

Background

In April 2021, the Global Drought Observatory (GDO) issued a drought warning for eastern Syria, notably the country's breadbasket.¹ Their drought analysis for Northeast Syria (NES) placed vast territories under High to Moderate risk, regions that, according to the Food and Agriculture Organization of the United Nations (FAO), are already "dry" and "cold"^a with "low production potential" and "erratic rainfall."²

While the GDO's warning from April becomes ever more salient as time passes, the contributing factors necessary to appreciate the "risk" go well beyond what the Syrian Ministry of Agriculture has called the country's worst drought in seventy years. Keeping with drought alone, the conflict in Syria that started over a decade ago subsists amid a much broader, much more extended period of regional drought considered the worst of its kind in at least the past nine centuries.³

Troubling though it is, the drought and its intermittent spells are but one of many aggravating factors that complicate and increase the threat to the lives and livelihoods of the Syrian people. In NES, water scarcity is closely linked with the control and management of rivers and groundwater and other natural hazards, including an already dry and worsening climate. But a once in nine-century drought is destined to have a sweeping impact across the region.

The Tishreen dam lies roughly 60 kilometre (km) from where the Euphrates River crosses into Syria from Turkey. In reaching the border, the river has already negotiated its way through five artificial barriers, primarily hydroelectric dams, each collecting a toll on the amount of water that continues flowing south. On 16 June, engineers at the Tishreen dam warned humanitarian actors that water levels had reached a critical point.⁴ A further 70 km southeast of Tishreen is the Tabqa dam, situated west of Ar-Raqqa, which provides emergency backup for millions of people in need of electricity, drinking water and irrigation. By May, water levels at Tabqa dam were already roughly 20% of normal.⁵

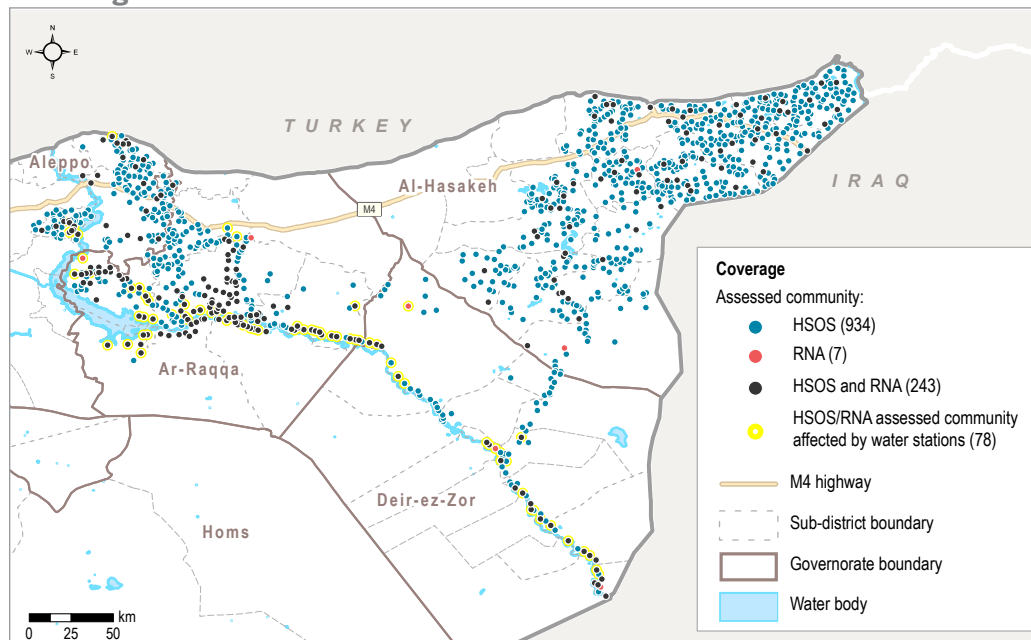
A further 170 km northeast, along the banks of the Khabur, a perennial tributary to the Euphrates in Syria, is the Alouk water station. Itself powered by the Tishreen dam, Alouk sits along Syria's northern border with Turkey. A mainstay of political authorities in the region, Alouk is essential to water resources across Al-Hasakeh. Yet, frequent shutdowns (twenty in the past year) and badly needed repairs leave the flow of water from Alouk insufficient to meet the needs of the population it serves – a problem made considerably worse by inconsistent access granted to technical teams to enter the station.⁶

The present factsheet, a zoom-in on the water crisis by the REACH Humanitarian Situation Monitoring team, seeks to shine a light on the complexity of this crisis, focusing on the intersectoral linkages needed for an effective humanitarian response.

Methodology

To accumulate the data necessary for this factsheet, REACH relied on various information sources. First and most commonly used are the data from ongoing research cycles at REACH, including the May rounds of the [Humanitarian Situation Overview in Syria \(HSOS\)](#)[▲] and the monthly [Market Monitoring exercise](#)[▶]. In May, HSOS collected data in 1,213 communities between 1-20 May from 3,739 Key Informants (KIs), while Market Monitoring surveyed 1,316 shops across 28 sub-districts between 3-10 May. In addition, REACH conducted a Rapid Needs Assessment (RNA)[▼] in NES from 3-6 June. The RNA was focused on communities considered to be most immediately at-risk from water scarcity and communities more commonly covered by the HSOS cycle. The RNA covered 250 communities across Ar-Raqqa, Deir-ez-Zor and Al-Hasakeh Governorates. A KI methodology was utilised for data collection. With a survey goal of three KIs per community, the team collected data from KIs with a range of expertise and knowledge. The resulting data were disaggregated and analysed primarily at the community level using only the available binary data where appropriate. All RNA data and analyses are available upon request. **Findings in this factsheet are indicative rather than representative, and should not be generalized across the population and region.**

Coverage





Water and Electricity



Lack of electricity and low levels of water are causing limited operation of a number of water pumping stations, increasing dependence on alternatives for household water usage across NES. **Alternative water sources reported in communities connected to affected water pumping stations were water trucking (93%), followed by surface water (16%).** If surface water usage increases, households will be at increased risk of illness, as there are **no habitual water sanitisation methods reportedly used by households in NES.** ▼

The most likely alternative for most communities is water trucking, whose reported price has increased dramatically in Ar-Raqqa sub-district in the in the six months prior to data collection. **The high cost of water trucking** is preventing households from accessing sufficient water, as it is reported as a barrier in 43% of communities assessed by HSOS. ▲

Reported coping strategies for a lack of water in communities connected to affected water stations include **relying on less preferred sources of water (43%),** and using less water (57%). ▼ For now, households are more commonly reported to be using less water related to uses other than drinking, but could soon be forced to limit drinking water, if water access does not improve.

Health



Households in 15% of the assessed communities are reportedly already **limiting their drinking water consumption** due to lack of access to sufficient water. ▲

Households are increasingly relying on alternative sources of drinking water that could expose them to waterborne diseases, including water transported or stored in unclean tanks which are exposed to high temperatures for extended periods of time. According to REACH's RNA data collected in June, **water-related illnesses were reported in 35% of the assessed communities.** ▼

Reduced access to water and electricity negatively affects the functioning of health facilities that don't have access to alternative sources.

Livelihoods and Food



Drought conditions **destroyed large swaths of rainfed crops resulting in a significant loss of income** for farmers. Moreover, failed barley crops are expected to affect the availability of animal feed in the coming season, with high rates of livestock death already reported in 14% of assessed communities in May. ▲

A continued decline in access to river water and electricity due to lowering levels of the Euphrates and a **rise in fuel prices** (30% increase since the start of the year ▶) as well as aggravating factors such as damaged irrigation infrastructure are likely to affect the quality of irrigated crops. **A lack of sufficient irrigation water quantities in the public irrigation canals, dams, and lakes** was reported by KIs as a **challenge for farmers in 39% of communities** assessed by REACH's RNA ▼ in June 2021.

Farmers also experienced a range of challenges related to cash availability following market price volatility. For example, unaffordability of fertilisers was the most commonly reported challenge for farmers (cited in 70% of assessed communities). This season, **households in 58% of assessed communities reportedly ran into debt while running agricultural operation.** ▼

To cope with the loss of revenue, farmers and livestock breeders have resorted to short-term strategies such as **renting out drought-affected land to livestock herders for grazing** (reported in 76% of assessed communities) and **selling livestock assets** (reported in nearly 60% of assessed communities). ▼ While these strategies might provide some respite in the short term, they **will not be sufficient to make up for sustained losses** nor to allow for activities in the upcoming seasons.

While crop loss is expected to impact food availability, the biggest challenge for households currently is **unaffordability of food items.** According to the Humanitarian Needs Assessment Programme (HNAP) income data from January 2021, a household with the median income of 250,000 SYP. would have to spend 84% of that just on the May Survival Minimum Expenditure Basket (SMEB) food component alone. ▶

In 21% of communities assessed by REACH's RNA, KIs reported that approximately 25% of **households in the community rely on one meal or less per day.** ▼

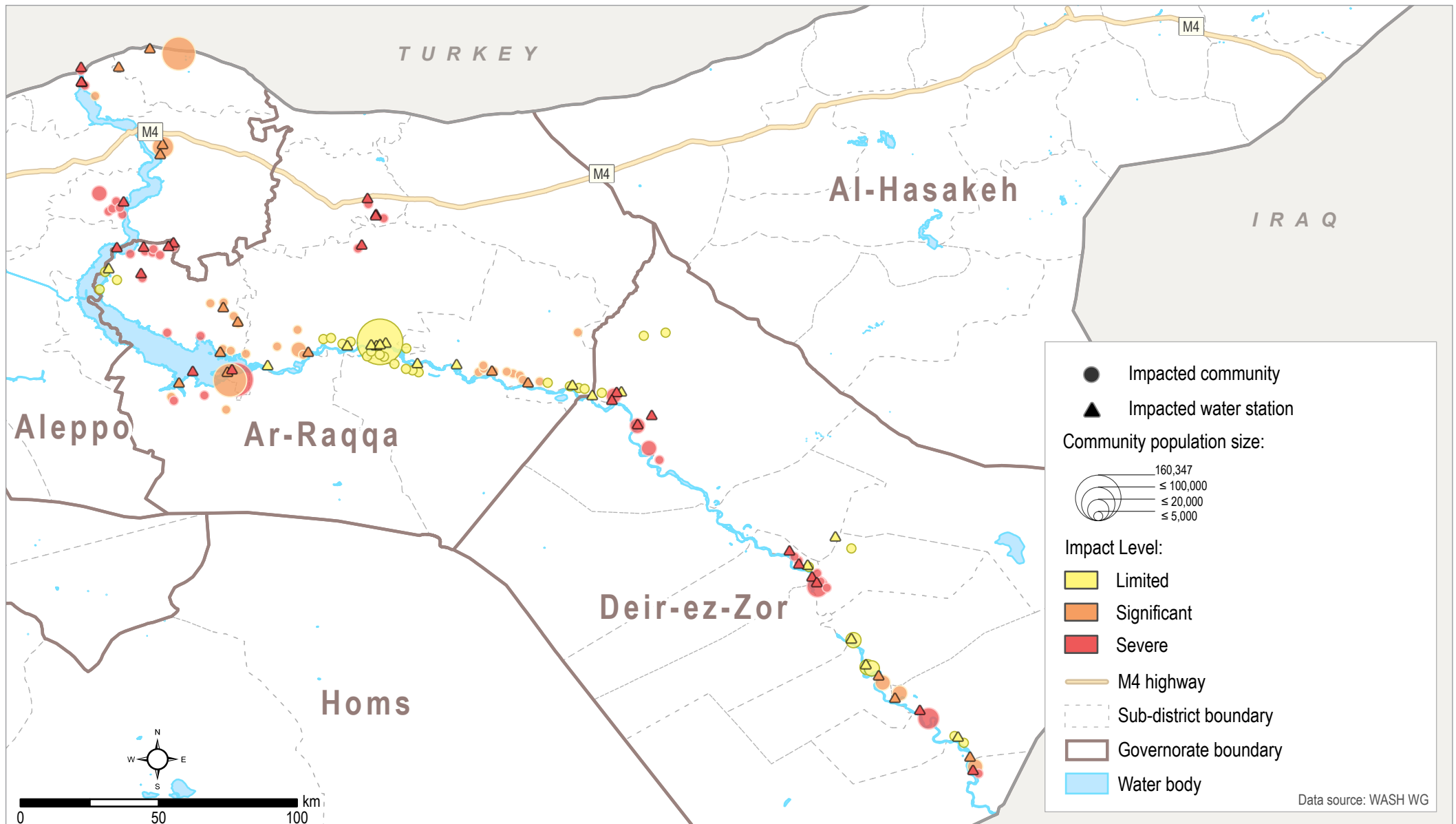


1. Situation Overview: Water Shortages

June 2021



Water Stations and communities affected by the lowering water levels of the Euphrates as of 16 June 2021





