# Crop Monitoring and Food Security Situation Update

## North East Syria (NES)

*2020/2021 Winter Season Post-Harvest Overview*

North East Syria Agriculture Working Group (AWG), iMMAP
Food Security and Livelihood Unit (FSLU) & Geoinformatics Unit

iMMAP

North East Syria (NES)
FOOD SECURITY & LIVELIHOODS
Agriculture Working Group

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# Executive Summary

## Overview

Due to the overlapping water shortage and economic crises in North East Syria (NES), agricultural production has been dramatically reduced this year. A historic shortage of rainfall and irrigation water from the Euphrates River basin, high prices of agricultural inputs and harvesting, and poor access to improved seed varieties led to one of the worst harvests on record. This production shock is likely to cause both shortages and price increases for flour and bread, a cornerstone of the household diet in NES. Such reductions in availability and access to staple foods will create a major threat to food security over the next year to 18 months at least. The negative impacts of the water and economic crises – amidst the ongoing conflict dynamics and public health emergency – are also likely to threaten livelihood and food security of people relying on agriculture for their livelihood (both farm owners and contracted formal or short-term informal laborers), both in the immediate loss of income and in the potential for the combined crises to deplete physical and human capital stocks.

## Key findings:

- Due in large part to failed rainfed crops, **18 sub-districts across NES recorded losses in harvested crop area of over 75%** – 13 were in Al-Hasakeh Governorate, including 7 with over 90% losses – affecting an estimated 60,087 people in agriculture-based livelihoods - 50,474 of which are farm owners – and an estimated 228,496 total people in agriculture-dependent households.
- **Summer cropping** - an important supplementary crop production strategy and revenue source - **was reduced significantly**, even in areas typically receiving higher levels of rainfall or irrigation water supply.
- **While many irrigated crops did not fail, they produced dramatically lower yields**. In a post-harvest survey, farmers planting rainfed crops reported zero yield, while irrigated crops faced losses of 17-55%, with irrigated soft wheat yields in Al-Hasakeh reduced by 50% and in Ar-Raqqa reduced by 37%.
- **Crop failures and lower yields have resulted in a massive reduction in wheat sold to the Self Administration of Northeast Syria (SANES) compared to 2020**. According to SANES, as of 14 August 2021, only 200,000 tonnes of wheat were sold to the Self-Administration mills and silos – far short of the projected 300-400,000 tonnes in the season and even further from the 950,000 tonnes produced in the 2020 season.[1] This shortage is projected to cause a 250,000 tonne shortage of bread flour for bakeries in the coming year.[2]
- Analysis of the impact of the less-severe drought year of 2018 on bread and staple grain prices indicated that **the impact of the crisis on food prices could last into 2023**, and possibly much longer if fundamental challenges in agricultural production are not addressed (and if future rainfall patterns remain erratic).
- **Among farmers in NES, irrigation appears to be a secondary concern to high cost of inputs and harvesting and declining seed quality** (particularly of concern in Ar-Raqqa). Intervening to correct these structural factors is crucial to ensuring that future crop production can replenish grain stocks.
- **Threats to availability and affordability of key staples, along with alarming results of localized malnutrition surveys, raise the alarm for the potential for the multiple overlapping crises to result in a crisis of malnutrition.** Further monitoring capacity and attention to nutritional interventions are needed to adequately address this looming crisis.

1 iMMAP (July 2021). Water Dynamics, Crises, and Challenges in Northeastern Syria.

2 Data on recent wheat harvests from NES AWG Coordination Team, originally released by SANES Economic Office.

## Recommendations

- Continue and increase support to bakeries and other wheat-to-bread value chain actors over the coming year to 18 months to ensure supply meets demand and to correct for price increases due to poor harvests.
- Provide short-term food support to households relying on agriculture-based livelihood activities to ensure food security before the next winter crop harvest - particularly in the lean months leading up to harvest in June-July of 2022.
- Humanitarian partners to arrange for an emergency response plan for importation of additional flour to fill the gaps inflicted by the poor harvests.
- Support silos, bakeries, and mills with rehabilitation and production costs to increase production capacity of wheat-to-bread actors and availability of bread.
- Support farmers with agricultural inputs like working capital for harvesting costs and seed access to ensure that they can produce in future seasons and implement agronomic strategies to adapt to erratic rainfall patterns.
- Support the development of a sustainable value chain to procure, process, and disseminate high-quality and drought-tolerant varieties of seeds within NES, including laboratory capacity to test, store, and propagate such varieties. This will increase access to needed seed varieties to stretch the thinning water budget of the region and increase the speed with which humanitarian and development actors can move to shore up production if subsequent bad seasons strike again.
- Support rehabilitation and expansion of irrigation infrastructure and access to sustainable, safe, and consistent water resources. Continue to support repair of irrigation infrastructure in conflict-affected areas. Focus on improved, water-efficient irrigation technology and on sustainable water sources not dependent on cross-border provision.
- Support the development of a strong humanitarian nutrition monitoring program – and continue monitoring the nutritional quality of bread produced and the nutritional status of the population in NES. Also, support the capacity of actors deploy malnutrition interventions, including support to the Nutrition Working Group in Whole of Syria and NES, inclusion of nutrition-sensitive interventions in Food Security and Livelihoods programming, and prepositioning of malnutrition treatment supplies.

# Introduction

## Triple Water Crisis Across NES

In a 4 May 2021 report, FAO declared a drought for portions of Syria, principally including North East Syria (NES), which has historically been the breadbasket of the country.[3] This report corroborated reports from the Global Drought Observatory (GDO) in April 2021 on drought in Eastern Syria and northern Iraq, and subsequent briefing papers in June 2021 from OCHA, REACH, and the NES Forum.[4] On 30 May 2021 iMMAP's mid-season Crop Monitoring and Food Security Situation Update (CMFSS) using iMMAP Data Cube remote sensing, demonstrated how unseasonably low and erratic rainfall was driving a massive decrease in vegetation cover in NES.[5] The "triple water crisis" in NES has been detailed in a series of reports, including iMMAP's July report on water dynamics and NES Forum's June briefing paper.[6]

Historically low and erratic rainfall across NES, and particularly in the major agricultural production area of Al-Hasakeh Governorate, has been coupled with massive declines in available water from cross-border sources in Turkey flowing along the Euphrates River and the Alouk Water Station. Based on district-level rainfall statistics produced by the WFP VAM Seasonal Monitor (cumulative millimeters between September and April), Al-Hasakeh district was hit hardest by low rainfall this year. Growing season rainfall totals reduced by 31-33% - including reductions of 149 mm in Al-Malikkiyeh district and 119 mm in Quamishli district- compared to the long-term average, while districts in other governorates recorded 9-28% declines. During the devastating drought year of 2018 Al-Hasakeh governorate recorded rainfall reductions of 7-11%, most districts in NES had low-single-digit percentage decreases and selected districts in Aleppo and Deir-ez-Zor governorates recorded rainfall increases of 7-32%.[7] Low rainfall and cross-border river flows from Turkey have resulted in dramatic reductions in available water downstream in the Euphrates River basin, including the Khabour River water flow failing this year as reported in the iMMAP July water dynamics report.

