Research Terms of Reference

Current Situation of the Water Crisis in Northeast Syria and its Humanitarian Impacts

SYR2206

Syria

April 2023
V1

REACH Informing more effective humanitarian action

1. Executive Summary

Country of intervention	Syria					
Type of Emergency	□	Natural disaster	X	Conflict	□	Other *(specify)*
Type of Crisis	□	Sudden onset	□	Slow onset	X	Protracted
Mandating Body/ Agency	REACH					
IMPACT Project Code	16AXF					
Overall Research Timeframe	01/02/2023 to 15/05/2023					
Research Timeframe	1. Pilot/ training: NA			6. Preliminary presentation: NA		
	2. Start collect data: NA			7. Outputs sent for validation: 08/05/2023		
	3. Data collected: NA			8. Outputs published: 15/05/2023		
	4. Data analysed: NA			9. Final presentation: May & June 2023		
	5. Data sent for validation: NA					
Number of assessments	X	Single assessment (one cycle)				
	□	Multi assessment (more than one cycle)				
Humanitarian milestones	**Milestone**			**Deadline**		
	□	Donor plan/strategy		_ _/_ _/_ _ _ _		
	□	Inter-cluster plan/strategy		_ _/_ _/_ _ _ _		
	X	WASH WG plan/strategy		TBD, around 06/2023		
	□	NGO platform plan/strategy		_ _/_ _/_ _ _ _		
	□	Other (Specify):		_ _/_ _/_ _ _ _		
Audience Type & Dissemination	**Audience type**			**Dissemination**		
	X Strategic			X General Product Mailing		
	X Programmatic			X Cluster Mailing (WASH, FSL)		
	□ Operational			X Presentation of findings at cluster meetings and on demand		
				X Website Dissemination (Relief Web & REACH Resource Centre)		

Detailed dissemination plan required	□	Yes	X	No
General Objective	The objective of this situation overview (SO) is to provided and updated and comprehensive understanding of the water crisis in Northeast Syria and its impacts on the humanitarian situation of host communities and internally displaced people in impacted areas. This will help to inform response actors on how the water crisis is affected needs, and which geographic areas are more heavily impacted, so as to improve selections of types and areas of interventions; furthermore, the SO may improve advocacy and fundraising efforts of response partners.			
Specific Objective(s)	1. To identify the key drivers of the water crisis, including both natural and human factors, and analyse the developments of the natural drivers over the previous year and since the onset of the water crisis. 2. To analyse the regional impacts of the water crisis on access to water for domestic and agricultural purporses, as well as on hydroelectric power, for local populations. 3. To understand the regional humanitarian impacts of the water crisis in terms of access to water, food, electricity, and households' risks of waterborne diseases, as well as providing insights into how regional trends manifest at the local (community) level.			
Research Questions	1. Which drivers of the water crisis can be identified? 2. How has the situation of key natural drivers of the water crisis developed since the previous report, and since the onset of the water crisis? 3. How has the water crisis impacted agricultural productivity? 4. How has the water crisis impacted household access to safe water, food, electricity, and their risk of waterborne diseases?			
Geographic Coverage	The area of interest is Northeast Syria, which is a unified area of influence and has been particularly strongly impacted by meteorological drought, falling groundwater levels, diminishing water levels in the Euphrates, and others.			
Secondary data sources	Sources from REACH include: • Remote sensing data • Humanitarian Situation Overview in Syria (HSOS) • Light Profiling • Joint Market Monitoring Initiative (JMMI) • HSOS Urban Household Assessment • Camps and Sites Assessment • Water Management Area-based Assessments (not yet published) External sources will be used extensively, including academic papers, reports from other humanitarian actors, and news articles.			
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]
Expected ouput type(s)	X	Situation overview #:1	□	Report #: _ _	□	Profile #: _ _
	□	Presentation (Preliminary findings) #: _ _	X	Presentation (Final) #: 1	□	Factsheet #: _ _
	□	Interactive dashboard #:_	□	Webmap #: _ _	□	Map #: _ _
Access	X	Public (available on REACH resource center and other humanitarian platforms)				
	□	Restricted (bilateral dissemination only upon agreed dissemination list, no publication on REACH or other platforms)				
Visibility	**REACH**					
	Donor: BHA					
	Coordination Framework: To be determined					
	Partners: NA					