1. Situation Overview: Water Shortages

June 2021

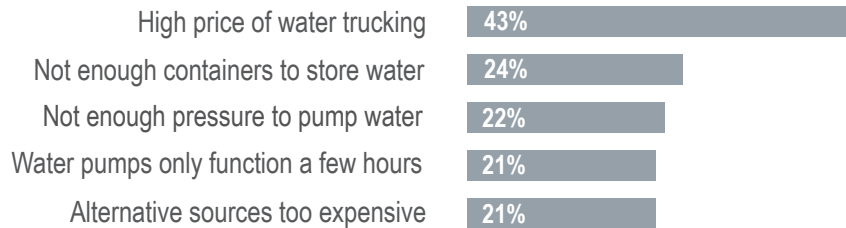


Days per week water from the network was reportedly available
(by % of 748 communities connected to a water network) ▲

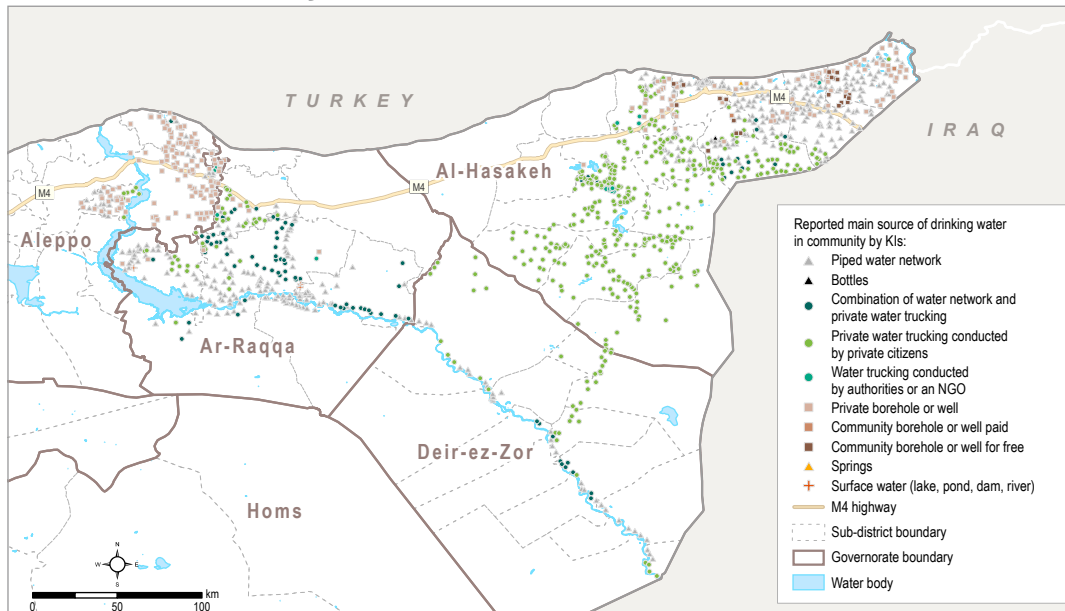


7 days	21%	1-2 days	19%
5-6 days	19%	0 days	25%
3-4 days	16%		

Most commonly reported barriers to accessing water (by % of communities) ▲ ▽



Water sources in May 2021 ▲



The impacts of lower water levels in the Euphrates and a lack of rainfall are far-reaching, the most direct being increased insufficiency of water for many communities. Direct access issues and price of water are major barriers, only to be exacerbated by water shortages. Reported coping strategies point to limiting water consumption and using lower quality water, which are particularly concerning with regard to health risks in the middle of summer.

Impact on water availability

According to the Water, Sanitation and Hygiene (WASH) working group in NES, as of 15 June there are 123 water pumping stations that provide filtered drinking water to communities along the Euphrates and related water bodies, mostly through piped water networks, but also water trucking in Deir-ez-Zor and Ar-Raqqa. A total of 57 water stations in NES are impacted by the lower water level of the river and related canals, of which 11 have already shut down completely.⁷ At least 97 communities and 58 Internally Displaced People (IDP) settlements are relying on water stations that are partially or fully impacted, with an estimated 576,000 people affected.^b Data from REACH assessments on water availability show persisting challenges in NES have been further exacerbated by the functionality of these water stations.

Access to sufficient water

The proportion of communities where sufficient access to water was reported fell 6% across NES (70.25% in January

2021 vs. 66.19% in May)[▲] but the drop was more significant in certain areas. The trend map on the following page shows a drop in community access to sufficient water particularly in Ar-Raqqa governorate (17% decrease)[▲]. Three sub-districts in particular are experiencing a dramatic decrease in water access (Ain al Arab, Ar-Raqqa, and Sur) whose water is supplied by the Euphrates and surrounding bodies.

Some of this is attributable to the low water levels, with 20% of communities regionally reporting a non-functioning main water network as a barrier to sufficient water[▲], but other factors such as lack of electricity could contribute as well. The communities reporting no change in access may be yet to experience or report^c the effects of the water levels, as many water stations along the Euphrates were designed to accommodate water levels lower than those occurring now, and so continue to function.[▲] But this also means that water trucking supplied directly from functioning pumping stations or directly from the river will be in higher demand, supplying communities usually reliant on highly affected pumping stations. Some communities in Al-Hasakeh may be experiencing improved water access because of water station rehabilitation in that area. The sporadic operation of Alouk water station in January^b and April⁹ also means that depending on the exact day of data collection, communities could have experienced more or less access in either month.

(continues on page 7)