3 FAO (May 2021). GIEWS Country Brief: The Syrian Arab Republic.

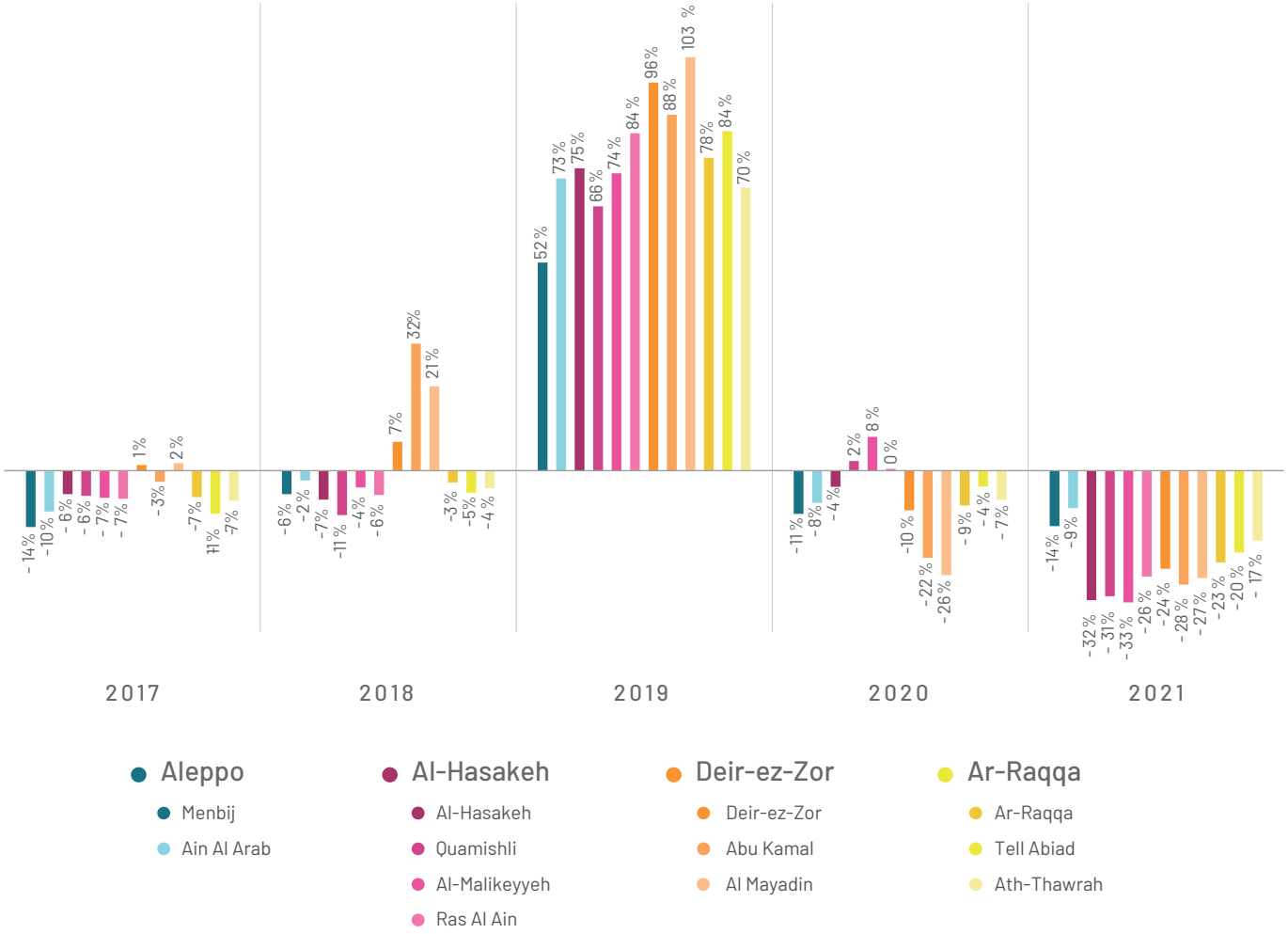
4 Global Drought Observatory (April 2021). Drought in Syria and Iraq – April 2021. edo.jrc.ec.europa.eu
REACH (June 2021). Briefing Note: Humanitarian Situation Overview in Northeast Syria, June 2021.
OCHA (June 2021). Syrian Arab Republic: Euphrates Water Crisis & Drought Outlook.
NES Forum (Jun 2021). Humanitarian impact of low Euphrates water levels and Drought in Northeast Syria.

5 iMMAP and NES AWG (May 2021). Crop Monitoring and Food Security Situation Update: Impact of low rainfall and other water stressors on winter crops – iMMAP Data Cube.

6 iMMAP (July 2021). Water Dynamics, Crises, and Challenges in Northeastern Syria.

7 WFP VAM. Dataviz Visualizations: Seasonal Explorer: Rainfall and Vegetation. dataviz.vam.wfp.org

**Figure 1:** *Percent Change in Winter Growing Season (Sep-Apr) Rainfall Totals in NES by District, 2017-2021*




** District Rainfall Totals and Long Term Averages from WFP VAM Seasonal Observer Database*
*** Rainfall Totals calculated as total rainfall over growing season: September April*

These combined crises affect the water available for both rainfed and irrigated staple crop production during the winter season, which ended in July 2021, and the ongoing summer cropping season, as well as the livestock production cycle. The water crisis also overlaps with an ongoing economic crisis linked to the COVID-19 pandemic and to the ongoing conflict dynamics, which has dramatically affected the cost and availability of agricultural inputs. Agricultural production in NES is in turn a vital source of both food products and livelihood in NES, and a key supplier of wheat for all of Syria and the Levant region. This study assessed the threats to food and livelihood security for agricultural producers and the broader population of NES from the overlapping crises.

# Harvest and Production

## Self-Administration Reporting

On 13 July 2021, the Self Administration in North East Syria (SANES) Economic Office reported that the amount of wheat sold to SANES silos and mills across NES was around 159,000 tonnes as of the end of the harvest season on July 6, 2021. On 14 August 2021 this was revised upward to 200,000 tonnes.[8] This quantity of purchased wheat fell far short of SANES wheat production projections of about 300,000-400,000 tonnes, leading to speculation that local farmers were holding onto their wheat produce in hopes of obtaining better prices. The total wheat harvest projection of up to 400,000 tonnes also represented a revised estimate from the Economy and Agriculture Commission for North and East Syria, which in early June estimated that the 2021 harvest at about 500,000 tonnes of wheat. All of these figures are far short of the estimated 600,000 tonnes required for domestic bread production and the 950,000 tonnes harvested in the 2020 crop harvest season.SANES further reported that if no more wheat is brought to SANES silos and mills, there will be a flour shortage of 250,000 tonnes in the current season.[9]

## Data Cube Harvested Area Analysis

iMMAP Data Cube analysis recorded a massive decrease in harvested crop area from previous seasons. Analysis presented on harvested crop area utilizes the NDVI thresholding method presented in the mid-season paper on the water crisis impact on agriculture in NES, extended by measuring NDVI progression over three scenes: crop planting in November and December of the previous year, season peak in March and April, and crop harvest in June to mid-July, for the past five seasons – 2017-2021. A mask is applied on low-lying and riverine areas to reduce noise from background vegetation. As reported in the mid-season paper, while remote sensing-derived estimates may differ from official statistics, the method allows useful comparison of cropping seasons between years.

Crop area harvested or replanted across NES in the current 2020-2021 winter season is compared to the 2019-2020 winter season, except in the center and east line areas of Deir-ez-Zor governorate, where widespread conflict associated with the campaign against ISIS from late 2017 to late 2019 led to damaged irrigation infrastructure during the 2019-2020 season. This infrastructure was partially repaired, primarily in Government of Syria (GoS)-controlled areas, ahead of the 2020-2021 season, inflating the comparative performance between 2021 and 2020 in contrast to the rest of NES. Therefore, 2016-2017 winter season is used in comparison, as the last year in which irrigation infrastructure was functioning at a "normal" post-2011 level. Comparison to the exceptionally high rainfall in the 2018-2019 winter season is less relevant operationally, while comparison to the drought in the 2017-2018 winter season creates distorted percent changes due to the very low crop production level in that year.[10]

Overall, winter crop area harvested declined dramatically across NES between the 2020 and 2021 harvest seasons, with the largest declines in Al-Hasakeh governorate. Furthermore, crop area harvested in Al-Hasakeh governorate declined compared to the drought year of 2018, while it improved in other governorates - likely due to the irrigation infrastructure interventions discussed above.

8 Key informant interview with members of SANES Economic Office (14 August 2021).

9 iMMAP (July 2021). Water Dynamics, Crises, and Challenges in Northeastern Syria.

10 The method is described in more detail in an iMMAP Geoinformatics Methodology Note available separately by emailing pfrost@immap.org.

