used in the Area-Based Assessment of the same area, and cannot be updated to reflect changes post-data collection.

²⁰ Bureau of Statistics of the Republic of Moldova, [Statistical Databank](#), consulted: 21/06/2024.

²¹ For more details about the Area-Based Assessment in Causeni, please consult the [Terms of Reference](#) of the assessment.

²² See: participatory mapping exercise on pg.7

Map 1. Căușeni Raion, with the assessed settlements highlighted



3.2 Secondary data review

See *Annex 1*.

3.3 Secondary Data Collection

Identifying relevant climatic and regional hazards to develop an exposure/risk matrix:

The first portion of the research will be to determine which hazards exist in the region and obtain data to model the spatial distribution of the hazard, along with a relative comparison. This data is remotely-sensed and preprocessed by either the National Aeronautics and Space Administration (NASA) or the European Space Agency (ESA). A complete list of consulted datasets is available in *Annex 1*.

The collection and analysis will be done in three steps.

Consultations with previous ABRA publications and relevant current research:

- Relevant climatic hazards will be identified and methodology will be developed to create an index from “high” to “low”. Each hazard will be investigated independently, and used in a later natural hazard index to determine which hazards are most relevant to each community. This data is represented in *Annex 1, Table 2*.

Information request from raion:

- To determine energy usage in gas and electricity per commune per year, a request will be sent to relevant bodies, such as local authorities and utilities companies. Utilities companies will be asked for energy

usage at the settlement level to compare total usage over the last two to three years. This will be used to develop lack of coping capacity indices and are relevant to ABA indicators of interruptions to energy and water. See *Annex 1* for a list of indicators.

- Local authorities may provide information such as DRR strategies in place, confirmation on locations of emergency shelters and emergency services, or important local legislature.

Data analysis and mapping:

- From the analysis of the specific information from local authorities, utilities companies, and remotely-sensed datasets, indicators and data important for research will be determined for hazards:
 - o Regionally-relevant natural hazards (e.g.: heat waves, earthquakes, deforestation, flooding, air pollution, etc.)
 - o Establishment of normative range for risks per year to understand the severity of each risk (e.g.: what is the standard range of natural phenomena, and whether the current year fits within the range), normalization of normative ranges for comparison (e.g.: 0 representing the lowest severity, 100 representing the highest)

These indices and resulting information will be used to establish the relative exposure of each hazard, the exposure of selected communities, and the risk that they represent to those communities.

Furthermore, recommendations for action will be proposed within guidelines [of Decision No 1313/2013/EU of the European Parliament](#), outlining responsible legal bodies and referencing relevant legislation, which is in line with IGSU analysis and reporting standards for integration into upcoming DRR strategy. As Moldova currently holds EU candidacy ([Republic of Moldova - Consilium \(europa.eu\)](#)), developing risk assessments within the Sendai Framework for Disaster Risk Reduction and adhering to EU reporting protocols add support to Moldova's move to EU membership ([Bilateral meeting of the IGSU leadership with the Head of the UN DRR Regional Office for Europe and Central Asia | General Inspectorate for Emergency Situations \(dse.md\)](#), internal meeting).

3.4 Primary Data Collection

Evaluating the status of emergency shelters identified by Inspectoratul General pentru Situații de Urgență:

Using the officially-published [map](#) of “adaptive protection shelters”, sites of these emergency shelters will be identified in communities of interest. Informal sites identified in focus group discussions (FGDs) in the Area-Based Assessment in Căușeni raion will be assessed where possible and permission is given.

Consultations with local authorities and facilities managers:

- Contact will be made with local authorities and facilities managers to discuss the possibility of access for evaluating the interior and exterior conditions (e.g.: if the shelter is accessible with or without a key, if the shelter is dry inside, etc.) of the identified emergency shelters and their potential capacity.
- Conditions include exterior access to the shelter, modality of access to the interior of the shelter, dangerous objects nearby, adaptive/accessible access for persons with disabilities, relevant emergency supplies within the shelter available for use, and other relevant observations that may occur on-site.

Site visits and survey:

- If granted access, enumerators will conduct a site visit and use a structured tool for direct observation in sites with no facilities managers and a combined structured key-informant survey and structured direct

observation tool in sites with facilities managers present, to be used dependent on availability of facilities managers.

Tool: Direct observation tool. The interview will be conducted with a KoBo survey intended to be used with or without a facilities manager present (e.g.: the enumerator can ask the facilities manager what supplies are present in the shelter or can visually confirm on their own).