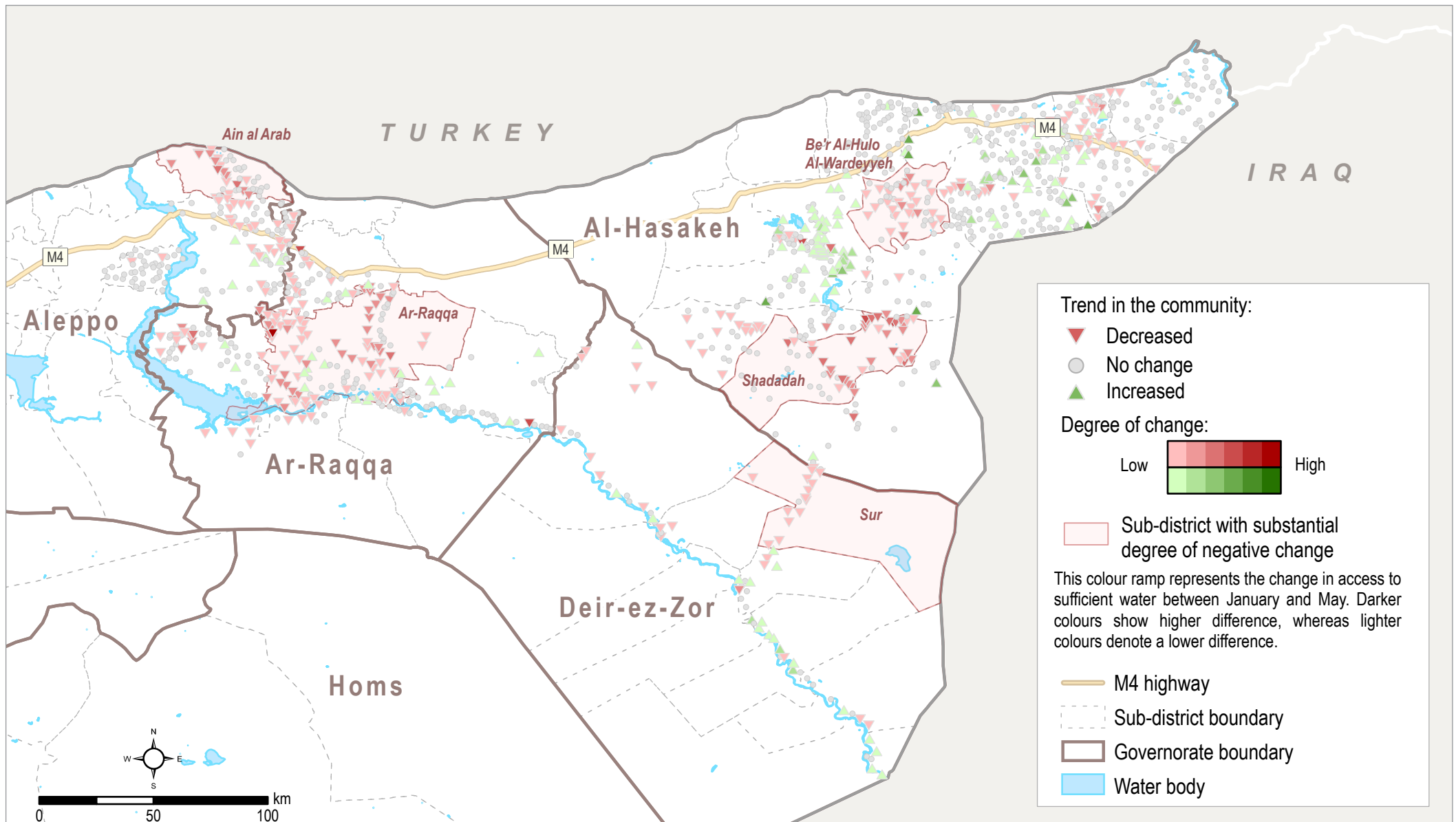


1. Situation Overview: **Water Shortages**

June 2021



Change in access to sufficient water between January and May 2021▲



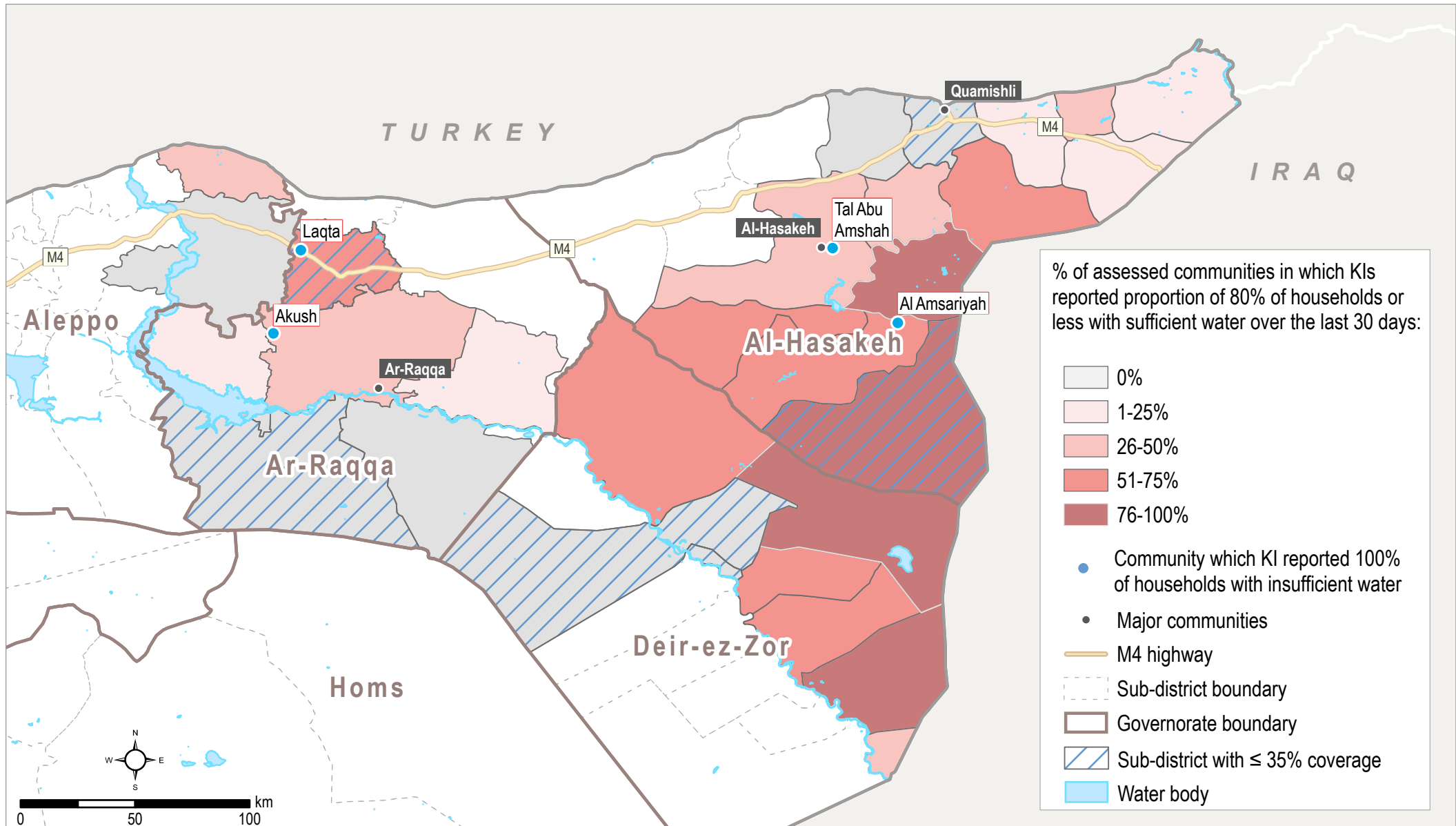


1. Situation Overview: **Water Shortages**

June 2021



Insufficient water access in May 2021▲





In Deir-ez-Zor and Al-Haskaeh, where water trucking is the main water source reported, KIs in communities also commonly reported the high price of water trucking as a barrier to water access[▲]. In Aleppo, where water sources are more diverse, so too are the reported barriers, where lack of storage containers and high cost of water alternatives are reported along with insufficient water from boreholes. Water insufficiency presents itself differently within different contexts across NES, but no water source is without barriers, and when barriers to access present too great a challenge, communities must cope by finding alternative sources, or reducing water use in sometimes dangerous ways. The most commonly reported alternative source of water according to a REACH RNA conducted in communities affected by the impacted water stations was water trucking (93% of KIs reporting a secondary source), but 47% of KIs were not reporting a secondary source of water in communities[▼].

Strategies to cope with lack of water

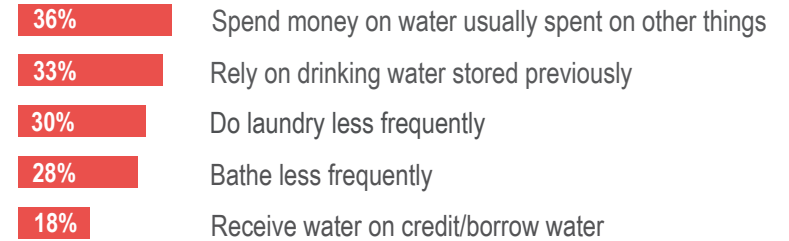
As demand goes up for alternatives like water trucking, the price will likely rise in response. Looking at pricing changes for water trucking from January to May (map on page 8), we see in Al-Hasakeh a generally stable trend, with prices both rising and falling in communities, and most by less than 50%. But in Ar-Raqqa sub-district, where the piped water network is the main source, there were significant price increases in communities from January 2021 to May, which could point to further price hikes as more communities turn to water trucking in areas along the Euphrates[►]. In May, the most commonly reported coping strategy for lack of water was spending money

on water usually used for other things (54%)[▲], meaning households are choosing between water and things like diverse foods, agricultural inputs, and healthcare. Given the economic crisis facing Syria as a whole, the reality is many households will simply go without sufficient water for all their needs if their current source is cut off/reduced. Strategies used by households in this situation point towards more acute risks to health.

Doing laundry less frequently and bathing less frequently were reported in 30% and 28% of communities respectively[▲]. Coping strategies reported in communities connected to affected water stations included reducing water consumption (57%) and relying on less preferred sources of water (43%)[▼], which have the potential to contribute to disease and illness, as further explained in the health section. KIs reported no methods used by households to make water safer (92%)[▲]. If the usage of untreated water increases, methods for improving water quality are reportedly not in the routine of most households.

Access to water was already strained in NES, with varying water supplies being further impacted by low water levels. Households depending on affected water stations will prioritize drinking water over other water uses, buying water when possible or simply going without enough water, with possibly detrimental effects on health, food security, and agricultural livelihoods as a result. While drought conditions do not point to an immediate impact on water supply for everyday use, it will mean increased usage of the water systems in place as farmers rely on water supplies for agricultural irrigation.

Most commonly reported coping strategies for lack of sufficient water (by % of communities)^{■▲}



92% % of assessed communities in which KIs reported that households do not use any methods to make water safer[▲]

Rapid Assessment Findings (by % of 237 KIs in communities affected by water station functionality)[▼]

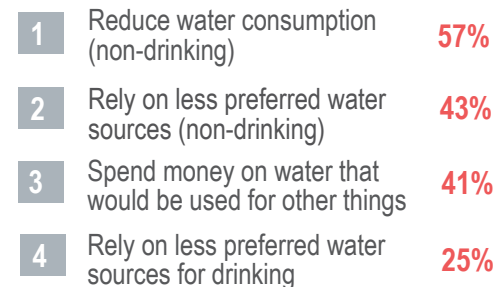
% of communities in which people use other sources of water for drinking aside from their main source



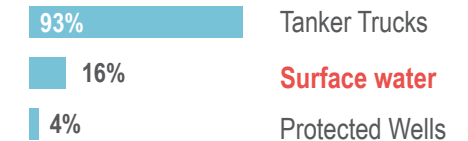
% of communities in which current or alternative sources of water are insufficient to meet needs for household and agricultural purposes



Most commonly reported coping strategies used to deal with insufficient water[■]



Most commonly reported secondary source for drinking water[■]



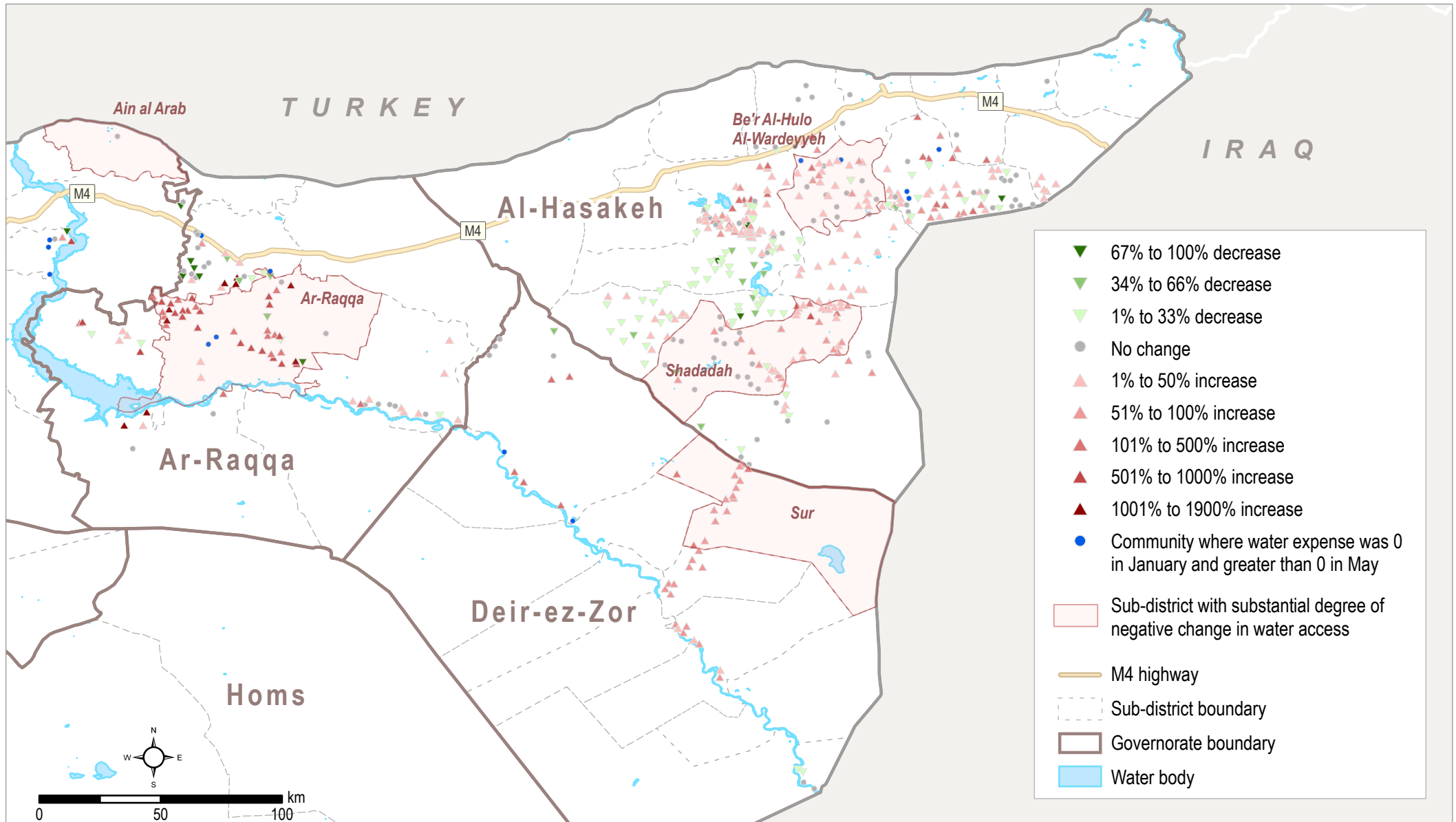


1. Situation Overview: **Water Shortages**

June 2021

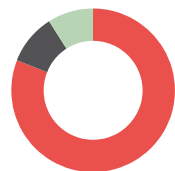


Change in drinking water expense for water trucking between January and May 2021▲





Most commonly reported sources of electricity used by households (by % of communities) ▲



Main network	81%
Private generator	9%
Community generators	9%
Solar panels	<1%

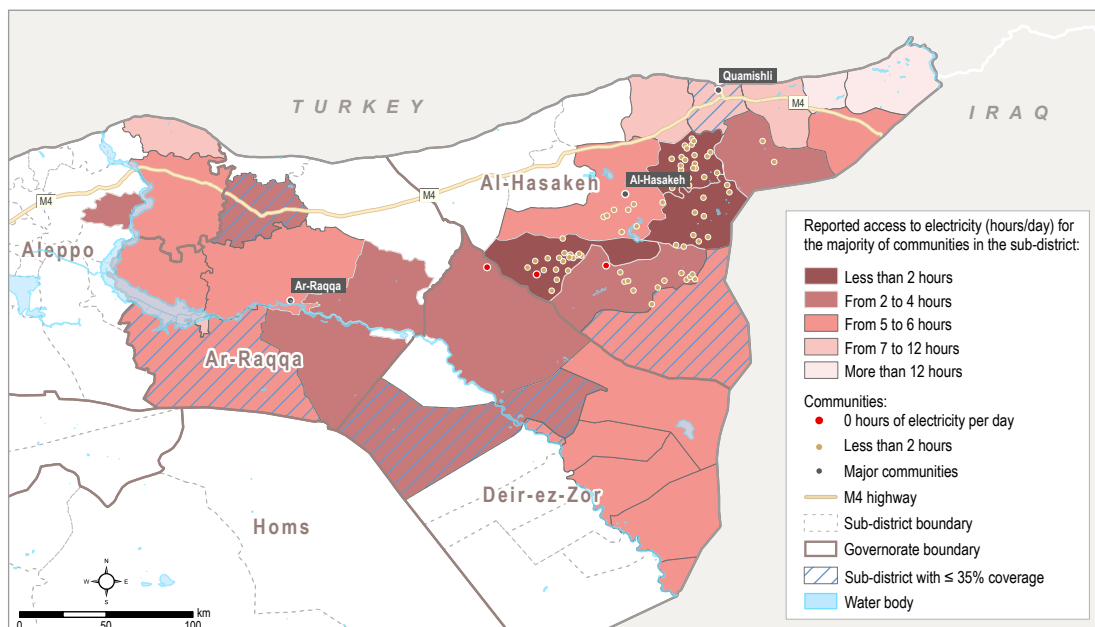
Barriers to accessing electricity (by % of communities) ■ ▲

1	Rationing electricity by local authorities	67%
2	Solar panels too expensive	58%
3	Fuel for generators too expensive	48%
4	Batteries too expensive	47%



27%
% of assessed communities in which KIs reported infrastructure as a priority need ▲

Access to electricity in May 2021 ▲



Electricity for at least 3 million people depends on the Euphrates dams¹⁰, which are at risk of inoperation. Alternatives are not viable for consistent use, as demonstrated in Al-Hasakeh governorate, where electricity is inconsistent and extremely limited. Water pumping station functionality is mainly dependent on hydro-electricity, so continued rationing also means water insufficiency for communities across NES.