**Table 1:** *Total Winter Crop Area Harvested or Replanted in Hectares 2017-2021, by Governorate.*

| Governorate | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| Aleppo | 66,432 | 27,980 | 568,527 | 294,804 | 83,356 |
| Al-Hasakeh | 439,044 | 204,037 | 1,432,585 | 1,160,312 | 169,663 |
| Deir-ez-Zor | 87,468 | 26,296 | 275,447 | 105,466 | 71,810 |
| Ar-Raqqa | 91,318 | 71,172 | 936,766 | 335,708 | 114,091 |
| **NES Total** | **684,262** | **329,485** | **3,213,324** | **1,896,291** | **438,920** |

## Sub-districts and Farmers Affected

The impact of poor crop growth and harvest during the 2020-2021 cropping season on the population relying on income from agricultural activities across NES was estimated using data on employment in agriculture from the most recent Humanitarian Needs Assessment Programme (HNAP) population survey in Syria conducted in May and June 2021. All figures presented represent estimates from survey data subject to sampling error and should not be interpreted as exact statistics. According to estimates of working-age individuals (15 years and older) participating in agriculture-based livelihoods (crops, livestock, or fishing) – including farm owners, contracted employees, and informal laborers – an estimated 165,301 individuals participate in agriculture-based livelihoods across NES, residing in 146,403 households.[11] Based on HNAP data for the share of people in agriculture-based livelihoods who own their operation, are formally contracted employees, or are informal laborers at the governorate level,[12] approximately 135,441 of these are farm owners, 4,720 are contracted (formal) employees, and 25,097 are informal farm laborers. Applying the average household size from the HNAP population survey for each sub-district to the number of agricultural households, 709,283 people across NES are reliant on agriculture-based livelihoods and thus are directly affected by the livelihood impacts of drought conditions on agriculture in the 2021 harvest season.[13]

Al-Hasakeh governorate appeared to be most impacted in terms of percent loss of hectares of crop harvested or replanted. Thirteen sub-districts across Al-Hasakeh governorate lost at least 75% of crop hectarage, with three losing over 95% and four more over 90%. Three sub-districts in northeastern Aleppo governorate also lost over 75% of crop hectarage, while Jurneyyeh sub-district in Ar-Raqqa[14] lost 77% and Kisreh sub-district in Deir-ez-Zor lost 79% of harvested crop hectarage. According to HNAP estimates, in these most affected sub-districts a total of approximately 60,087 working-age individuals' primary livelihood activity is agriculture-based, including 18,804 people in Al-Hasakeh governorate, 28,751 people in Aleppo governorate, 4,231 people in Ar-Raqqa governorate, and 8,301 people in Deir-ez-Zor governorate. About 50,474 of these individuals are farm owners.[15] An estimated 228,496 people live in households relying on agriculture-based income sources affected by the livelihood impacts of the triple water crisis within these most affected sub-districts.

11 While this figure encompasses individuals 15 years of age and older, it should be noted that in NES, agricultural production can involve entire family units. This figure should be taken as a lower estimate of all individuals participating in agricultural production.

12 Governorate-level data is used to ensure that these figures are statistically representative, due to small sample sizes at the sub-district level when disaggregating. As a result, these figures are indicative but not necessarily representative for each sub-district.

13 HNAP (August 2021). Syria: Socioeconomic Situation Summer 2021.

14 For Ar-Raqqa and Al-Hasakeh governorates, sub-districts under Turkish control in the Peace Spring Operation zone are not reported: Tell Abiad, Suluk, and Ein Issa in Ar-Raqqa and Ras Al Ain in Al-Hasakeh. Each of these sub-districts lost at least 75% of harvested crop hectarage compared to 2020.

15 HNAP (August 2021). Syria: Socioeconomic Situation Summer 2021.

As mentioned above, sub-districts in the center and east line of Deir-ez-Zor governorate appeared less impacted in 2021 compared to 2020, though these governorates recorded losses compared to the more useful comparison year of 2017. Still, these losses were lower than those experienced in areas relying more on rainfed production. Ultimately, this suggested that while agriculture in Deir-ez-Zor governorate recovered from its nadir during the drought- and conflict-affected 2017-2018, 2018-2019 and 2019-2020 winter seasons, attributed to the critical irrigation infrastructure repairs, the recovery has not reached the levels of the post-2011 "normal" that existed prior to the campaign against ISIS.

Furthermore, most of this "recovery" has been concentrated in GoS-controlled sub-districts south of the Euphrates River. The sub-districts of Ashara, Abu Kamal, Al Mayadeen, Jalaa, and Muhasan – all center and east line sub-districts located fully south of the Euphrates River – experienced gains in total crop area harvested of 66 to 236% compared to 2020, including gains of 95 to 442% in irrigated crop area harvested (those reaching the NDVI > 0.65 threshold during winter cropping season peak), while most sub-districts across NES recorded massive losses in irrigated crop areas harvested compared to 2020. However, compared to 2017, these same sub-districts recorded losses of total crop area harvested of 11 to 67% and losses of irrigated crop area harvested of 12-68%, except for Muhasan sub-district which gained 11% of irrigated crop area harvested (while losing 18% of total crop area harvested). Similar to these center and east line sub-districts, the west line district of Tabni, also in GoS territory recorded a 9% gain in total crop area harvested compared to 2020, but a 6% loss compared to 2017. Despite gains in crop area harvested in GoS-controlled sub-districts in Deir-ez-Zor governorate relative to 2020 due to repaired irrigation infrastructure, the situation is still far from a complete recovery.

**Figure 2:** *Map of Change in Total Harvested Crop Area and Agriculture-based Livelihoods in NES, 2021 versus 2020 (and 2017).*