2. Rationale

2.1 Background

Syria is a water-scarce country. In 2019, the World Bank estimated the amount of internal renewable freshwater in Syria to be 355 m^3 per capita, amongst the lowest in the world.[1] Over decades, systems have been developed to mitigate the lack of water, including building dams on the Euphrates River, and drilling boreholes in order to use the groundwater for domestic and agricultural purposes. However, many factors have come that have been diminishing access to fresh water, including the ongoing conflict, which has led to the destruction of infrastructure and loss of access to resources across lines of control, overextraction of groundwater, and climate change.[2] Currently, this situation is made more pressing by the multi-year shortfall in precipitation[3] combined with unusually low water levels in the Euphrates[4] and, for Northeast Syria specifically, the continued shut-down of Alouk water station,[5] which usually provides water to around 1 million people.[6]

[1] The World Bank (n.d.). Renewable internal freshwater resources per capita (cubic meters). https://data.worldbank.org/indicator/ER.H2O.INTR.PC?most_recent_value_desc=false [Accessed 12/03/2023]

[2] Ülker, D., Ergüven, O., Gazioğlu, C. (2018). Socio-economic impacts in a Changing Climate: Case Study Syria. International Journal of Environment and Geoinformatics 5(1), 84-93. https://doi.org/10.30897/ijegeo.406273

[3] European Commission - Copernicus Emergency Management Service (n.d.). Compare Monthly Maps. https://edo.jrc.ec.europa.eu/gdo/php/index.php?id=2075&map=spi48_blended&year=2023&month=2&do=ASC&nm=2&mr=auto&mbr=-20%2C-35%2C60%2C40&freq=1&captmode=3&minx=35&miny=32&maxx=43&maxy=38&mode=Compare
The dashboard which can be accessed through the above link shows the Standard Precipitation Index (SPI), which compares the precipitation over a selected period with the long-term average. To see Syria, the coordinates should be entered: latitudes 32° and 38° N, and longitudes 35° and 43° E.

[4] Qereman, O., Gebeily, M. (March 2023). Low water levels force halt to north Syria hydropower. Reuters. https://www.reuters.com/world/middle-east/low-water-levels-force-halt-north-syria-hydropower-2023-03-01/

[5] WASH Working Group North East Syria (n.d.). Alouk Station and Himme Reservoir – Daily Status. https://app.powerbi.com/view?r=eyJrIjoiODFlZmU2NmQtMmMzZC00MGRiLWJkYmMtZmFlOTY2MmRjMjBhIiwidCI6Ijg1Njc0NTQyLWRlNmUtNGUxZi04Nzg0LWM1NjBiNTAzMTEyMyIsImMiOjh9 [Accessed 12/03/2023]

[6] UN OCHA (April 2021). Syria: Disruption to Alouk Water Station – Flash update #1 (As of 28 April 2021). https://www.humanitarianresponse.info/en/operations/syria/document/disruption-alouk-water-station-flash-update-01?_gl=1*mg9ahj*_ga*MTQ4MDcwOTkyMi4xNjQ4OTg0NTY5*_ga_E60ZNX2F68*MTY3ODYyOTI4Ny4yMTMuMS4xNjc4NjI5NTM3LjYwLjAuMA..

REACH has reported on the ongoing water crisis in Northeast Syria twice already, once in 2021 and once in 2022.[7] The current situation overview aims to update and expand on what has been done thus far. This is considered necessary due to the lack of more recent reports in light of the evolving situation. However, it also serves as a tool for advocacy in order to draw attention to the ongoing humanitarian needs in the Northeast while the focus is currently centred on the earthquake impacts in the Northwest. This can be done using existing data from REACH, including existing remote sensing data as well as data on the humanitarian situation in communities, camps, and informal sites, detailed water area based assessments in communities, the seed security assessment, and others. Relying on this data means that the burden of data collection is reduced and the useability of existing data is increased by setting it into context and conducting further analysis. It will be supplemented as necessary with other information to fill gaps, notably concerning public health.