Data collection was carried out in July of 2024, dependent on permission for access to shelters from authorities and facilities managers.

Key definitions:

- *Local actor:* local authorities and organisation, group or institution, with a permanent presence in the community or raion, which aims to respond to the crisis-related needs of the population (or a group there within);
- *Emergency services:* emergency healthcare facilities, fire department facilities, state emergency services, etc., Local authorities (communes): elected and other bodies of territorial communities empowered to resolve issues of local importance (village, settlement, city council);
- *Raion:* an association of all citizens of a first-level administrative-territorial unit (including villages, settlements, cities, and neighborhoods within a city) clearly defined in space which is the primary subject of local self-governance
- *Commune:* an association of all citizens of a second-level administrative-territorial unit (including villages, settlements, cities, and neighborhoods within a city) clearly defined in space which is the primary subject of local self-governance
- *Community:* an association of all citizens of a third-level administrative-territorial unit (villages or cities) clearly defined in a contiguous developed space

3.5 Data Processing & Analysis

The secondary data for the ABRA will be processed in ArcGIS Pro, Google Earth Engine, and Microsoft Excel. The remotely-sensed datasets used are global datasets that are pre-cleaned and pre-processed and do not require any additional cleaning before analysis. The data adheres to the standards set by the [IMPACT Remote Sensing Guidance and Related Resources](#). As there is no identifiable information in these datasets, they do not require processing for PII.

All data cleaning and analysis will be reviewed by the IMPACT HQ Research Design and Data (RDD) Unit before the output production.

Geospatial data will be processed and analysed within each section of the Area-Based Risk Assessment (see **Table 3**). It must be noted that these are the proposed methods, and they may need to be adjusted based on available techniques and the suitability of different methods.

As a result of data analysis, a multi-hazard ranking list of communes with the level of summarised multi-hazard risk (from minimum 0 to 100 points in maximum) was developed. Thus, the communes most in need of assistance in the development of climate-related risk mitigation strategy development are to be determined.

Table 3: Summary of data processing and analysis for hazard determination and exposure

Section name	Process / Analysis
Population density (exposed population)	Calculate from OSM buildings layer or Microsoft building footprint where appropriate – using OCHA settlement population estimates and available census data, extract areas of settlements that are residential.
Exposure (and risk) to presumed vegetation wildfires	<p>Hazard: FIRMS dataset identifying presumed vegetation (PV) fires between 2012-2023 will be aggregated into communes, and then the mean frequency and intensity of fires per month will be calculated for each commune, focusing on fires that exceed the threshold for “stable burning events”. Fires will also be disaggregated by time of day and landcover type. Comparisons will be made for changes over the last 1, 5, and 10 years in hotspot locations. Establishment of average number of fires per year and average intensity (normative ranges) to investigate trends over time.</p> <p>Exposure: The mean frequency and intensity of fires per month per commune.</p> <p>Risk: A risk index using available vulnerability data determined from the ABA data collection (e.g.: households with IDPs, households with three or more children, disabled head of household, etc.) and distance from settlements (580m).</p>
Drought risk	<p>Hazard: Calculate drought intensity based on accumulated vegetation condition index in spring and summer over a long time period (calculated from MODIS NDVI or Sentinel-2 NDVI data, with non-agricultural land masked out). Establishment of VCI ranges per year over the past 5 years (normative range) to investigate trends over time. Focus on climate change with mapping long-term rainfall anomalies (increased or decreased precipitation patterns) with data from the State Hydrometeorological Service and Precipitation Estimation From Remotely Sensed Information Using Artificial Neural Networks-Climate Data Record (PERSIANN-CDR).</p> <p>Exposure: The mean VCI on agricultural lands per commune, and communes with overall decreased precipitation patterns.</p> <p>Risk: Calculated by percentage of HHs reliant on agriculture as a primary source of income.</p>
Erosion	<p>Hazard: Calculate potential topsoil erosion loss with the use of the Revised Universal Soil Loss Equation (RUSLE), using the global R dataset, ESA Worldcover 2021, and Shuttle Radar Topography Mission (SRTM).</p> <p>Exposure: The mean potential topsoil erosion loss on agricultural lands per commune.</p>