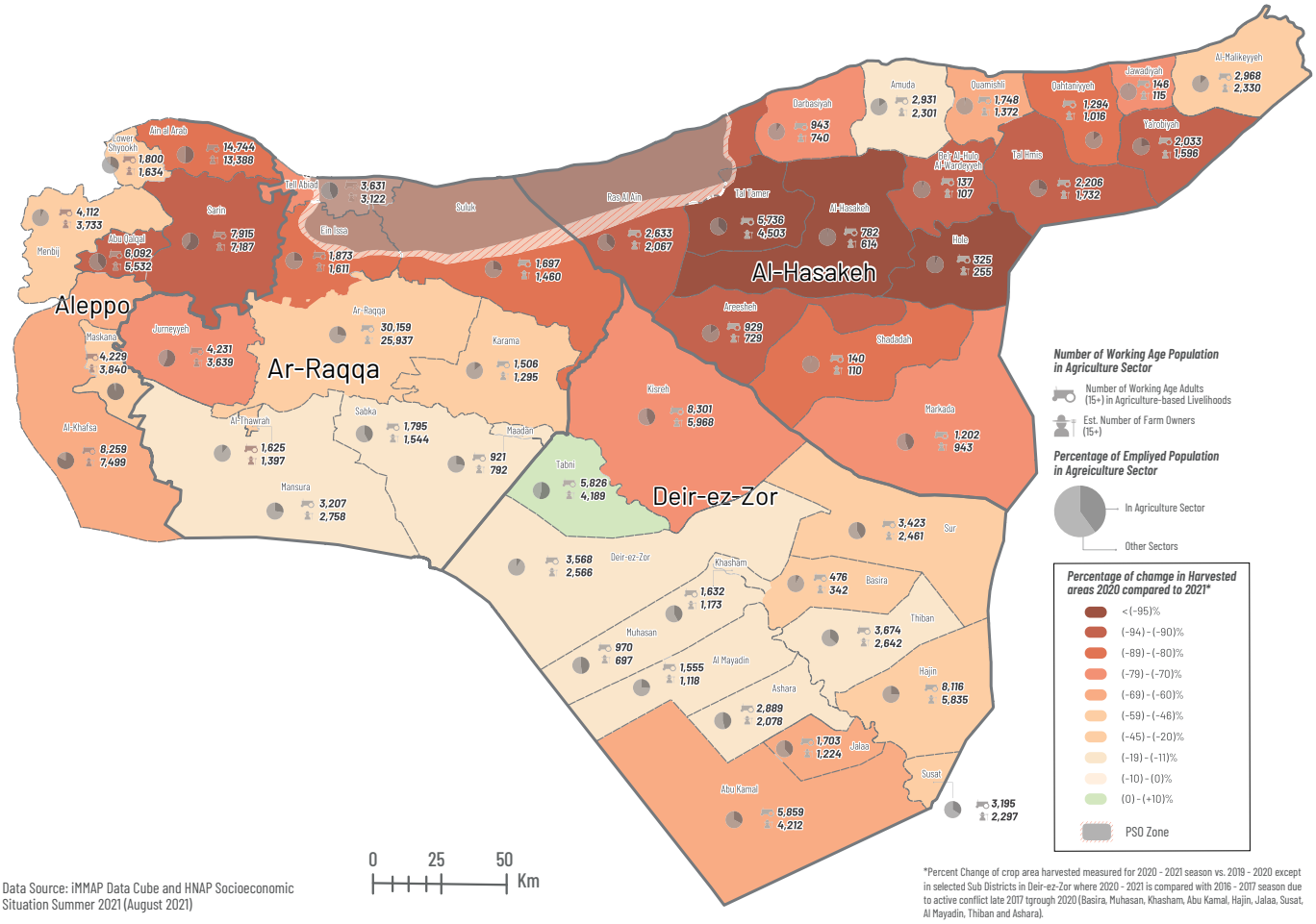


**Figure 3:** *Population Affected by Livelihood Impacts of Water Scarcity for Agriculture*

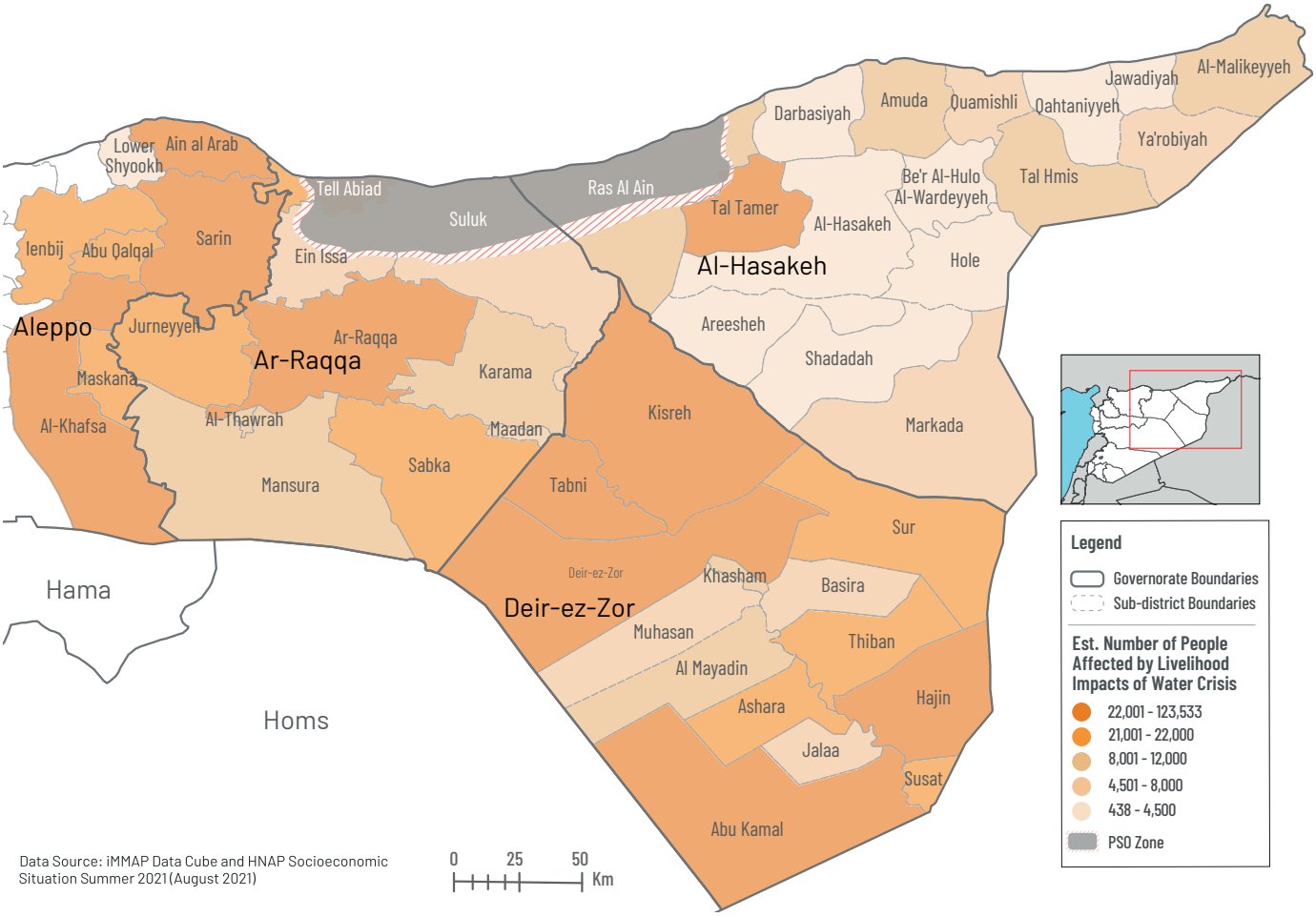


**Table 2:** *Sub-districts Categorized by Percent Change of Harvested Crop Area, 2020* compared to 2021.*

| % Change 2021 vs. 2020* | Governorate | Sub-districts Impacted (% / # of working age population (15+) in agriculture-based livelihoods ) | Estimated number of working age individuals (15+) in agriculture-based livelihoods (# of farm owners**) | Estimated number of people affected by livelihood impacts from water scarcity*** | Governorate % Farm Owners vs. Formal vs. Informal Farm Laborers**** |
|---|---|---|---|---|---|
| >-95% | Al-Hasakeh (3 SD) | Hole (5.9% / 325), Tal Tamer (37.6% / 5,736), Al-Hasakeh (1.9% / 782) | 6,843 (5,372) | 27,785 | 78.5% - 12.3% - 9.2% |
| -90-94% | Aleppo (2 SD) | Sarin (59.7% / 7,915), Abu Qalqal (39.6% / 6,092) | 14,007 (12,718) | 45,742 | 90.8% - 0.2% - 9.0% |
| | Al-Hasakeh (4 SD) | Areesheh (15.1% / 929), Tal Hmis (29% / 2,206), Ya'robiyah (22.7% / 2,033), Be'r Al-Hulo Al-Wardeyyeh (5.2% / 137) | 5,305 (4,164) | 20,507 | 78.5% - 12.3% - 9.2% |
| -80-89% | Aleppo (1 SD) | Ain Al Arab (50.6% / 14,744) | 14,744 (13,388) | 43,973 | 90.8% - 0.2% - 9.0% |
| | Al-Hasakeh (3 SD) | Shadadah (2.3% / 140), Amuda (15.3% / 2,931), Qahtaniyyah (14% / 1,294) | 4,365 (3,427) | 15,399 | 78.5% - 12.3% - 9.2% |
| -75-79% | Al-Hasakeh (3 SD) | Jawadiah (2% / 146), Markada (43.9% / 1,202), Darbasiyah (9% / 943) | 2,291 (1,798) | 8,229 | 78.5% - 12.3% - 9.2% |
| | Deir-ez-Zor (1 SD) | Kisreh* (44.1% / 8,301) | 8,301 (5,968) | 47,412 | 71.9% - 0.5% - 27.6% |
| | Ar-Raqqa (1 SD) | Jurneyyeh (57% / 4,231) | 4,231 (3,639) | 19,449 | 86.0% - 3.4% - 10.5% |
| -60-69% | Aleppo (1 SD) | Al-Khafsa (82.9% / 8,259) | 8,259 (7,499) | 37,076 | 90.8% - 0.2% - 9.0% |
| | Al-Hasakeh (1 SD) | Qamishli (3% / 1,748) | 1,748 (1,372) | 6,183 | 78.5% - 12.3% - 9.2% |
| | Deir-ez-Zor (2 SD) | Jalaa* (38.8% / 1,703), Abu Kamal* (33.5% / 5,859) | 7,562 (5,437) | 29,682 | 71.9% - 0.5% - 27.6% |
| -50-59% | Aleppo (2 SD) | Manbij (6.8% / 4,112), Lower Shyookh (34% / 1,800) | 5,912 (5,368) | 22,243 | 90.8% - 0.2% - 9.0% |
| | Ar-Raqqa | Karama (14.5% / 1,506) | 1,506 (1,295) | 8,172 | 86.0% - 3.4% - 10.5% |

| | | | | | |
|---|---|---|---|---|---|
| -20-45% | Aleppo (1 SD) | Maskana (97.3% / 4,229) | 4,229 (3,840) | 19,144 | 90.8% - 0.2% - 9.0% |
| | Al-Hasakeh (1 SD) | Al-Malikeyyeh (12.6% / 2,968) | 2,968 (2,330) | 10,210 | 78.5% - 12.3% - 9.2% |
| | Deir-ez-Zor (4 SD) | Sur (41.6% / 3,423), Susat* (33.7% / 3,195), Hajin* (25.9% / 8,116), Basira* (7.6% / 476) | 15,210 (10,936) | 72,358 | 71.9% - 0.5% - 27.6% |
| | Ar-Raqqa (2 SD) | Al-Thawrah (11.3% / 1,625), Ar-Raqqa (27.5% / 30,159) | 31,784 (27,334) | 133,234 | 86.0% - 3.4% - 10.5% |
| -5-19% | Deir-ez-Zor (6 SD) | Deir-ez-Zor (9.2% / 3,568), Muhasan* (47.7% / 970), Thiban* (36.6% / 3,674), Khasham* (41.6% / 1,632), Al Mayadeen* (25.6% / 1,555), Ashara* (46.4% / 2,889) | 14,288 (10,273) | 86,153 | 71.9% - 0.5% - 27.6% |
| | Ar-Raqqa (3 SD) | Sabka (41.6% / 1,795), Mansura (28.2% / 3,207), Maadan (27.9% / 921) | 5,923 (5,094) | 29,164 | 86.0% - 3.4% - 10.5% |
| +0-10% | Deir-ez-Zor (1 SD) | Tabni (53.6% / 5,826) | 5,826 (4,189) | 27,164 | 71.9% - 0.5% - 27.6% |