Euphrates Impact

Dams along the Euphrates river are generating hydro-electric power for millions of Syrians. If the water level drops below certain levels for each dam, there will not be sufficient water flow to operate them, which could happen as early as mid-July¹⁰. Reduction of electricity access has already been reported in the northeast, likely due to rationing of electricity by the NES Self Administration (SA)¹¹, and conflict affecting electricity networks this winter in the Tel Tamer area^{12,13}. The most commonly reported number of hours/day of electricity in February dropped to only 5-6 hours/day from more than 12 hours/day in January[▲], where it has remained since. Further HSOS findings show that from March to May, the proportion of communities where infrastructure was reported as a priority need for residents went from 0% to 27%, with expansion of main network access in May reported as a need in 48% of assessed locations[▲]. The trend map on page 10 shows a sharp decrease in access from January 2021 and May 2021 in communities around the

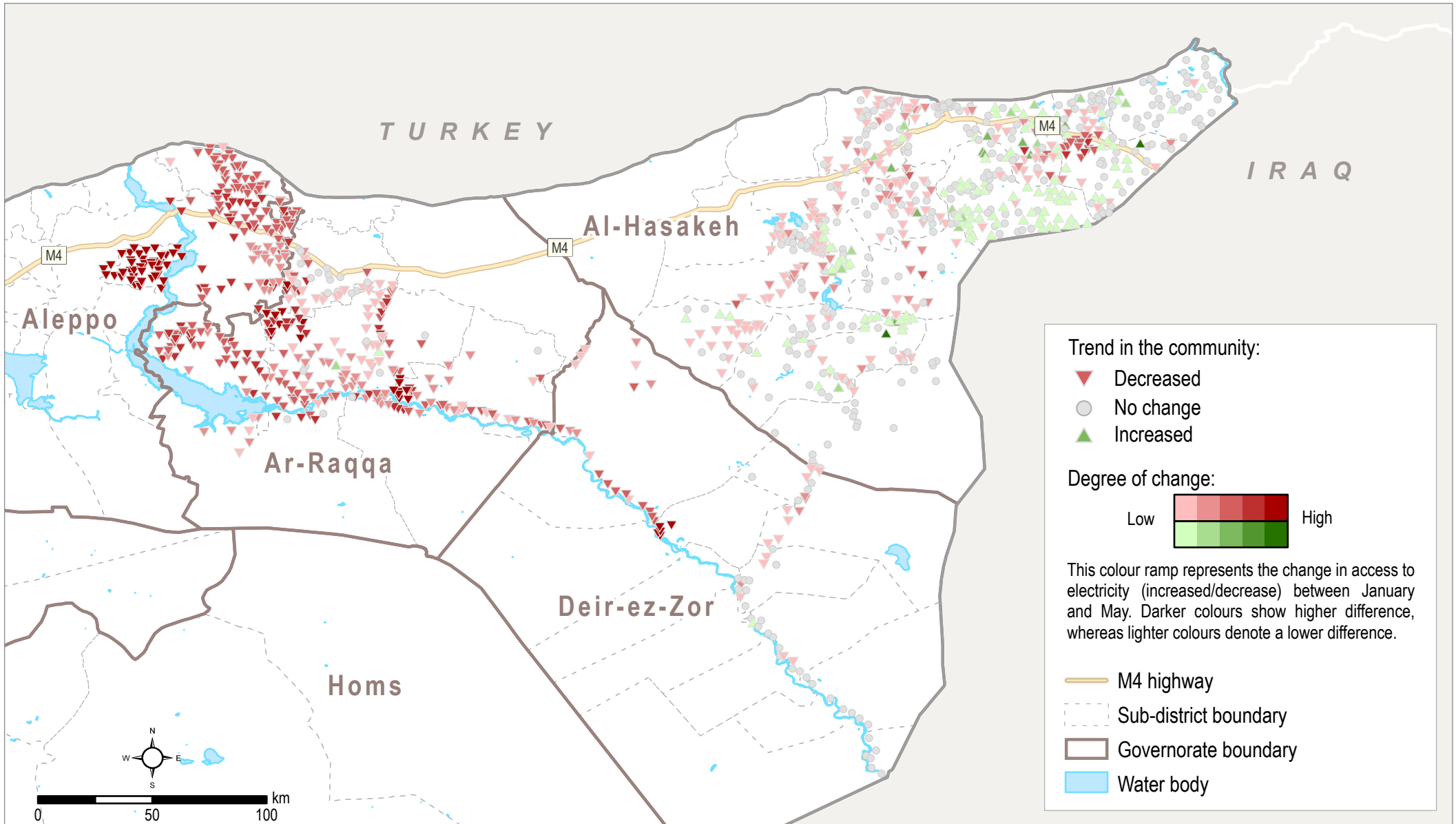
Euphrates. The proportion of communities where electricity access through the main network was reported across NES is 81%, but over 99% of assessed communities in Ar-Raqqa and Aleppo governorates are relying on the main network, which is mainly supplied by Tishreen's hydro-electric power[▲]. Al-Hasakeh governorate experiences extremely low reports of electricity more consistently, so little change is seen in the trends map while the access map to the left shows low access. Barriers to electricity include the rationing of electricity by authorities, but also the high cost of any alternatives, like generators and solar panels. According to REACH Market Monitoring data, the median diesel fuel price in Ar-Raqqa is currently more than 3 times higher than in Al-Hasakeh (488 Syrian Pound [SYP] per liter vs 150 SYP)[▶], meaning pivoting to generators in Ar-Raqqa will be that much more challenging.

Water station power supply

In addition to effects on communities' everyday electricity use, most of the water pumping stations supplying water to communities along the Euphrates and related bodies are powered by the main network, meaning their function is put into question not only because of lower water levels, but limited electricity needed to pump water through to communities, camps, and settlements. The ripple effect of these water shortages continue on from electricity to food security and livelihoods.



Change in access to electricity (hours/day) between January and May 2021▲





Farmers and livestock breeders in NES experience a wide-range of challenges affecting access to livelihoods. Lack of rainfall and lowering water levels in rivers have resulted in significant levels of crop failure, loss of livestock and a shortage of animal feed. Rain-fed crops are particularly hit this season but irrigated crops are also impacted by reduced electricity access and damaged infrastructure. Rising operational costs following market volatility exacerbates the situation with an increasing number of farmers unable to make ends meet.

Reliance on Agriculture in NES

Agriculture is an essential livelihood activity in Northeast Syria. Local sources estimate that roughly 40% of households depend on agriculture or livestock activities to make a living. While the agricultural sector remains an important economic driver, the proportion of households relying on agriculture decreased in recent years because of factors like high production costs, displacement, and loss of land.

Farmers in NES traditionally cultivate wheat and barley. Barley crops are almost exclusively rainfed and predominantly consumed by livestock. Wheat crops are both rainfed and irrigated with softer varieties of wheat relying on irrigation as they are less drought-resistant. Rainfed barley and wheat crops cover some 700,000 hectares or an estimated 70% of agricultural land in NES. Rainfed

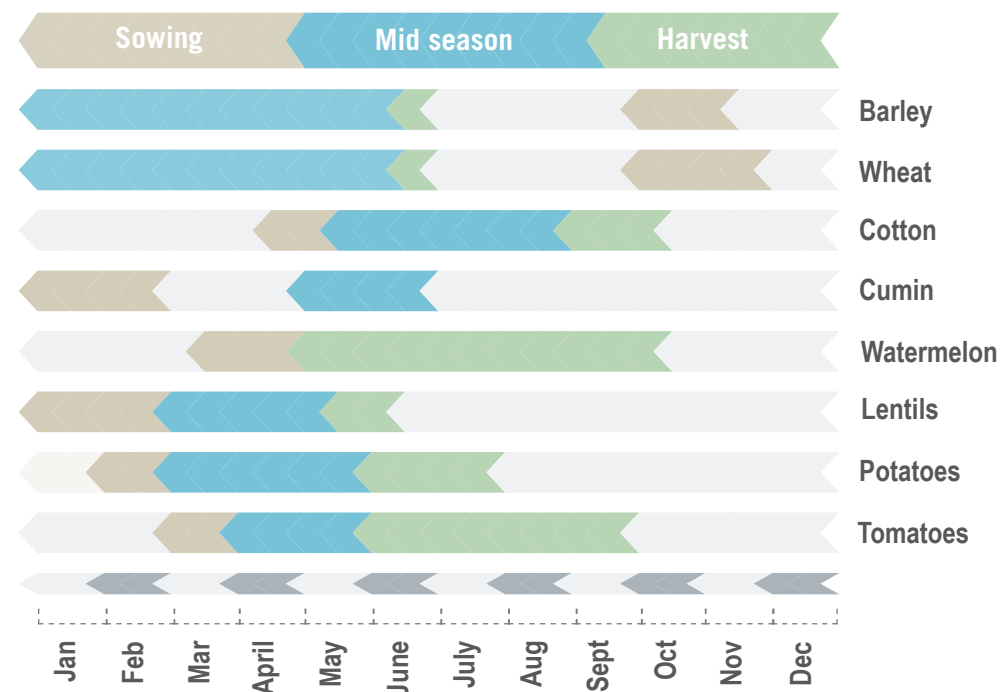
crops are planted across the first four agricultural stability zones (see map on page 12) which receive more rainfall. Irrigated areas make up over 300,000 hectares and are concentrated along the Euphrates river in the 4th and 5th agricultural stability zones, which comprise desert and pastoral grazing land.

Impact of water shortages on livelihoods

The combined impact of the delayed rainfall at the start of the planting season, persistent drought conditions throughout 2021, and reduced water levels of the Euphrates since late January has resulted in high levels of damage to this season's winter crops. At the time of writing, the full extent of the crop damage was unclear. However, iMMAP and NES AWG's preliminary assessment of crop growth based on data from February and March suggests a greater negative impact on rainfed crops compared to the region's last drought in 2018. Local sources estimate that between 60-95% of rain-fed crops failed due to the lack of rainfall.