2.2 Intended impact

The situation overview (SO) intends to raise awareness for the ongoing water crisis and the humanitarian impacts it is having to improve humanitarian planning around the crisis as well as encouraging funding for needs in NES. It also intends to update and improve the understanding of response actors regarding the current situation in NES. As such, the key audience include (but is not exclusive to) WASH and FSL actors who may require further information on the types of needs and geospatial distribution of needs resulting from the crisis; response actors who require further information for advocacy and fundraising; and donors who may be able to finance interventions aiming to mitigate the water crisis. The language and structure should also be such that the SO is open to any audience trying to gain an understanding of the water crisis.

3. Methodology

3.1 Methodology overview

This situation overview is based on data previously collected by REACH Syria. As such, the methodology focuses on analysis and interpretation rather than on data collection.

The situation overview looks at both the drivers and the impacts of the water crisis.

To capture climatic drivers, key indicators from remote sensing analysis will be used. These include:

- The Standard Precipitation Index, which relates precipitation levels to their long-term average. This index will be used to indicate the extent of the meteorological drought, with maps showing the geospatial distribution of shortfalls. Secondary literature also indicates a drying trend (trend of decreasing rainfall) over the previous decades;[8,9] these findings could be replicated for NES, if time allows.
- Changes to Total Groundwater Storage over time indicate both a lack of recharge of groundwater (mainly through rainfall) and overextraction. As such, it helps to understand both the hydrological (water resources) and socio-economic (excess demand) dimensions of

[7] REACH (June 2021). Briefing Note: Humanitarian Situation Overview in Northeast Syria. https://www.impact-repository.org/document/reach/b2f66abb/REACH_SYR_Briefing-Note_Humanitarian-Situation-Overview-in-Northeast-Syria_June-2021.pdf
REACH (April 2022). Briefing Note: Humanitarian Impact of Water Shortages in Northeast Syria. https://www.impact-repository.org/document/reach/e6cdd794/REACH_SYR-Humanitarian-Impact-of-Water-Shortages-in-NES-April-2022-1.pdf
[8] Kelley, C. P., Mohtadi, S., Cane, M. A., Seager, R., Kushnir, Y. (2015). Climate change in the Fertile Crescent and implications of the recent Syrian drought. Proceedings of the national Academy of Sciences, 112(11), 3241-3246. https://doi.org/10.1073/pnas.1421533112
[9] Bozkurt, D., & Sen, O. L. (2013). Climate change impacts in the Euphrates–Tigris Basin based on different model and scenario simulations. Journal of hydrology, 480, 149-161. https://doi.org/10.1016/j.jhydrol.2012.12.021

the drought. This can be complemented by the borehole assessment conducted by REACH, which provides measurements of depth of groundwater.

- Surface Water Extent is a proxy indicator for water volume in surface water. This is particularly important for the Euphrates river, which provides substantial amounts of water for domestic and agricultural purposes to Syria, in addition to dams on the river providing a key source of electricity for NES.
- Additional indicators can be useful to understanding the drought dynamics more completely. Most importantly, this includes temperature which plays a large role in evaporation of water and heat stress of plants; and soil moisture, which is only partially explained by rainfall and temperature (additional factors include water storage capacity of the soil, type of vegetation, river flow, irrigation, and others) but has a large importance for agriculture. Time permitting, these may be included in the analysis.

For non-climatic drivers, secondary data sources must be used (see "3.3 Secondary data review" below). Non-climatic drivers considered here include the overextraction of ground- and surface water, the shut-down of Alouk water station, and the impact of the electricity crisis on water infrastructure.