* Percent loss of crop area harvested measured for 2020-2021 season vs. 2019-2020, except in center and east line areas of Deir-ez-Zor governorate where 2020-2021 is compared to 2016-2017 season due to active conflict late 2017 through 2020.

** Calculated by multiplying the estimated number of people working in agriculture-based livelihoods by the governorate-level percentage of those working in agriculture-based livelihoods who own the business in which they make their livelihood. All figures presented represent estimates from survey data subject to sampling error and not interpreted as exact statistics.

*** Calculated by multiplying the estimated number of people working in agriculture-based livelihoods by the average household size (based on HNAP population survey) in each sub-district. All figures presented represent estimates from survey data subject to sampling error and not interpreted as exact statistics.

**** Percentage of people working in agriculture-based livelihoods who are business owners, fixed-term or contracted employees (formal) or day laborers (informal). Calculated on governorate level due to small sample sizes in each sub-district, thus figures are indicative but not necessarily representative for each sub-district. All figures presented represent estimates from survey data subject to sampling error and not interpreted as exact statistics.

**Table 3:** *Sub-districts in Deir-ez-Zor Governorate Center and East Lines Categorized by Percent Change of Harvested Crop Area, 2017 compared to 2021.*

| % Change 2021 vs. 2017 | Governorate | Sub-districts Impacted (% / # in agriculture-based livelihoods) |
|---|---|---|
| +0-30% | Deir-ez-Zor | Hajin (25.9% / 8,609), Susat (33.7% / 3,292), Basira (7.6% / 476), Khasham (41.6% / 1,632), Thiban (36.6% / 3,674) |
| +50-70% | Deir-ez-Zor | Ashara (46.4% / 2,889), Abu Kamal (33.5% / 6,049) |
| +100-240% | Deir-ez-Zor | Al Mayadin (25.6% / 1,555), Jalaa (38.8% / 1,893), Muhasan (47.7% / 970) |

Estimates of crop area harvested also recorded the area of crops which appeared to have been either replanted or planted for the summer cropping season. The mid-season CMFSS mentioned replanting summer crops after winter crop failure as a potential coping strategy for farmers, as well as the potential for negative impact of low Euphrates River flows on the subsequent summer cash cropping season, which relies primarily on irrigation water from the Euphrates River. Again, it appeared that the greatest proportional losses of summer cropping from 2020 (or 2017 for Deir-ez-Zor governorate) occurred in Al-Hasakeh governorate, where 12 sub-districts lost at least 75% of summer crop hectarage compared to 2020, with four sub-districts above 90% losses.

Al-Malikeyyeh sub-district, which lies in the rainiest region of northeastern Al-Hasakeh governorate and which recorded a 35% reduction in total crop area harvested, lost almost 24,000 hectares of summer crops, an 83% loss compared to 2020. Meanwhile Ar-Raqqa sub-district, with over 30,000 working age individuals in agriculture-based livelihoods and several large irrigation networks, recorded much smaller proportional losses: 23% reduction of total harvested crop area against 2020, 11% of irrigated crop area lost, and 12% of summer crop area lost. However, localized losses in Ar-Raqqa sub-district should not be ignored, and losses in irrigated lands along the Euphrates River are more likely to come not in a reduction of area under cultivation, but in the quality of the harvest from those lands – both in terms of crop yield per hectare and in terms of nutritional quality (protein content) of harvested grains and profitability of cash crops (including widespread reports that profitable but water-intensive crops like cotton were not cropped in the current year due to water scarcity).

**Table 4:** *Sub-districts Categorized by Percent Change of Confirmed Summer Crop Area, 2020* compared to 2021.*

| % Change 2021 vs. 2020* | Governorate | Sub-districts Impacted (Change in hectares) |
|---|---|---|
| >-95% | Al-Hasakeh | Tal Hmis (-6,031 ha), Hole (-2,206 ha) |
| -90-94% | Al-Hasakeh | Ya'robiyah (-6,819 ha), Al-Hasakeh (-9,615 ha) |
| -80-89% | Aleppo | Abu Qalqal (-939 ha) |
| | Al-Hasakeh | Be'r Al-Hulo Al-Wardeyyeh (-5,052 ha), Jawadiyah (-3,483 ha), Tal Tamer (-4,372 ha), Ras Al Ain (-16,366 ha), Al-Malikeyyeh (-23,756 ha), Areesheh (-1,678 ha) |
| -75-79% | Aleppo | Sarin (-2,169 ha) |
| | Al-Hasakeh | Qahtaniyah (-5,032 ha), Amuda (-8,727 ha) |
| -60-69% | Aleppo | Ain Al Arab (-1,072 ha) |
| | Al-Hasakeh | Qamishli (-5,027 ha), Darbasiyah (-8,243 ha), Shahadah (-985 ha) |
| | Deir-ez-Zor | Jalaa (-1,270 ha) |
| | Ar-Raqqa | Tell Abiad (-3,280 ha), Suluk (-8,030 ha) |
| -50-59% | Aleppo | Manbij (-1,015 ha) |
| | Al-Hasakeh | Markada (-3,570 ha) |
| | Deir-ez-Zor | Abu Kamal (-1,579 ha) |
| | Ar-Raqqa | Jurneyyeh (-783 ha) |
| -20-40% | Aleppo | Lower Shuyookh (-862 ha), Al-Khafsa (-2,571 ha) |
| | Deir-ez-Zor | Sur (-588 ha), Kisreh (-1,543 ha), Susat (-824 ha), Muhasan (-1,820 ha), Khasham (-392 ha), Al Mayadeen (-894 ha) |
| | Ar-Raqqa | Ein Issa (-1,682 ha), Al-Thawrah (-82 ha), Karama (-2,342 ha), Sabka (-1,190 ha) |
| -0-19% | Deir-ez-Zor | Hajin (-525 ha), Ashara (-402 ha), Thiban (-586 ha), Basira ( -313 ha), Deir-ez-Zor (-155 ha), Tabni (+23 ha) |
| | Ar-Raqqa | Ar-Raqqa (-3,348 ha), Maadan (-262 ha), Mansura (-49 ha) |
| +0-25% | Aleppo | Maskana (+119 ha) |

**Table 5:** *Sub-districts in Deir-ez-Zor Center and East Lines Categorized by Percent Change of Confirmed Summer Crop Area, 2017 compared to 2021.*

| % Change of Summer Crop Area 2021 vs. 2017 | Governorate | Sub-districts Impacted (Change in Hectares) |
|---|---|---|
| -0-19% | Deir-ez-Zor | Susat (-253 ha) |
| +0-25% | Deir-ez-Zor | Hajin (+190 ha), Basira (+190 ha), Khasham (+140 ha), Abu Kamal (+285 ha), Thiban (+865 ha) |
| +50-85% | Deir-ez-Zor | Ashara (+922 ha), Al Mayadeen (+1,449 ha) |
| +100-230% | Deir-ez-Zor | Jalaa (+412 ha), Muhasan (+2,394 ha) |