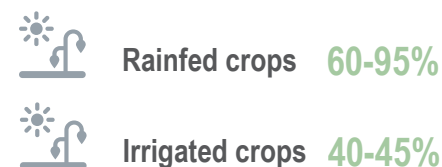
The impact on irrigated crops is expected to be less severe with a projected loss of 40-45% of yields across NES. The lower impact can be attributed to relatively sufficient water availability at the start of the mid-season (January-February) which is when crops need the most water. However, a continued decline in access to river water and (continues on page 13)

Crop calendar



Source: Food and Agriculture Organization of the United Nations (FAO)

Estimated range of crop loss according to local sources

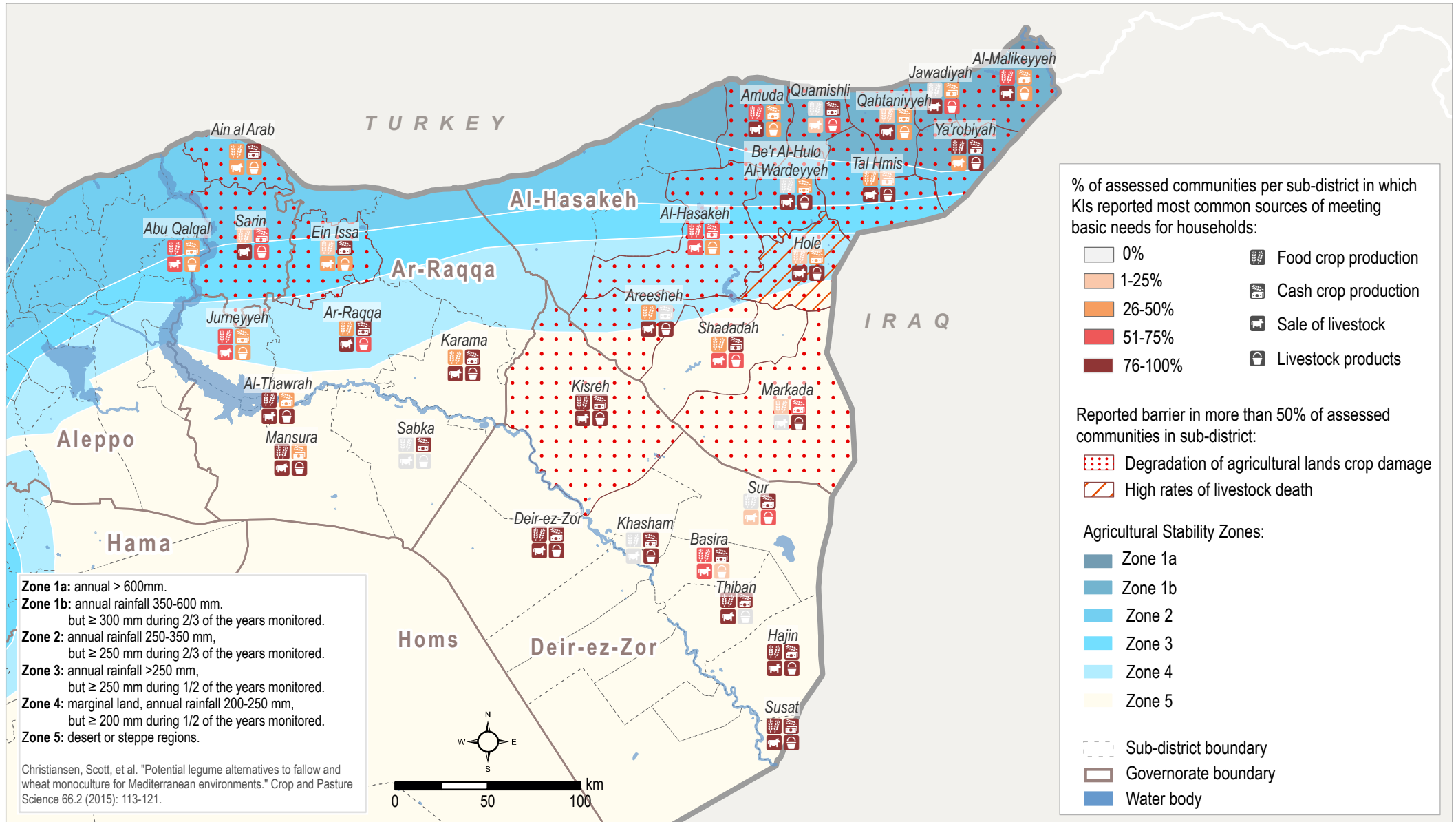


40%

Estimated % of households relying on agriculture or livestock activities to make a living



Agricultural livelihoods sources and barriers to livelihoods in May 2021▲

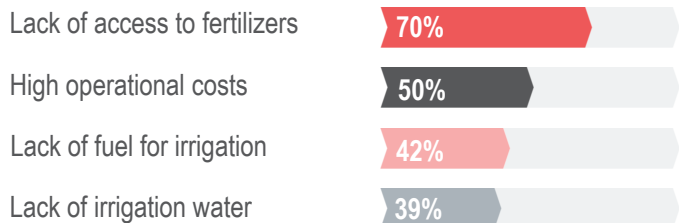




Prices of Manually Refined Diesel per litre in SYPi ▶



Reported challenges to accessing livelihoods from agriculture (reported by % assessed communities) ▼



% of assessed communities in which KIs reported crop damages as a barrier to accessing livelihoods ▲

electricity due to lowering levels of the Euphrates and a rise in fuel prices as well as aggravating factors such as damaged irrigation infrastructure are likely to affect the quality of irrigated crops.²⁰ A lack of sufficient irrigation water quantities in the public irrigation canals, dams, and lakes was reported by KIs as a challenge for farmers in 39% of communities assessed by REACH's RNA ▼ in June 2021.

Additionally, the lack of rainfall and limited water access have disrupted livestock activities by reducing pastureland and deteriorating livestock body conditions, while the failure of barley crops decreased the availability of fodder. Low availability of forage is expected to drive up the cost of animal feed this season as fodder will either have to be sourced from Government of Syria (GoS) areas or imported from abroad. ▼

Crop failures and poor livestock health are critically impacting farmers' and livestock breeders' access to livelihoods. According to HSOS May 2021 findings ▲, both crop damages and a lack of resources (including water for irrigation) affected the income of households in 72% of assessed communities, while high rates of livestock death reportedly impacted livelihoods in 14% of assessed communities. High rates of livestock death were relatively more commonly reported in Hole Sub-district in Al-Hasakeh governorate where KIs in 95% of assessed communities cited the livelihoods barrier.

Further, daily and seasonal workers who typically maintain crops, tend to livestock, or participate in the harvest, faced limited livelihood opportunities this season. A lack of work opportunities was a reported barrier to livelihoods access in nearly 30% of communities in NES ▲. i

Aggravating factors

In addition to the impact of the water shortages, farmers face increasing operational costs following market price volatility ▼.

Shortages of agricultural inputs including seeds, fertilisers, herbicides, pesticides, and agricultural medicines in the local market have forced farmers to rely on low-quality alternatives from unreliable sources. ▼ Moreover, even if inputs were available, they were often unaffordable for farmers due to price increases following currency fluctuations. A lack of access to fertilisers due to limited cash availability was the most commonly reported challenge for farmers (cited in 70% of assessed communities) ▼.

Further, expensive fuel prices limited the access to the electricity needed for pumping irrigation water as well as for operating agricultural machinery.²¹ According to REACH's Market Monitoring ▶, the price of manually refined diesel used for irrigation increased by nearly 30% since the start of the year. High fuel prices were reported as a challenge for farmers to accessing livelihoods (continues on page 14)



in 32% of assessed communities, while a lack of sufficient quantities and quality of fuel for irrigation was reported in 42% of assessed communities ▽.

Finally, damaged agricultural infrastructure and challenges in accessing modern farming machinery forced farmers to rely on outdated farming methods lowering the productivity of their operations. Maintenance of machinery was reported to be unaffordable for farmers in 18% of assessed communities, while difficulties in accessing ploughing services and damaged irrigation systems were reported as challenges to farmers in 20% and 10% of assessed communities, respectively ▽.

Insufficient income from livelihoods to make ends meet

Rising operational costs forced farmers and livestock breeders to invest substantial financial resources throughout the season. Purchases of inputs and services are reportedly made in USD²², exposing farmers to the continued decreasing value of the SYP. As a result, farmers are increasingly unable to make the required investments to keep their operations functioning. Moreover, KIs in roughly 30% of assessed communities reported that access to credit for entrepreneurial investment was a livelihoods priority need and KIs in over half of communities cited the lack of available ways to access financial resources as a barrier to meeting basic needs ▲. ^k

With the costs of the operations exceeding the expected revenue, an increasing number of farmers and livestock breeders are struggling to make ends meet. According to HNAP²³, 77% of households whose livelihoods depend on agriculture did not make enough money to meet basic needs in January 2021, which is a nearly 40% increase compared to findings from January 2020. Similarly, 83% of households depending on livestock activities for their livelihoods reported insufficient income in January 2021 which compares to 58% in January 2020. Low yields due to water shortages coupled with the continued economic decline are expected to further deteriorate the economic situation for farmers and livestock breeders.

Coping strategies

To mitigate the loss of this season's revenue, farmers and livestock breeders resorted to a number of coping strategies. Notably, farmers rented out drought-affected land to livestock herders for grazing (reported in 76% of assessed communities), while livestock breeders turned to selling their livestock assets (reported in nearly 60% of assessed communities). However, for most farmers, neither strategy will be sufficient to make up for sustained losses nor to allow for activities in the upcoming seasons. This season, households in 58% of assessed communities reportedly ran into debt while running agricultural operations ▽.

Reported agricultural operational costs perceived to be highest (reported by % assessed communities) ▽ ▲

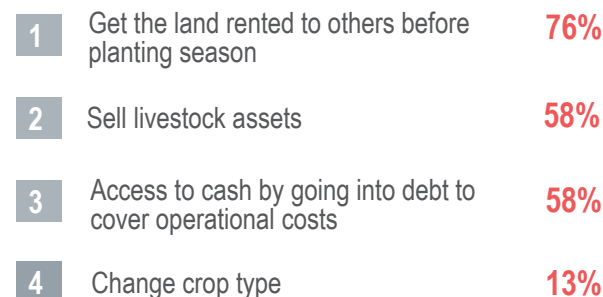


76% of households reported to receive insufficient income from farming ^{HNAP}



83% of households reported to receive insufficient income from livestock ^{HNAP}

Most commonly reported strategies to cope with a lack of agricultural resources during the last season (reported by % assessed communities) ▽ ▲

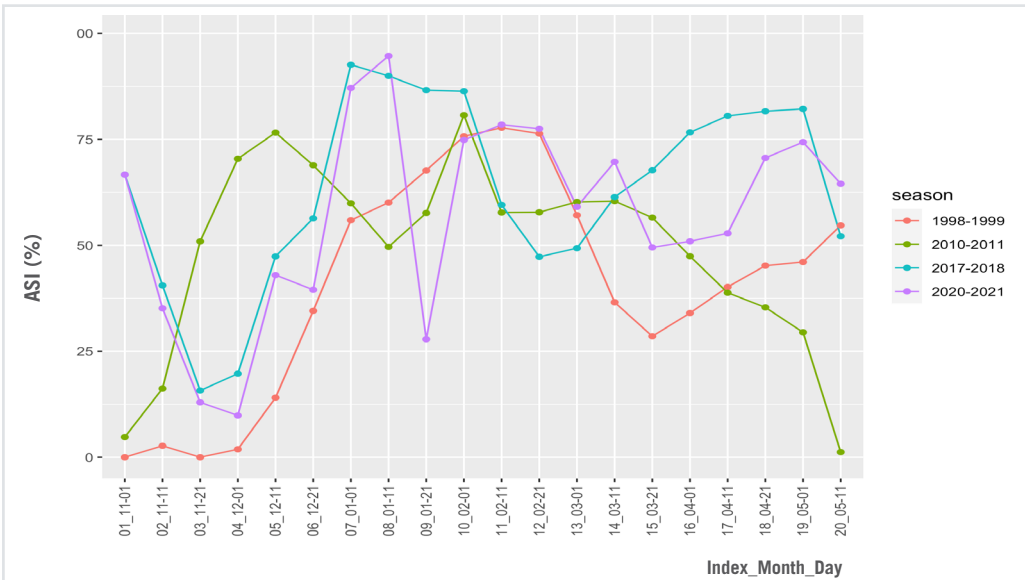


30%

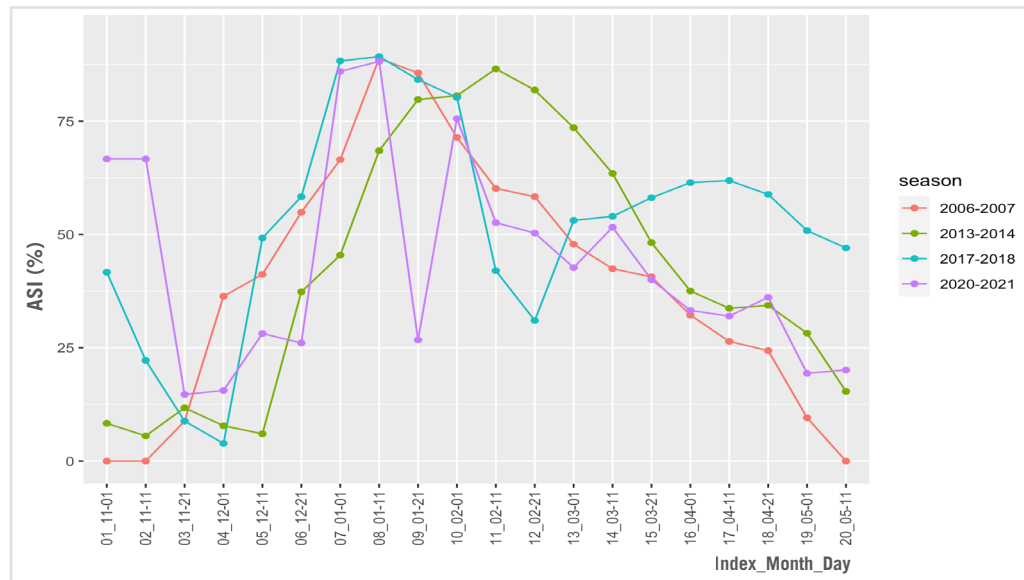
% of assessed communities in which KIs reported access to credit for entrepreneurial investment as a livelihoods priority need ▲