In terms of the impacts of the water crisis, this will focus on humanitarian needs at the regional and local levels. To this end, the following data sources are uses:

At the regional level:

- Humanitarian Situation Overview in Syria (HSOS) provides key informant information on living conditions, access to services, and priority needs at the community level with very high coverage across the area of interest. The focus is on out-of-camp populations and as such excludes parts of the internally displaced population (IDPs).
- The Light Profiling provides similar information to HSOS, though with a shorter questionnaire. It covers the situation of IDPs in collective centers and informal settlements, and as such complements HSOS.
- Joint Market Monitoring Initiative (JMMI) provides data on prices of goods in markets, which helps to track any impacts that the drought may have had on market prices.
- Remote sensing data on agriculture, in particular data on the Normalized Difference Vegetation Index (NDVI) which indicates vegetation health, and cropland loss maps which capture which agricultural lands have are experiencing extremely low levels of vegetation.

At the local level:

- HSOS Urban Household Assessment provides representative household-level data from Al-Hasakeh and Ar-Raqqa cities. It will be used to provide further information on the urban water situation, though acknowledging that data is only available from 2022 onwards, so that the impact of the drought will not be captured.
- The Camps and Sites Assessment provides data the humanitarian situation in various formal camps in NES. As there are few camps in NES (12 in total, including 2 without formal camp management, of which REACH assessed 11) and the situation between them can differ substantially, data is generally treated on a camp-by-camp basis as opposed to being aggregated. This data includes key informant information and representative household-level data, which will be used to better understand the situation of households in formal camps.
- The Water Management Area-based Assessments (not public) were conducted in 3 communities in NES, looking at the drivers of water insecurity and their impacts on local communities. They are of particular interest due to their much higher level of detail on the water situation, including

operational data derived from participatory data collection. These will be used as case studies, to provide an indication of the local impacts of the regional water crisis.

The situation overview will include a section on "ways forward". This will include expert opinions on ways to cope with the water crisis, any relevant guidance documents, and/ or examples of humanitarian interventions successfully implemented to cope with droughts and water crises. The aim of this is not to provide a complete list of recommendations, but rather to emphasize that availability of existing solutions and the necessity to take drought and water shortages into account during humanitarian planning.

3.2 Population of interest

This situation overview focuses on the area of influence NES. This includes most of Al-Hasakeh governorate as well as parts of Deir-ez-Zor, Ar-Raqqa, and Aleppo governorates. Within this area, the report seeks to include all populations, including host community members and internally displaced people (IDPs). However, considering the focus on agriculture, which is necessary due to its large importance for local food security and the economy of NES, as well as the relatively lower proportion of IDPs in camps,[10] the situation overview will be skewed towards out-of-camp populations.

3.3 Secondary data review

Secondary data will be used extensively to set findings from REACH's assessments into context, triangulate them, and provide information not covered by REACH's work. As such, an intensive literature review was conducted prior to drafting the Terms of Reference. Notably included are:

1. **Academic Literature**
   Open-access papers provide insights into long-term developments in the region and deeper insights into historical events. As such, two key topics were considered when looking at academic literature. These are the ongoing and anticipated impacts of climate change on Syria and the Middle East,[8,9,11,12] as well as analyses of past droughts and the origins of societal vulnerability to those droughts.[13,14,15,16,17] Noteworthy other topics include the