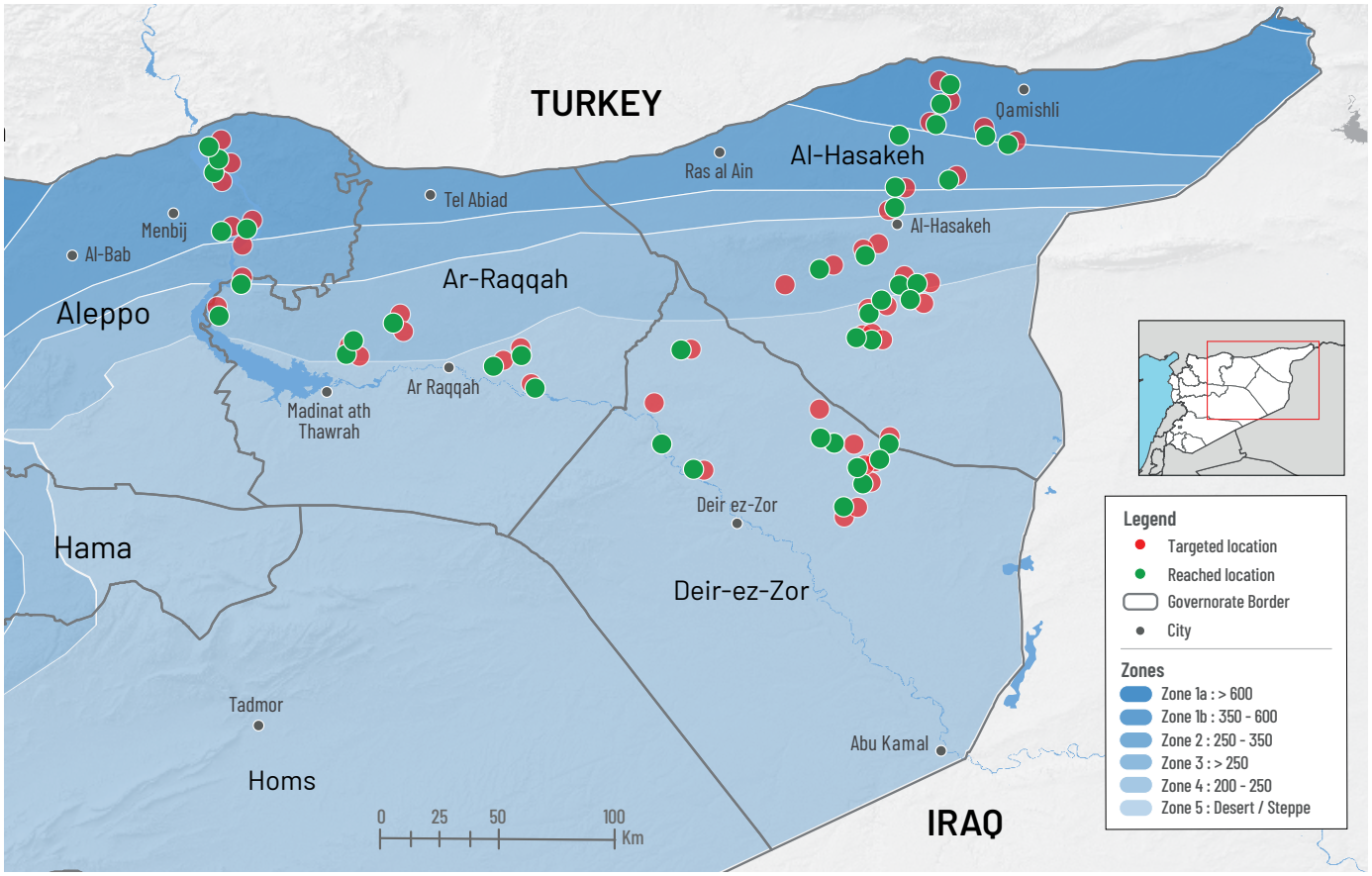
# Post-Harvest Survey findings

A post-harvest survey was conducted by ACTED - titled "Drought Impact Assessment - Post-Harvest Survey on Wheat and Barley in NES Comparing 2020 and 2021" - with technical support from iMMAP FSLU across NES, to understand the average crop yield for wheat and barley farmers and the challenges farmers faced and coping strategies they used in 2020 versus 2021. 197 key informant interviews with farmers were conducted, with samples taken from communities in each of the five rainfall zones in Al-Hasakeh governorate and farmers along the Euphrates River in Ar-Raqqa, Deir-ez-Zor, and northeastern Aleppo governorates (see coverage map below for sample locations). Surveys were conducted for each farmer, with a section on crop- and season-specific variables for each unique staple crop – barley, hard wheat, and soft wheat – grown in each of the past two winter cropping seasons – 2019-2020 and 2020-2021 – with the possibility of six surveys per farmer. Sixty five farmers completed one survey, 120 completed two, and one each completed three and four surveys, for a total of 332 observations. Due to reliance on key informants – experienced farmers in each community – and lack of a statistically powered sample, results are indicative rather than representative.[16]



16 ACTED (August 2021). Drought Impact Assessment - Post-Harvest Survey on Wheat and Barley in NES Comparing 2020 and 2021.

**Figure 4:** *Geographical Coverage of ACTED Post-Harvest Survey, August 2021.*




## Harvest and Crop Yield

Compared to the 2020 harvest year, there was a decrease in harvest and crop yield across NES. In 2020, 87.5% of surveyed farmers who planted rainfed crops – mainly in Al-Hasakeh governorate – were able to harvest their crops, but in 2021 no rainfed crops were harvested as normal. 37% of the crops were harvested early and 63% not harvested at all. In 2020, 97% of farmers were able to harvest irrigated crops, while in 2021, 3% of irrigated crops were not harvested at all, while 10% were harvested early. Farmers who planted rainfed crops in Aleppo and Al-Hasakeh governorates reported no yield in 2021. Yield per hectare for all irrigated crops declined across all governorates.

While irrigated barley yield decreased by the largest percentage across governorates, irrigated soft wheat yields – the most critical for bread production and thus food security – decreased by an alarming 50% (-1.2 tonnes per hectare (t/ha)) in Al-Hasakeh and Thirty seven percent (-0.85 t/ha) in Ar-Raqqa, the two largest wheat-producing governorates in NES. These decreases in irrigated crop yield underscore that while irrigated crops in Ar-Raqqa and Al-Hasakeh governorates could still be harvested, the impact of water scarcity on the 2021 cropping/harvest season was also felt in the productivity of the land, even if crops did not completely fail. This is also significant in light of comparison to previous years. According to data from past FAO/WFP joint Crop and Food Security Assessment Mission (CFSAM) exercises, irrigated crop yield across NES tends to be between 2-3 t/ha for wheat and between 1.5-2 t/ha for barley. This includes the drought year of 2018, when rainfed crops were largely not harvested, but irrigated crops tended to maintain their yield figures.[17]



17 FAO/WFP (2015-2019). FAO/WFP Crop and Food Security Assessment Mission to the Syrian Arab Republic.

**Table 6:** *Irrigated Crop Yield, 2020 vs. 2021 Harvest Years, by Governorate and Crop Type.*

| Governorate | Crop | 2020 Crop Yield | 2021 Crop Yield | % Change in Crop Yield |
|---|---|---|---|---|
| Aleppo | Barley | 2.3 t/ha | 1.2 t/ha | -47% |
| | Hard Wheat | 1.9 t/ha | 1.3 t/ha | -29% |
| | Soft Wheat | 2.2 t/ha | 1.8 t/ha | -17% |
| Al-Hasakeh | Barley | 1.4 t/ha | 0.6 t/ha | -55% |
| | Hard Wheat | 2.5 t/ha | 1.8 t/ha | -28% |
| | Soft Wheat | 2.5 t/ha | 1.2 t/ha | -50% |
| Deir-ez-Zor | Barley | 2.0 t/ha | 1.1 t/ha | -44% |
| | Hard Wheat | 1.9 t/ha | 1.4 t/ha | -26% |
| | Soft Wheat | 2.6 t/ha | 2.0 t/ha | -23% |
| Ar-Raqqa | Barley | n/a | 0.8 t/ha | n/a |
| | Hard Wheat | 2.7 t/ha | 1.8 t/ha | -34% |
| | Soft Wheat | 2.3 t/ha | 1.5 t/ha | -37% |

** Rainfed crop yield not included due to lack of data for 2021 harvest year.*

The post-harvest survey results, iMMAP Data Cube harvested crop area analysis, and past CFSAM data corroborates the wheat production numbers put forward by SANES. The harvested crop area analysis indicates that more crop area was harvested in the 2021 harvest year than in the 2018 harvest year. According to CFSAM data, that year saw the harvest of 560,000 tonnes of wheat - primarily irrigated - with a wheat crop yield of about 2.6 t/ha across NES. (It should be noted that the CFSAM figures are not estimates of harvested grain sold to SANES, but total harvested grain across the region.) Since irrigated wheat yields have dropped considerably in the current year to between 1.2 t/ha and 2.0 t/ha depending on governorate and variety (see table above), it follows that wheat yield has likely fallen below 2018 production. Still, a drop to only 200,000 tonnes of wheat produced, given these comparisons, is unlikely. Thus, these figures also support the notion that additional harvested grain is still held privately, waiting to be sold to SANES, but likely not more than the downward-adjusted estimates of up to 400,000 tonnes of wheat harvested total.