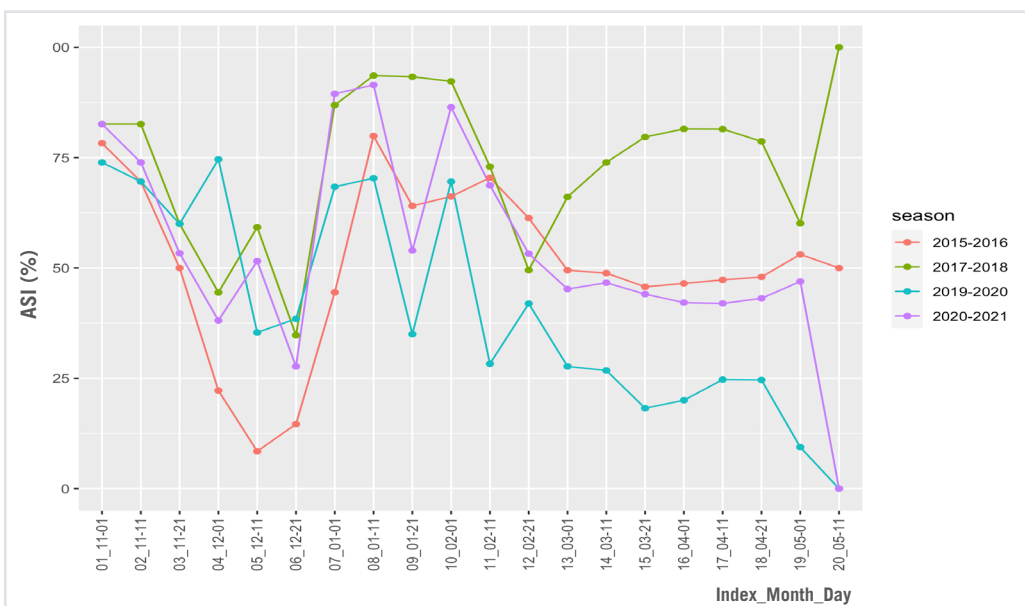
Al-Hasakeh Governorate



Ar-Raqqa Governorate



Deir-ez-Zor Governorate



Agricultural Stress Index (ASIS) Trend

FAO's Agricultural Stress Index System (ASIS) monitors drought conditions by looking at the Vegetation Health Index based on photosynthetically active radiation. A higher percentage represents a more severe agricultural drought resulting in anomalous vegetation growth. The graphs on this page show the comparison of the ASIS between November and May for the current 2020-2021 season with the three most similar seasons for Al-Hasakeh, Ar-Raqqa, and Deir-ez-Zor governorates. The trend indicates that the ASIS was almost always lower in 2020-2021 than in 2017-2018 which was when the region experienced its last drought. This suggests that crops have experienced less

stress overall during the 2020-2021 season. However, while this is the case for the whole season in Deir-ez-Zor, the ASIS is higher between mid-February and mid-March in Al-Hasakeh and Ar-Raqqa in 2020-2021 compared to 2017-2018. This coincides with the flowering and grain-filling phases which are particularly sensitive to water scarcity, preventing crops from reaching maturity. In other words, the yield for 2020-2021 may be lower than in 2017-2018 in Al-Hasakeh and Ar-Raqqa despite the lower ASIS for most of the season. Impact on production will likely be considerable with crops in Al-Hasakeh governorate comprising the majority of wheat and barley production in NES.



4. Situation Overview: Impact on Food Security

June 2021



Northeast Syria is the country's "wheat basket", producing between 70 and 80 per cent of the country's wheat, a staple food crop for Syria's roughly 17 million residents.⁵ However, reduced rainfall combined with decreasing water levels in the Euphrates basin have placed significant pressures on a population bound at the intersection of agriculture and livestock production and distribution, resulting in combined shrinkages in food production and availability.²⁴

The combined drought and water access challenges impact agricultural production for both irrigated or non-irrigated farmland. While wheat harvests increased in 2019 and 2020, a variety of challenges, including prices of farm inputs, and the need for certain imports, along with access and distribution challenges between separate territorial regions of Syria, has nevertheless left a strain on wheat and bread markets that depend on

local production and distribution of the crop.²⁵ Focus group discussions led by REACH with KIs knowledgeable about agriculture and food markets, indicated that farmers predict devastating yield losses due solely to natural factors that include drought and rising temperatures that also increase the likelihood of crop fires. All of that considered, combined with socio-political factors affecting access to water for irrigation, fuel expenses, distribution chains, potential livestock death, high food and water prices, and low expectations for this year's wheat yield, the potential impacts on food security for all Syrians are likely considerable.

Unaffordability of food

Indeed, while the cost for one kilo of bread has seen an overall decline in the past six months, the price increased by 38% from April to May. According to REACH's Market Monitoring [▶], the price per kilo of chicken and flour increased by 86% in the previous six

months, bulgur costs increased by 41%, and the price per kilo of milk increased by 54%. According to HNAP income data from January 2021²³, a household with the median income of 250,000 SYP would have to spend 84% of that just on the SMEB food component alone, with the median price of the SMEB increasing by 17% since January. Unaffordability of food is not isolated to certain areas, with 94% of KIs across assessed locations in NES reporting unaffordability of food as a barrier to accessing sufficient food for IDPs and 88% for residents.¹ [▲] And while markets remain the primary source of food for families across NES, KIs in 38% of communities reported in May that households could not access food markets within the community in the previous month. [▲]

Coping strategies

Households are reported to cope with a lack of food in various ways, but many of these strategies are not sustainable in the long-term. In 21% of communities assessed by REACH's

RNA, KIs reported that approximately 25% of households in the community rely on one meal or less per day. [▼] KIs also reported that households are borrowing money to buy food and are spending money on food usually used for other things in 76% and 67% of assessed locations in HSOS respectively. [▲]

Supply challenges

Changing production cycles and reduced crop production levels have already changed distribution routes and essential supply chain mechanisms. For example, the transportation solutions previously used to transfer cotton and other valuable crops across governorates in Syria are increasingly infeasible economically and are either not operating or are severely hindered by political and military boundaries. Ultimately, the supply chains upon which food crops and their distribution rely are likewise reduced or even shut down. [▲] Indeed in May only 16% of surveyed vendors in NES reported no supply challenges, according to REACH's



% communities in which KIs reported that households could not access markets within their own community [▲]



% of increase of the price per kilo of flour in the 6 months prior to data collection [▶]



% of the regional median income that a household would need to spend to buy the SMEB food component [▶]



% communities in which KIs reported unaffordability of food as a barrier to accessing sufficient food for residents [▲]



% communities in which KIs reported that a proportion of households are borrowing money to buy food [▲]



% communities in which KIs reported that approximately 25% of households in the community rely on one meal or less per day [▼]



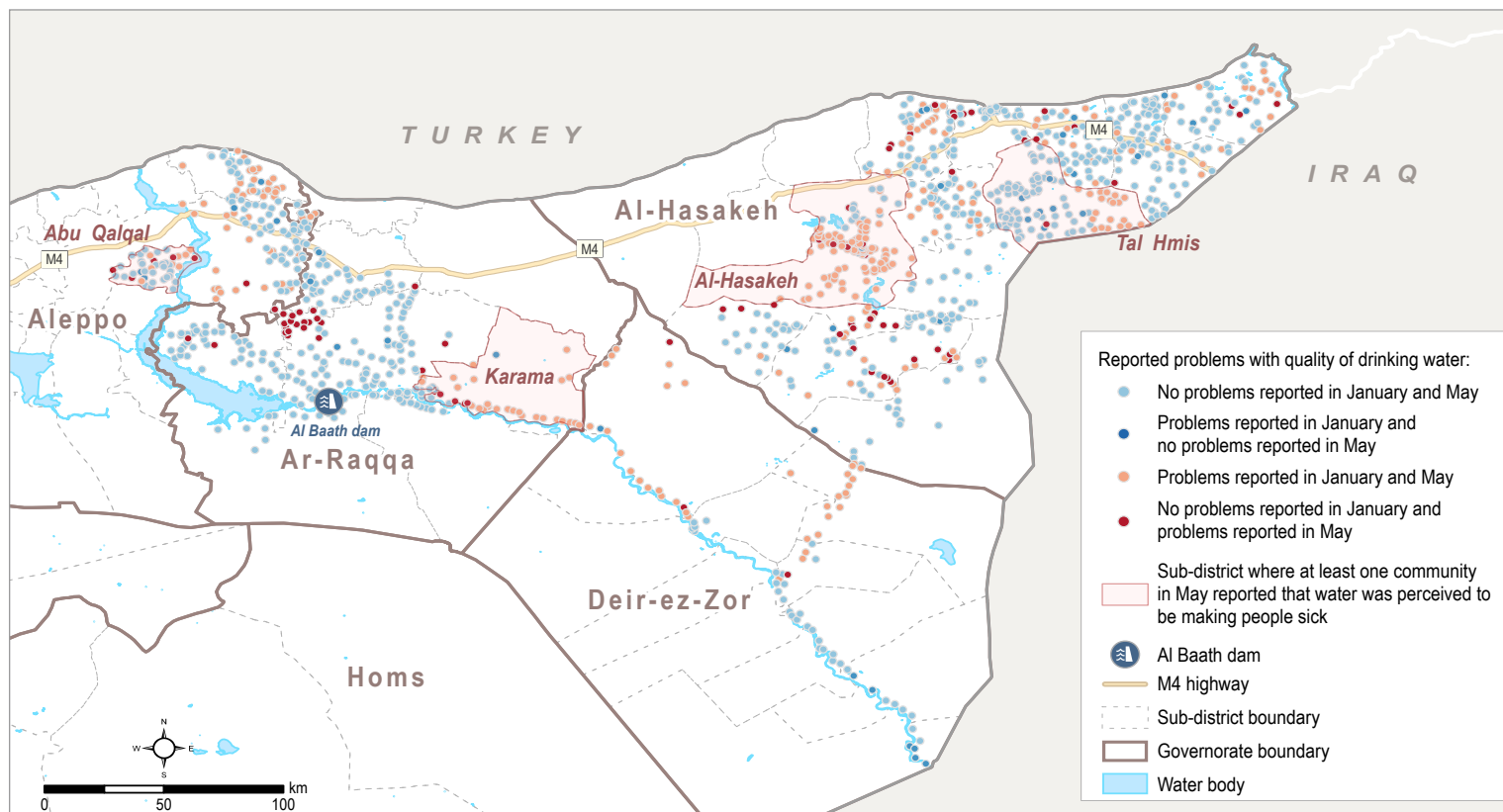
Due to water scarcity and high costs of water, some households were not able to secure sufficient quantities of drinking water in NES in May. Given the decreased quality of water from existing sources and the necessity to gather water from less safe sources, people were increasingly exposed to waterborne diseases. Accessing health facilities to treat such diseases did not come without challenges. Moreover, disruptions in water and electricity provision through the networks put at risk the functioning of health facilities that could not rely on alternative sources.