	<p>Risk: Determined by percentage of HHs reliant on agriculture for their primary income.</p>
<p>Heat wave risk</p>	<p>Hazard: Extract periods of extremely high temperatures that have occurred recently. For the map, calculate zonal statistics for land surface temperatures for April-October 2001-2023: minimum, maximum, mean, standard deviation. Calculate mean number of days per season with temperatures above (mean -1 standard deviation), per pixel. Calculations carried out in Google Earth Engine with MODIS LST product. Establishment of number of days per year over the threshold (normative range) for trend comparison.</p> <p>Exposure: The mean LST in the settlement, percentage of HHs that reported interruptions to water.</p> <p>Risk: The exposure index is multiplied by percentage of population with vulnerabilities (e.g.: persons under 5 years of age, persons over 60 years of age).</p>
<p>Cold wave risk</p>	<p>Hazard: Extract periods of extremely low temperatures that have occurred recently. For the map, calculate zonal statistics for land surface temperatures for December-February 2001-2023: minimum, maximum, mean, standard deviation. Calculate mean number of days per season with temperatures below (mean -1 standard deviation), per pixel. Calculations carried out in Google Earth Engine with MODIS LST product. Establishment of number of days per year over the threshold (normative range) for trend comparison.</p> <p>Exposure: The mean LST in the settlement, percentage of HHs that reported interruptions to energy.</p> <p>Risk: The exposure index is multiplied by percentage of population with vulnerabilities (e.g.: persons under 5 years of age, persons over 60 years of age, HHs under the minimum monthly income).</p>
<p>Flood risk</p>	<p>Hazard: This methodology will be based off of the REACH Central African Republic Flood Susceptibility and Risk. Using the weighted linear combination (WLC) a final flood susceptibility map will be produced using the ArcGIS Raster Calculator tool: Land cover, soil drainage, elevation, slope, Topographic Wetness Index (TWI), Height Above Nearest Drainage (HAND), stream density, rain duration, and rain intensity. Establishment of number of reported floods and average rainfall per year (normative ranges) for trend comparison.</p> <p>Exposure: Kilometers of roads, density of water networks, and number of buildings within the community that are highly susceptible to flood.</p>

	Risk: The final product will also display digital elevation data, infrastructure such as bridges, and vulnerable populations who may need support during an evacuation such as children, persons with disabilities, etc.
Natural multi-hazard index	Based on the analysis performed on each individual hazard, natural hazard index will be calculated. This will be derived from a normalized summary of mean risk values (0 – 100) and ranked per hazard per commune in the raion. Four hazards will be selected: fires, drought, flood, and heatwaves, as they are the most relevant to the communities in Căușeni raion.

The communes most at risk for selected hazards can be prioritized in the development of emergency response by the Natural Multi-Hazard Index. This index will identify the exposure for selected natural hazards for all communities and can be used to develop mitigation strategies that inform DRR planning by local actors.

3.6 Limitations

The primary limitation of the ABRA is the diversity and granularity of datasets. Global datasets, such as remotely-sensed imagery, may lack requisite resolution to identify and investigate climatic data, and may require supplementation with local datasets. Local datasets may also be incomplete: OpenStreetMap (OSM), which is used for transport analysis and building footprints, is not complete in Moldova, but represents the most complete public dataset and is therefore used.

Similarly, global datasets representing phenomena such as air pollution, rainfall, and other spatial phenomena may only be available at higher resolutions and fail to capture regional patterns. Where possible, this data is supplemented with local weather station data, which may not be publicly available or contain temporal gaps.

Information on population is derived from the national census, which was conducted in 2014, and is being repeated in 2024, but results will not be published before the publication of the ABRA, and therefore cannot be used. Population data is supplemented with estimates from raion-level assessments and implementing partner assessments, which may contain errors.

Data from third parties, such as electricity and gas consumption may not be available for analysis or publication, and may impact the vulnerability and lack of coping capacity assessments.

3. Key ethical considerations and related risks

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

<i>The proposed research design...</i>	<i>Yes/ No</i>	<i>Details if no (including mitigation)</i>
... Has been coordinated with relevant stakeholders to avoid unnecessary duplication of data collection efforts?	Yes	Stakeholders have been contacted and secondary data review suggests a need for this assessment.
... Respects respondents, their rights and dignity (specifically by: seeking informed consent, designing length of	Yes	Data collected is not personal and is strictly relevant to the structure itself.