## Irrigation Water Sources and Changes

In 2021, most surveyed farmers in Aleppo, Deir-ez-Zor, and Ar-Raqqa governorates had irrigated crops, while in Al-Hasakeh governorate, most farmers (57%) planted rainfed crops. The source of irrigation water varied by governorate. Private boreholes (32%) and wells (7%) dominated the irrigated crop production in Al-Hasakeh governorate. In Aleppo governorate, 50% of surveyed farmers were irrigating from a river, while 44% used wells (6% of farmers use exclusively rainwater). In Deir-ez-Zor governorate, 60% of farmers used river water sources and 32% relied on private boreholes. In Ar-Raqqa governorate, 63% of farmers irrigated from an irrigation canal and 30% from river water, while 7% used a private borehole. In terms of irrigation schemes, traditional furrow or line irrigation - in which farmers dig open channels along crop rows through which irrigation water is distributed to crops - dominates across NES, accounting for 100% of irrigated schemes in Deir-ez-Zor and Ar-Raqqa governorates, 97% in Aleppo governorate, and 75% in Al-Hasakeh governorate, among the surveyed farmers using irrigation. Sprinkler irrigation accounted for 3% of irrigated schemes in Aleppo governorate and 26% in Al-Hasakeh governorate.

In 2021, farmers surveyed estimated that private boreholes retained the same amount of water as compared to an average year. In Al-Hasakeh governorate, farmers estimated that wells retained 69% of normal water availability on average, while river water sources (a minor source within Al-Hasakeh governorate) retained 97% of water for an average year. In Aleppo governorate, farmers estimated that river and well sources retained 56% and 58% of normal water levels on average, respectively. In Deir-ez-Zor governorate, farmers estimated that wells retained 95% of normal water levels on average, but that rivers retained only 42% of normal water levels on average. In Ar-Raqqa governorate, farmers estimated that irrigation canals retained 52% of normal levels and that rivers retained 42% of normal levels.

A far more detailed survey of water availability, and in particular ground water levels in private boreholes, is needed to draw firm conclusions about the optimal water resources for irrigation in NES, their availability on a broader geographic scale, and the feasibility of creating interventions to tap from this water resource. However, the available preliminary data indicate that, in the short term, groundwater accessed through boreholes may provide a useful supplement to irrigation surface water, which can be depleted quickly due to poor rainfall and allocation decisions by upstream parties.

Still, drilling more and deeper boreholes will not solve long-term water availability issues driven by climate change or upstream interference. Unconstrained drilling for water will certainly drain limited non-renewable groundwater resources more quickly. Any efforts to improve access to groundwater must also be complemented with increased ability for recharge of groundwater during bumper rainfall years. Recharge efforts must also contend with rampant pollution and salinization of surface and near-surface water throughout NES – resulting from the environmental consequences of war detailed in the May 2021 PAX report, especially including so-called "artisanal" oil refining.[18] Finally, the predominance of furrow irrigation across NES is a concern given that these schemes are the most susceptible to loss of water via evaporation. More efficient schemes may cost more to install and maintain, but may be a useful intervention to reduce loss of dwindling water resources in NES.



18 PAX Netherlands (May 2021). War, Waste, and Polluted Pastures: An Explorative Environmental Study of the Impact of the Conflict in north-east Syria.

**Figure 5:** *Percent of Farmers Using Various Irrigation Sources*

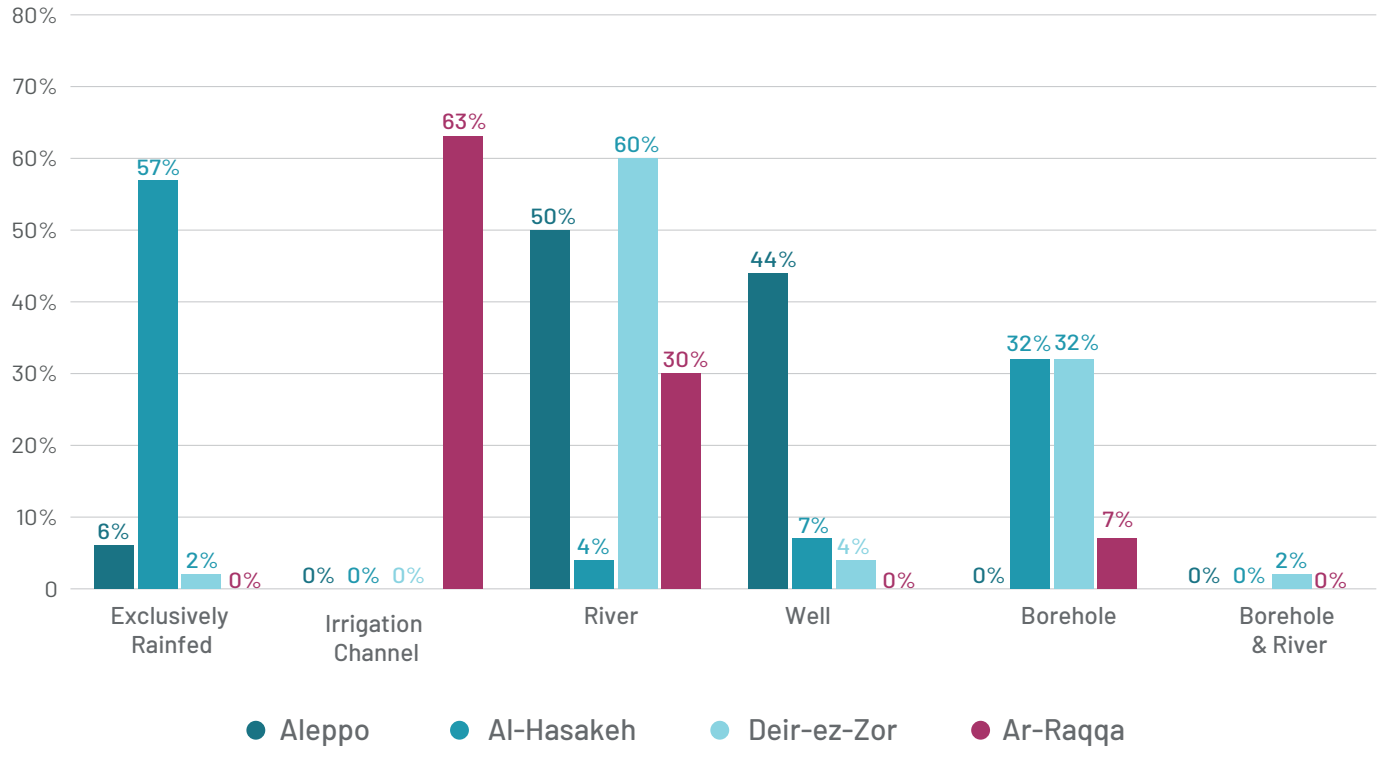
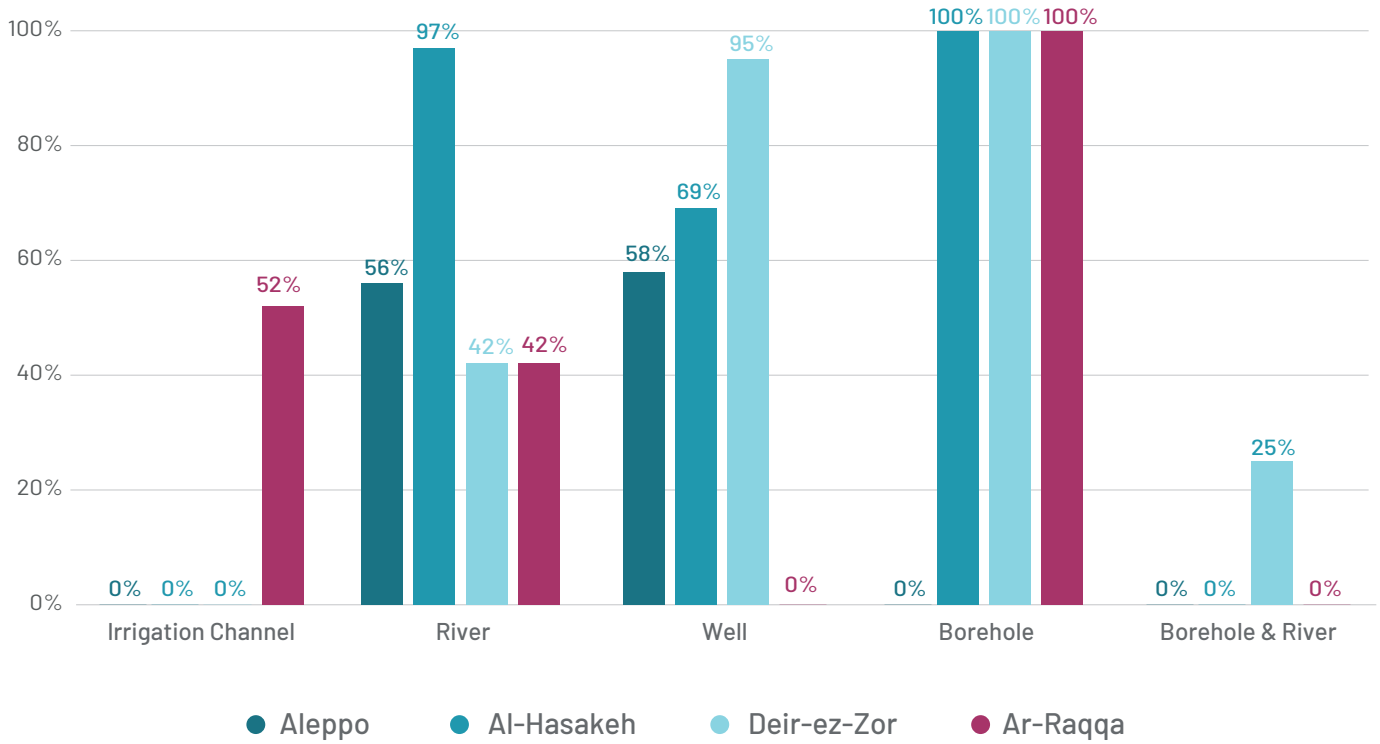