Quantity and quality of drinking water

When unable to access sufficient drinking water, people had to decrease its consumption or rely on previously stored water. In 15% of assessed communities in May, people reportedly resorted to reducing their drinking water consumption. This extreme coping strategy was highly prevalent in Deir-Ez-Zor, where it was reported in 44% of the assessed communities. In 53% of assessed communities across NES and 68% in Deir-Ez-Zor, KIs reported drinking water to be among the three most important WASH needs. ▲

People in 34% of the communities reportedly relied on drinking water stored previously in order to cope with a lack of water. ▲ This coping strategy can lead to health risks if the drinking water is stored

Problems with drinking water ▲



contaminated tanks – often the case in IDP camps.²⁶ The risk is also heightened during summer months due to the tanks' exposure to high temperatures, which enhance the growth of microorganisms.^m

Reduced access to filtered water and reliance on alternative sources likely impacted the quality of drinking water. In May, KIs in a third of

the assessed communities indicated problems with drinking water, including a bad taste (21%) and bad colour (9%). ▲ While the direct impact of the decreased water levels of the Euphrates on water quality is not clear, there are reports of decreased river flows affecting water pollution levels.²⁷ Moreover, local sources in Al-Hasakeh and Deir-ez-Zor Governorates reported that

water shortages and unaffordable water trucking have prompted households to drill artesian wells, whose water is often unclear.^{28,29}

Water from the main drinking water station in Raqqa reportedly reached four nephelometric turbidity units (NTU) in May.³⁰

(Continues on page 18)



This level of turbidity can be visible to the eye and thus affects the acceptability of drinking-water to consumers. High levels of turbidity can be dangerous because they can stimulate the growth of bacteria and make disinfection less effective.³¹ In particular, water with turbidity above five NTU would not meet minimum water quality standards.³²

The increased turbidity was attributed to the decreased water levels of the Euphrates. Turbidity issues particularly affected communities after Al Baath Dam, located in Ar-Raqqa Sub-district, due to the presence of small and often muddy tributary water streams of the Euphrates. KIs in seven of the assessed communities in Karama Sub-district (Ar-Raqqa Governorate), reported that water was perceived to be making people sick.

Incidence of waterborne diseases

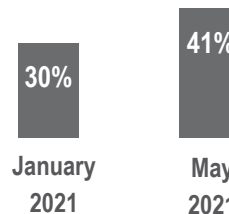
As access to safe drinking water has come under strain, the number of people contracting waterborne diseases is expected to go up. According to REACH's RNA conducted in June, in 35% of the assessed communities at least one of the contacted KIs reported that some community members experienced water related illnesses in the previous month. Deir-ez-Zor was the governorate with the highest proportion of communities where KIs reported that some community members experienced water-related illnesses (58%). WHO's Early Warning, Alert and Response System data shows

a 142% increase in reported weekly cases of acute diarrhoea in Deir-ez-Zor Governorate, from 20 March 2021 (week 11) to 1 May 2021 (week 17).³³ In 85% of the communities affected by waterborne diseases according to REACH's RNA, community members reportedly visited a health facility to seek treatment. In particular, pharmacies were the most commonly cited facility where people sought treatment, followed by private clinics and primary care facilities. In the remaining communities where people reportedly did not seek treatment, problems with access to healthcare, including the lack of nearby hospitals and the high cost of healthcare, were mentioned.

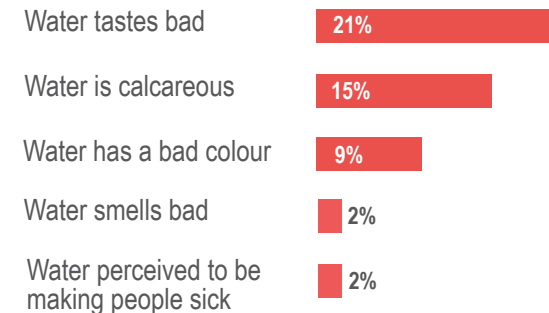
Impact on health facilities

Decreased or interrupted provision of water through water networks could highly impact health facilities. Among the 123 public health centres that were functioning in NES at the end of 2020, 75% relied on the main pipeline as the main source of water. Public health centres in NES were also ill-equipped for electricity shortages, which would inhibit the provision of health services depending on a steady supply of electricity. In fact, 76% of the functioning public health centres did not have a generator as of the end of 2020. Moreover, 28% of them did not have refrigerators for vaccines, and reportedly sought support of a nearby municipality, school or house to store vaccines and medicines.³⁴

Diarrhoea reported among health problems in the location (by % of communities where the interviewed KI was a medical/health professional)



Reported problems with drinking water (by % of communities)



% of communities where households did not have access to a healthcare service in the location nor in nearby locations

83%

Treatment for malnutrition

79%

First Aid/ Emergency care

77%

Paediatric consultations

Most commonly reported barriers to healthcare access (by % of communities)

- 1 Cost of health services 86%
- 2 Lack of transportation to health facilities 72%
- 3 Cost of transportation to health facilities 68%

Most commonly reported healthcare needs (by % of communities)

- 1 Treatment for chronic diseases 65%
- 2 Medicines 53%
- 3 Paediatric consultations 45%



A continued decrease of the water levels in the Euphrates and persistent drought conditions will likely result in high levels of vulnerability across the region. Coupled with the effects of the economic collapse and eroding infrastructure, critically low access to water resources is expected to have a multidimensional impact on people's lives.

Water and electricity availability outlook

A continued lowering of water levels in the Euphrates would mean that water stations will be further impacted along the Euphrates and related bodies of water. To cope with reduced water access from the main network, people will likely start relying on other water sources. REACH's RNA finds that in most assessed communities the secondary source of water is water trucking followed by surface water which has little oversight on quality. In fact, to bypass the water station functionality, some water trucking pumps water directly from the Euphrates into tankers. If not properly treated, this could cause increased health risk.

Water scarcity would only be further impacted by the shutting down of Tishreen and Tabqa dams, which provide electricity for many of the water pumping stations and private well pumps around the Euphrates. Not only may people be forced to find alternatives such as generators for their household power needs, but also for water access. Whether this is from a private generator or public shared generator, the added cost will be more than most households can afford. Because of the regional importance of the river and its related bodies, it is clear that such a major limitation of its resources will mean decreased water and electricity access. It is unlikely that a water source as relied upon as the Euphrates can be completely bypassed without consequences. People will likely be forced to reduce water usage if the situation continues.

Reported coping mechanisms point to households reducing water for purposes other than drinking while possible. Reduced access to water could pose a barrier to complying with COVID-19

prevention measures. People in 9% of the communities assessed in May reportedly washed their hands less frequently due to a lack of water and over 40% of communities saw bathing less frequently and doing laundry less frequently as coping strategies. These practices can increase the risk of skin diseases such as leishmaniasis, which is already a reported issue across NES (reported in 22% of the communities where the interviewed KI was a medical/health professional).

Decreased water access will also mean people turning to less safe sources of water. According to REACH's RNA, a total of 16% of KIs reporting on communities connected to affected water pumping stations said that households use surface water as an alternative source of water.▼ KIs also reported that no methods (such as boiling, chlorinating, etc.) are commonly used by households to make water safer. This is concerning because surface water is not suitable for drinking without treatment.³¹ As water becomes less available, households will likely have to rely more on untreated water for cooking, washing clothes, and even drinking.

The health risk associated with unsafe water is linked to the presence of pathogenic bacteria, viruses and parasites that cause infectious diseases. While the consumption of contaminated drinking water is the highest risk, waterborne diseases can also spread through other routes of transmission, including contact and inhalation.³¹ With water and electricity shortages limiting the operations of health facilities, treating illnesses will be increasingly challenging. Moreover, the availability of medicines to treat waterborne diseases is already low in health facilities in NES. In the last quarter of 2020, 55% of the functioning public health centres in Syria did not have oral rehydration solution (ORS) and 49% did not have antibiotics to cover one month of needs.³⁴ If households are unable to access sufficient quantities of safe water to meet their drinking and domestic needs, outbreaks of waterborne illnesses and heightened risk of contracting COVID-19 and skin diseases can be expected.

Agriculture under strain

Farmers and livestock breeders face a multitude of challenges in the next agricultural season. Low yields from the winter cropping season limit access to cash for the preparation of the next season. Moreover, a lack of revenue means that many farmers are unable to pay off debt acquired in the past season. According to REACH's RNA, farmers in 38% of assessed communities plan on spending income from other livelihood activities on agriculture to be able to continue operations.▼ Households whose only source of livelihood is farming are expected to experience severe financial strain.

Further, farmers in 60% of assessed communities reportedly plan on going into debt to buy seeds for the upcoming season. However, seeds availability will likely be limited due to the high levels of crop damage.▼ KIs in 40% of assessed communities indicated that farmers intend to plant their land with seeds from last year's harvest.▼ Available seeds will likely be of inferior quality, meaning they are less resistant to diseases, impacting next season's production rates.

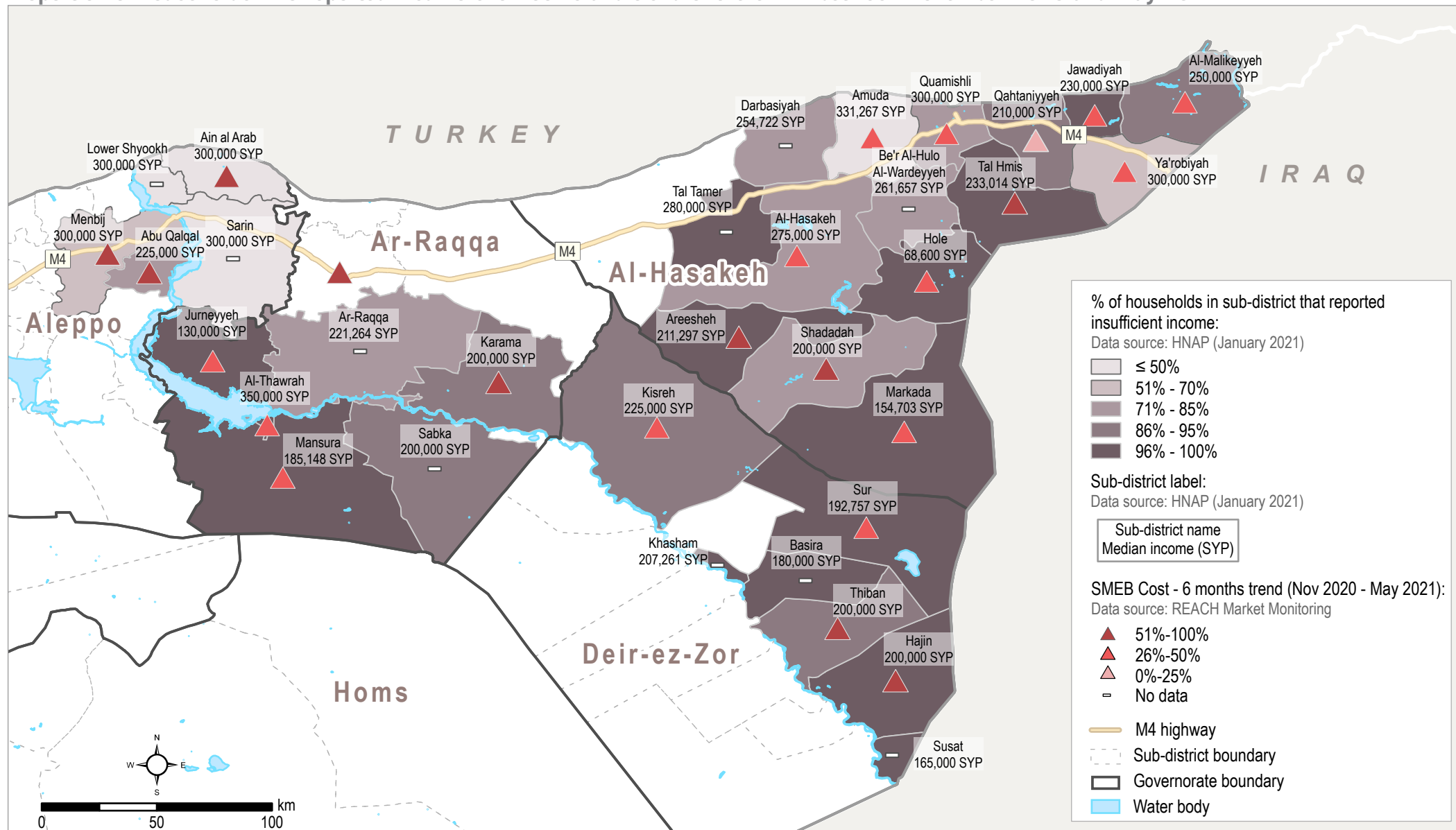
A further reduction in available water resources is expected to decrease irrigated areas. As water levels in the Euphrates decrease, pumping stations have started to reduce their pumping hours or shut down all together. As a result, farmers have had to draw water from a greater distance increasing their demand for fuel. Alternatively, farmers rely on private irrigation sources such as wells. However, long term drought and historical over-extraction may affect the replenishment of groundwater. Agricultural irrigation would need to pull water from existing water resources, further stretching groundwater reserves for as long as the drought conditions persist.◀

Moreover, if rainwater does not sufficiently replenish water reserves, and increased reliance on groundwater continues, boreholes and private wells would begin to run dry and would need to be extended further into the ground to operate.◀

(Continues on page 21)



Proportion of households who reported insufficient income and trend of the SMEB between November 2020 and May 2021





Continued interruption of irrigation will likely affect the productivity of strategic crops such as cotton as well as various vegetables this summer. With irrigation becoming too expensive and less reliable, farmers may consider scaling down cultivation of water-intensive crops. REACH findings show that farmers in 8% of assessed communities plan to change crop type in the coming season. ▽ Among the crops farmers are changing to are aromatic crops like cumin, which are less water dependent.