[10] The Humanitarian Needs Assessment Programme reported for May 2022 that 4% of the population in NES were IDPs in camps. Humanitarian Needs Assessment Programme (June 2022). Population Assessment.
[11] Baba, A., Karem, R. A., & Yazdani, H. (2021). Groundwater resources and quality in Syria. Groundwater for Sustainable Development, 14, 100617. https://doi.org/10.1016/j.gsd.2021.100617
[12] Adamo, N., Al-Ansari, N., Sissakian, V., Laue, J., & Knutsson, S. (2018). The future of the Tigris and Euphrates water resources in view of climate change. Journal of Earth Sciences and Geotechnical Engineering, 8(3), 59-74. https://www.diva-portal.org/smash/get/diva2:1199706/FULLTEXT01.pdf
[13] Chen, T., Guo, R., Yan, Q., Chen, X., Zhou, S., Liang, C., ... & Dolman, H. (2022). Land management contributes significantly to observed vegetation browning in Syria during 2001–2018. Biogeosciences, 19(5), 1515-1525. https://bg.copernicus.org/articles/19/1515/2022/
[14] Eklund, L., Theisen, O. M., Baumann, M., Forø Tollefsen, A., Kuemmerle, T., & Østergaard Nielsen, J. (2022). Societal drought vulnerability and the Syrian climate-conflict nexus are better explained by agriculture than meteorology. Communications Earth & Environment, 3(1), 85. https://doi.org/10.1038/s43247-022-00405-w
[15] Tabor, R., Almhawish, N., Aladhan, I., Tarnas, M., Sullivan, R., Karah, N., Zeitoun, M., Ratnayake, R., Abbara, A. (February 2023). Disruption to water supply and waterborne communicable diseases in northeast Syria: a spatiotemporal analysis. Conflict and Health 17(4). https://doi.org/10.1186/s13031-023-00502-3
[16] Al-Riffai, P., Breisinger, C., Verner, D., & Zhu, T. (2012). Droughts in Syria: an assessment of impacts and options for improving the resilience of the poor. Quarterly Journal of International Agriculture, 51(892-2016-65162), 21-49. http://dx.doi.org/10.22004/ag.econ.155471
[17] Ülker, D., Ergüven, O., & Gazioğlu, C. (2018). Socio-economic impacts in a changing climate: Case study Syria. International Journal of Environment and Geoinformatics, 5(1), 84-93. https://doi.org/10.30897/ijegeo.406273

linkages between waterborne diseases and drought,[18,19] as well as various other health outcomes.

2. **Humanitarian Reports**
   The water crisis in Syria previously received ample attention from humanitarian actors, so that a range of high-quality reports were published.[20,21,22,23,24] These are included as they provide differing perspectives on the crisis (e.g. an assessment by Mercy Corps and Triangle considered the gendered impacts of drought in the region[25]) and additional information. Furthermore, they serve to ensure that this report avoids unnecessary duplication.
3. **News Articles**
   The news provides information on the situation in Syria on an ongoing basis, and as such is particularly useful when looking at the most recent situation. Furthermore, it fills some gaps in political analysis that aren't generally captured by humanitarian or academic reports, which may nonetheless provide important context. However, in the given context, articles may be heavily biased or otherwise of mixed reliability. Therefore, information will generally only be used where other sources can be found (either confirmation by REACH data, by humanitarian partners, or by various other media outlets which tend to report with different perspectives on the crisis). Outlets that are more heavily relied upon include Reuters, Al-Jazeera, and Al-Monitor, which are international media outlets, and Enab Baladi, an independent Syrian non-profit media outlet.

3.4 Primary Data Collection

NA – the situation overview focuses on available data.

3.5 Data Processing & Analysis

This situation overview relies on available data. However, some additional analysis may be conducted to support in understanding links between various developments. Specifically, further analysis of remote sensing data will be done. An example would be to regress vegetation conditions on rainfall and temperature in order to better understand to what extent current climate factors are affecting agriculture.

[18] Mosley, L. M. (2015). Drought impacts on the water quality of freshwater systems; review and integration. Earth-Science Reviews, 140, 203-214. https://doi.org/10.1186/s12889-022-13701-z

[19] Guzman Herrador, B. R., De Blasio, B. F., MacDonald, E., Nichols, G., Sudre, B., Vold, L., ... & Nygård, K. (2015). Analytical studies assessing the association between extreme precipitation or temperature and drinking water-related waterborne infections: a review. Environmental Health, 14, 1-12. https://doi.org/10.1186/s12940-015-0014-y

[20] Mercy Corps – Humanitarian Access Team (2021). Measuring agricultural water stress in northeast Syria.