survey/ discussion while being considerate of participants' time, ensuring accurate reporting of information provided)?		
... Does not expose data collectors to any risks as a direct result of participation in data collection?	Yes	If sites are deemed unsafe, data collectors will not enter.
... Does not expose respondents / their communities to any risks as a direct result of participation in data collection?	Yes	No risk is involved for respondents, as there is no personal data collected.
... Does not involve collecting information on specific topics which may be stressful and/ or re-traumatizing for research participants (both respondents and data collectors)?	Yes	Questions about the use of the shelter were considered in context of current events in Ukraine and tensions with Transnistria.
... Does not involve data collection with minors i.e. anyone less than 18 years old?	Yes	No minors are involved in data collection, and site visits are timed when no minors are present.
... Does not involve data collection with other vulnerable groups e.g. persons with disabilities, victims/ survivors of protection incidents, etc.?	Yes	Only facilities managers or local authorities are consulted, and questions are not asked about personal vulnerability.
... Follows IMPACT SOPs for management of personally identifiable information ?	Yes	No personally-identifiable information is collected and therefore does not require management.

4. Roles and responsibilities

Task Description	Responsible	Accountable	Consulted	Informed
<i>Research design</i>	Senior GIS Officer, GIS Assistant	Associate Research Manager	Data Officer ACTED DRR Focal point Africa and Europe Unit Associate Research Manager	Country coordinator
<i>Supervising data collection</i>	Senior GIS Officer, GIS Assistant	Senior GIS Officer	Associate Research Manager Africa and Europe Unit GIS CoP	Country Coordinator
<i>Data processing (checking, cleaning)</i>	Senior GIS Officer, GIS Assistant	Senior GIS Officer	GIS CoP Africa and Europe Unit	Country Coordinator
<i>Data analysis</i>	GIS Assistant	Senior GIS Officer	GIS CoP Africa and Europe Unit	Country Coordinator

<i>Output production</i>	Senior GIS Officer, GIS Assistant	Associate Research Manager	Associate Research Manager Africa and Europe Unit	Country Coordinator USAID BHA
<i>Dissemination</i>	Senior GIS Officer, GIS Assistant	Associate Research Manager	Africa and Europe Unit Communication Department	Country Coordinator
<i>Monitoring & Evaluation</i>	Senior GIS Officer, GIS Assistant	Associate Research Manager	Projects and Funding Officer Africa and Europe Unit	Country Coordinator
<i>Lessons learned</i>	Senior GIS Officer, GIS Assistant	Associate Research Manager	HQ ABRA Unit Africa and Europe Unit	Country Coordinator

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

5. Data Analysis Plan

No personal data is collected for his assessment. However, it makes use of data from the Area-Based Assessment Căușeni, and the Data Analysis Plan (DAP) for this assessment is separately published. Click [here](#) to view the ABA Căușeni DAP. For the DAP of the Emergency Shelter tool, please click [here](#).

6. Monitoring & Evaluation Plan

Drafting tips: Please complete the M&E Plan column in the table and use the corresponding Tools in the Monitoring & Evaluation matrix to implement the plan during the research cycle.

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	# 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 checked="" type="checkbox"/> Yes
	Number of individuals accessing IMPACT services/products	# 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, sending Blue, 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	# stakeholders who received the output and maps
		# 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_Feedback and Usage_Survey template	<i>Usage survey to be conducted at the end of the research cycle related to all outputs, targeting at partners to whom the outputs have been disseminated.</i>
		Perceived usefulness and influence of IMPACT outputs			
		Recommendations to strengthen IMPACT programs			
		Perceived capacity of IMPACT staff			
		Perceived quality of outputs/programs			
Number of humanitarian documents (HNO, HRP, cluster/agency strategic plans, etc.) directly informed by IMPACT products	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:

Table 1: Resources, sources, and purpose

Resource:	Source:	Purpose:
Multi-Sector Needs Assessment 2023, Republic of Moldova	REACH Initiative	Context Triangulation
Ukraine Situation - Moldova: 2024 Refugee Response Plan Moldova: Local Consultations Final Report	UNHCR	Context Triangulation
Comprehensive Analysis of the Disaster Risk Reduction System for the Agriculture Sector in the Republic of Moldova	FAO	Context Information Gaps
Natural Hazards, People's Vulnerability, and Disasters	Wisner Ben, Blaikie Piers, Cannon Terry, Davis Ian	Research Design
Peer Review Report: Republic of Moldova	European Union Civil Protection	Context Information Gaps
Sendai Framework for Disaster Risk Reduction 2015-2030	United Nations	Context Research Design
Local Economic Development Plan 2019-2021	Republica Moldova Consiliul Raional Căușeni	Context
Strategia de Dezvoltare Durabilă a Raionului Căușeni	Republica Moldova Consiliul Raional Căușeni	Context
Community-led Climate Adaption Solution Toolkit	Doh Eain	Context Research Design
2023 Participatory Assessment Report	UNHCR	Context
Environmental And Social Management Framework: Strengthening Disaster Risk Management and Climate Resilience in Moldova (ESMF)	Government of the Republic of Moldova	Context, Research Design
Copernicus Emergency Management Service – Mapping: Online Manual for Risk and Recovery Mapping	Copernicus	Research Design
Căușeni Scorecard (MCR2030)	UNDRR	Context, Research Design