To cope with the difficult economic situation, farmers and livestock breeders plan on selling or renting out their assets in the coming season. According to KIs, farmers in 78% of assessed communities plan to rent out their land to others, while livestock breeders in half of assessed communities reportedly intend to sell their livestock assets in the next season. ▽ KIs in just eight communities reported that farmers plan to sell their land. ▽ While these strategies might provide some respite in the short term, they are by no means a sustainable solution. Rented land will not be cultivated and a lack of fodder makes buying livestock less preferable, which will likely decrease the purchase price.

Both strategies indicate that for some families, farming is no longer economically sustainable, and alternative sources of income may offer more stability. However, with households looking for other livelihood opportunities, pressure on the labour market likely increases. Moreover, lower agricultural production raises the demand for imported goods, possibly impacting food prices and access to certain food items.

Economic vulnerability

Over the last year and a half, the economic crisis in Northeast Syria accelerated. Prices are soaring and the value of the SYP has dropped to a record low. REACH finds that the cost of the basic SMEB more than doubled in the last year ▶, while according to H NAP²³ the proportion of households whose income was insufficient went up from 51% to 79% between

January 2020 and January 2021. HSOS findings suggest that households are going into debt, foregoing critical needs, and are selling assets in order to pay for basic items and services. ▲

With water, electricity, and food prices expected to increase as a result of water shortages, meeting basic needs will only become more difficult for families. In order to look at how compounding economic factors may be affecting areas differently, the map on page 20 shows the geographical distribution of three indicators: the proportion of households who reported insufficient income in January 2021, the median reported incomes in January 2021 per subdistrict, and the SMEB trend between December 2020 and May 2021. Tal Tamer, Tal Hmis, and Areesheh sub-districts (Al-Hasakeh governorate) as well as Hajin sub-district (Deir-ez-Zor governorate) are highlighted as particularly vulnerable to further price hikes. The high rates of perceived income insufficiency (between 95-100% of households) and the at least 50% increase of the SMEB cost in the last 6 months exposes the sub-districts to increased economic risk. The SMEB water component in Areesheh was already 50% more expensive than the regional median, while in Hajin the price for manually refined diesel was 70% more expensive than the regional median. ▶

Households relying on agriculture will likely be vulnerable to a worsening of the situation. Especially households who already reported insufficient income from agriculture or livestock activities would be hit hard by a loss of income and further increase of operational costs as a result of a lack of water resources. The map on page 22 highlights the areas in which a high proportion of households rely on agriculture or livestock and where high levels of income insufficiency were reported.²³ Tal Tamer (Al-Hasakeh governorate), Sarin, Jurneyyeh, (Ar-Raqqah governorate) and Kisreh (Deir-ez-Zor governorate) sub-districts are identified as particularly vulnerable to a loss of livelihood.

Displacement and social cohesion

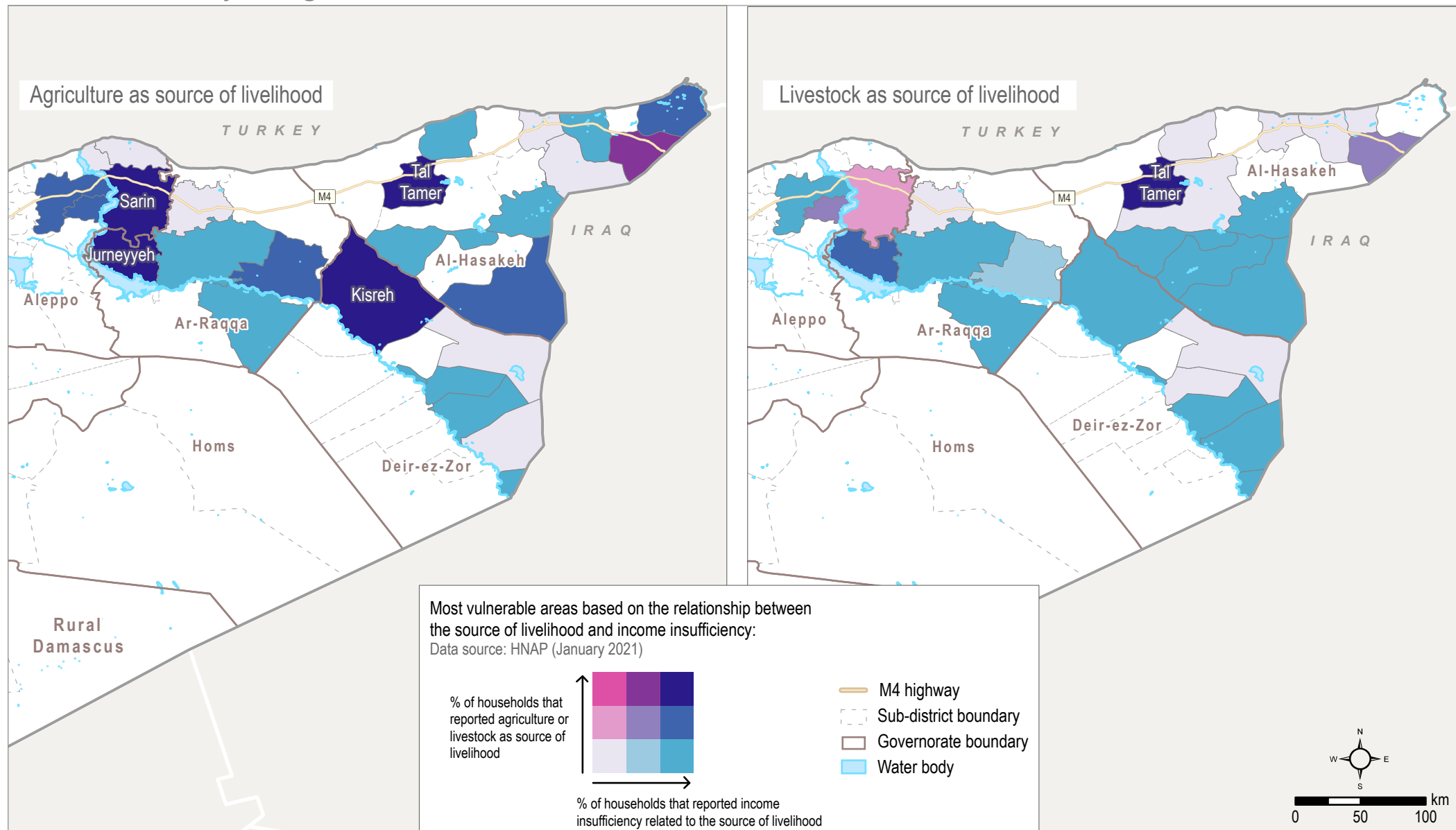
Finally, an important consideration is the understanding that water shortages like this are not simply isolated instances caused by unlikely weather patterns. A devastating drought affected much of Northeast Syria from 2007-2010, damaging crops, putting lives at risk and forcing significant migration into cities.³⁵ This drought, and the government's response to it, was thought to contribute to the inception of the unrest that eventually led to the civil war, although this theory is debated.³⁶ Regardless, climate change is increasing the volatility of weather patterns that regions have depended upon for hundreds of years, and the arid climate of the region means drought conditions will continue to occur in the future.

While it is impossible at this time to make direct comparisons to the severity of this drought and the previous one, we know that conditions families face in Syria currently are much worse than they were pre-conflict. Coping strategies reported during the 2007 drought have been used for the past nine years by families facing economic collapse, conflict affected infrastructure, and psychological trauma, their ability to adjust behavior is limited to the alternatives that are left after a decade of conflict. The 2010 drought lasted approximately 3 years, affecting around 1.3 million people and causing the death of 80% of livestock.³⁷ This led to the migration of 200,000 – 300,000 people from agricultural areas into cities like Damascus, Hama, and Aleppo. With current areas of influence, it is more likely people would be forced to move into camps and informal sites near their residence rather than larger cities.

Additionally, over-extraction of groundwater is shown to decrease water levels over time, without being influenced much by rain levels.^{38,39,40} Responsible water usage will be just as important, if not more so, than predicting weather patterns going forward for NES. Without proper mitigation planning and water conservation, severe water shortages will continue to affect Syrians in the future.



Economic vulnerability from agriculture and livestock





Footnotes

- KIs could select multiple answers, thus findings might exceed 100%.
- ▼ Clarifying note: the unit of analysis for the RNA findings is % of communities, except when the narrative specifies the analysis was done only for communities affected by the impacted water stations. In this case, the unit of analysis is % of KIs.
 - a. Cold is here in reference to seasonal growing possibilities affected by colder seasonal weather.
 - b. This estimation is the sum of population figures of all communities, and settlements reportedly connected to water pumping stations that are at all affected by Euphrates water levels, rounded to the nearest thousand.
 - c. Latest water sufficiency data was collected through HSOS on 8-15 May, and therefore does not capture the latest changes in water access.
 - d. This number includes daily and seasonal workers employed in the agricultural sector.
 - e. Syria has been divided into five areas of stability according to the sustainability for rainfed crop production. Note that the classification which, is based on the average annual rainfall, dates back to 1975.
 - f. Winter crops include: barley, wheat, lettuce, tomato, onion, potatoes, etc.
 - g. Northeast Syria Agricultural Working Group (AWG) .
 - h. As harvest is ongoing and further analysis needs to be done, there are no final estimates on crop loss as of the time of writing. The estimated loss of rain-fed crops depends on the agricultural stability zone. According to local sources, losses go up to 95% of the cropland in some areas.
 - i. This percentage does not exclusively refer to work opportunities for daily workers.
 - j. In April, access issues prevented Market Monitoring from collecting data in Deir-ez-Zor governorate. Due to comparative difference between April and May, we chose to remove the April data from the graph to avoid misinterpretation of the trend.
 - k. This percentage does not exclusively refer to livelihoods needs and barriers for farmers.
 - l. 92% of communities rely on food purchased on local markets and markets in other communities.
 - m. According to the World Health Organization (WHO), high water temperature enhances the growth of microorganisms and may increase problems related to taste, odour, colour and corrosion. Wherever possible, water temperatures should be kept outside the range of 25–50 °C to prevent the growth of these organisms.

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About REACH

REACH facilitates the development of information tools and products that enhance the capacity of aid actors to make evidence-based decisions in emergency, recovery and development contexts. The methodologies used by REACH include primary data collection and in-depth analysis, and all activities are conducted through inter-agency aid coordination mechanisms. REACH is a joint initiative of IMPACT Initiatives, ACTED and the United Nations Institute for Training and Research - Operational Satellite Applications Programme (UNITAR-UNOSAT). For more information please visit our website: www.reach-initiative.org. You can contact us directly at: geneva@reach-initiative.org.