[21] Schwartzstein, P., & Zwijnenburg, W. (2022). We fear more war, we fear more drought. In: PAX for Peace. https://reliefweb.int/report/syrian-arab-republic/we-fear-more-war-we-fear-more-drought-how-climate-and-conflict-are

[22] COAR (July 2022). Syria Update – Not a Drop to Drink: Overlapping Crises Affect Agriculture and Drinking Water Distribution Across Syria. https://coar-global.org/2022/07/04/not-a-drop-to-drink-overlapping-crises-affect-agriculture-and-drinking-water-distribution-across-syria/

[23] Food Security Cluster. (2021). WATER CRISIS IN NORTHERN AND NORTHEAST SYRIA Immediate Response and Funding Requirements. https://fscluster.org/sites/default/files/documents/response_plan_water_crWoSs_in_northern_and_northeast_syria_september_2021.pdf

[24] iMMAP. (2022). Northeast Syria Flash Report - Deterioration of the Livestock Feed and Fodder Market. https://reliefweb.int/report/syrian-arab-republic/northeast-syria-flash-report-deterioration-livestock-feed-and-fodder

[25] Triangle, Mercy Corps (2022). UNDERSTANDING GENDER & DROUGHT IN NORTHEAST SYRIA.

4. Key ethical considerations and related risks

5. 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?	NA	No primary data collection
… **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*)?	NA	No primary data collection; secondary data will be used in line with the intended purpose that the respondents was informed on.
… Does not **expose data collectors to any risks as a direct result** of participation in data collection?	NA	No primary data collection
… Does not **expose respondents / their communities to any risks as a direct result** of participation in data collection?	NA	No primary data collection
… Does not involve **collecting information on specific topics which may be stressful and/ or re-traumatising** for research participants (both respondents and data collectors)?	NA	No primary data collection
… Does not involve **data collection with minors** i.e. anyone less than 18 years old?	NA	No primary data collection
… Does not involve **data collection with other vulnerable groups** e.g. persons with disabilities, victims/ survivors of protection incidents, etc.?	NA	No primary data collection
… Follows IMPACT SOPs for management of **personally identifiable information**?	NA	Available secondary datasets do not include personally identifiable data

5. Roles and responsibilities

Table 3: Description of roles and responsibilities

Task Description	Responsible	Accountable	Consulted	Informed
Research design	AO	DCC	IMPACT HQ	WASH WG, FSL WG
Supervising data collection	NA	NA	NA	NA
Data processing (checking, cleaning)	NA	NA	NA	NA
Data analysis	AO, GIS Officer	DCC	IMPACT HQ	
Output production	AO	DCC	IMPACT HQ, WASH WG, FSL WG	

Dissemination	AO	DCC	PD	
Monitoring & Evaluation	PD			
Lessons learned	NA	NA	NA	NA

6. Data Analysis Plan

NA – the situation overview does not involve primary data collection.

7. Monitoring & Evaluation Plan

IMPACT Objective	External M&E Indicator	Internal M&E Indicator	Focal point	Tool	Will indicator be tracked?
Humanitarian stakeholders are accessing IMPACT products	Number of humanitarian organisations accessing IMPACT services/products Number of individuals accessing IMPACT services/products	# of downloads of x product from Resource Center	Country request to HQ	User_log	X Yes
		# of downloads of x product from Relief Web	Country request to HQ		□ Yes
		# of downloads of x product from Country level platforms	Country team		□ Yes
		# of page clicks on x product from REACH global newsletter	Country request to HQ		X Yes
		# of page clicks on x product from country newsletter, sendingBlue, bit.ly	Country team		X Yes
		# of visits to x webmap/x dashboard	Country request to HQ		□ 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	X Yes
		# references in single agency documents			X Yes
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	*NA*
		Perceived usefulness and influence of IMPACT outputs			*NA*
		Recommendations to strengthen IMPACT programs			
		Perceived capacity of IMPACT staff			***NA***
		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 *(providing resources, participating to presentations, etc.)*	# of organisations providing resources (i.e.staff, vehicles, meeting space, budget, etc.) for activity implementation	Country team	Engagement_log	□ Yes
		# of organisations/clusters inputting in research design and joint analysis			□ Yes
		# of organisations/clusters attending briefings on findings;			X Yes