Table 2: List of data sources to be utilized

Data source	Short description	Area	Available data and comment	Risk data type
HAZARD				
European Severe Weather Database	Web-portal with information about severe weather events	Europe	Meteorological data: severe wind, large hail, heavy rain, heavy, snowfall/snowstorm	Hydro-meteorological

WorldClim	Historical and future projected climate datasets	Global	Precipitation, temperature and bio-climate indicators	Hydro-meteorological
MODIS land surface temperature	LST, 2001-2020	Global	Data on historical land surface temperatures	Hydro-meteorological
FIRMS fire data	Near real-time active fire data	Global	Active fires	Environmental (wildfires)
The Sentinel-5 Precursor mission	RS	Global	Atmospheric SO ₂ , NO ₂ , Aerosol index, CO concentration	Environmental (air pollution)
Global Forest Watch	Forest cover, loss and gain	Global	Forest cover, forest loss, forest gain	Environmental (biodiversity loss, wildfires)
Copernicus global land cover	Green areas within settlements	Global	Data on green areas within settlements	Hazard/Exposure
WWF Hydrosheds	Hydrological data and maps based on Shuttle Elevation Derivatives at multiple Scales	Global	Hydrographic information for regional and global-scale, river networks, watershed boundaries, drainage directions, and flow accumulations	Hazard/Exposure
Water resources web map	Web-map with basins	European	Available borders of main river basins and subbasins	Hazard, exposure
INFORM country risk profiles	Web-portal with risk estimation on country level	Global	Ranked hazard, exposure on country level	Hazard, exposure
Moldova Digital Seismic Network	Web-portal with historical seismic activity	Moldova	Seismic activity, intensity, and date on country level	Environmental (earthquakes)
Landsat 8	RS (multispectral)	Global	Multispectral imagery (15-30 meters)	Exposure
Sentinel 2	RS (multispectral)	Global	Multispectral imagery (10-30 meters)	Exposure
Protected Planet	Web-map on protected areas	Global	Terrestrial and marine protected areas	Exposure
EXPOSURE				
ESRI land cover	Land use and land cover data	Global	10m resolution land cover raster Sentinel based)	Exposure

OSM buildings network (building type, residential areas, pop. Density proxy)	Vector layer	Global	Raw OSM	Exposure
OSM river network	Vector layer	Global	Raw OSM	Exposure
OSM road network	Vector layer	Global	Raw OSM	Exposure
GHS built environment raster (radar-based)	Global map of built- up areas	Global	Data on build-up areas	Exposure
Microsoft Building Footprints	Vector layer	Global	Building footprints	Exposure
GHS population raster	Geospatial data on population distributions, demographic	Global	Population raster, RS- based	Exposure
OCHA settlement and admin boundaries	Administrative boundaries and associated population estimate	Moldova	Administrative boundaries: country, oblasts, raion, community	Exposure
The Flash Environmental Assessment Tool 2.0	Methodology to apply spatial dimensions to chemical hazards	Global	Table of chemicals and their estimated impact	Exposure
VULNERABILITY				
National Bureau of Statistics	Complex regional statistics	Moldova	Statistic data	Economic capacity
The International Organization for Migration (IOM) 2023.	IDP estimates	Raion level data	IDP, migrant or returnee population presence in a defined administrative area of the country.	Vulnerability
Energy consumption	Moldovagaz, Premier Engery	Commune -level data	Energy use and interruption per commune over the past three years	Lack of coping capacity

Annex 2:

Indicators used in the ABA to be used in the ABRA:

Vulnerability:

- Percent of households per community with a female, disabled, or single HoH
- Percent of households per community with more than three children in the home
- Percent of households per community that have refugees in the household
- Percent of households per community that have a person with a disability or chronic illness

Lack of coping capacity:

- Percent of households per community that have a reliance on agriculture
- Percent of households per community that made less than the minimum subsistence amount per month
- Percent of households that experienced energy shortages during the winter months (Nov. 2023 to March 2024)
- Percent of households that experienced water shortages in the past 6 months
- Percent of households aware of shelters in their communities