**Figure 6:** *Availability of Water from Various Irrigation Sources.*



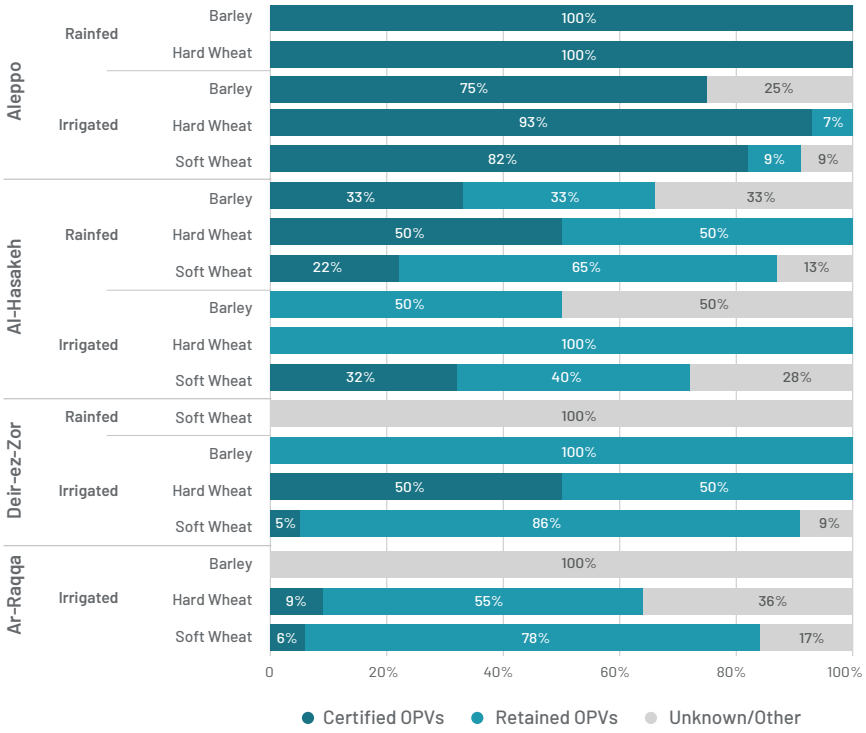
## Seed Availability and Quality

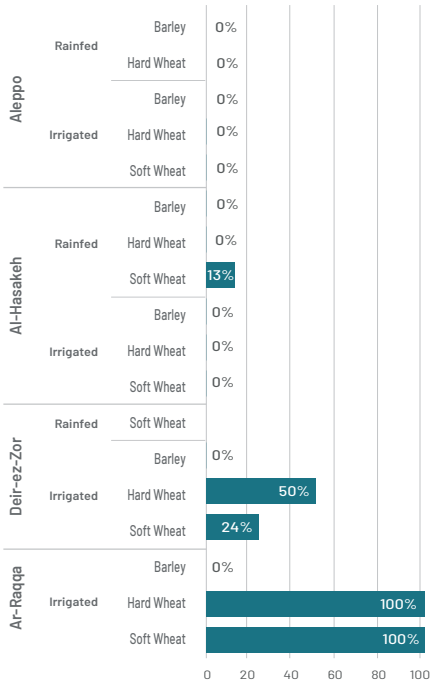
Seed systems in NES are a major concern to farmers and AWG partners. Due to humanitarian access constraints, the Food and Agriculture Organization of the UN (FAO) and International Center for Agricultural Research in the Dry Areas (ICARDA) do not operate in the majority of locations in NES, resulting in diminished availability of improved seed varieties. Furthermore, when open pollinated varieties (OPVs) are used as retained seeds for more than four consecutive seasons without access to new certified OPVs to break the cycle, quality of OPVs of seeds deteriorates quickly, affecting both the seed viability, crop yield, and nutritional quality of the crop grain. In the ACTED post-harvest results, surveyed farmers reported relying almost exclusively on OPVs of wheat and barley seeds. In Aleppo governorate, the vast majority of farmers relied on new certified OPVs – planted for the first time in the 2020-2021 winter cropping season. In Al-Hasakeh governorate, depending on the crop type and irrigation system, 22-50% of farmers reported using new certified OPVs while 32-100% relied upon retained OPVs planted in previous years. In Ar-Raqqa and Deir-ez-Zor governorates, retained OPVs were dominant, accounting for 78 and 86% (respectively) of irrigated soft wheat production and about half of irrigated hard wheat production.

More importantly, among surveyed farmers, use of OPVs older than four years was exceptionally high in Ar-Raqqa governorate, where 100% of retained OPV seeds for both irrigated hard and soft wheat were first used more than four years ago. In Deir-ez-Zor governorate, 24% of irrigated soft wheat retained OPVs and 50% of irrigated hard wheat retained OPVs were first used more than four years ago. Apart from 13% of retained OPVs used in rainfed soft wheat across Al-Hasakeh governorate, no retained OPVs were in use older than four years across Al-Hasakeh and Aleppo governorates. This indicated that seed quality is of most immediate concern for irrigated wheat planting in Ar-Raqqa governorate, where the average retained OPVs of wheat seeds were first planted in 2010. Still, on average, retained OPVs were first planted in 2019 in Aleppo and Al-Hasakeh governorates and in 2017 in Deir-ez-Zor governorate. **If access to certified and improved varieties is not ensured throughout NES in the coming years, farmers will not be able to maintain expected standard levels of crop productivity even if rainfall returns to normal to correct for the dramatic decline in crop yield in the past year.**

**Figure 7:** *Share of Farmers Using Certified versus Retained OPV Seeds, by Governorate and Crop Type.*

**Figure 8:** *Share of Farmers Using Retained OPV Seeds Over Four Years Old, by Governorate and Crop Type.*



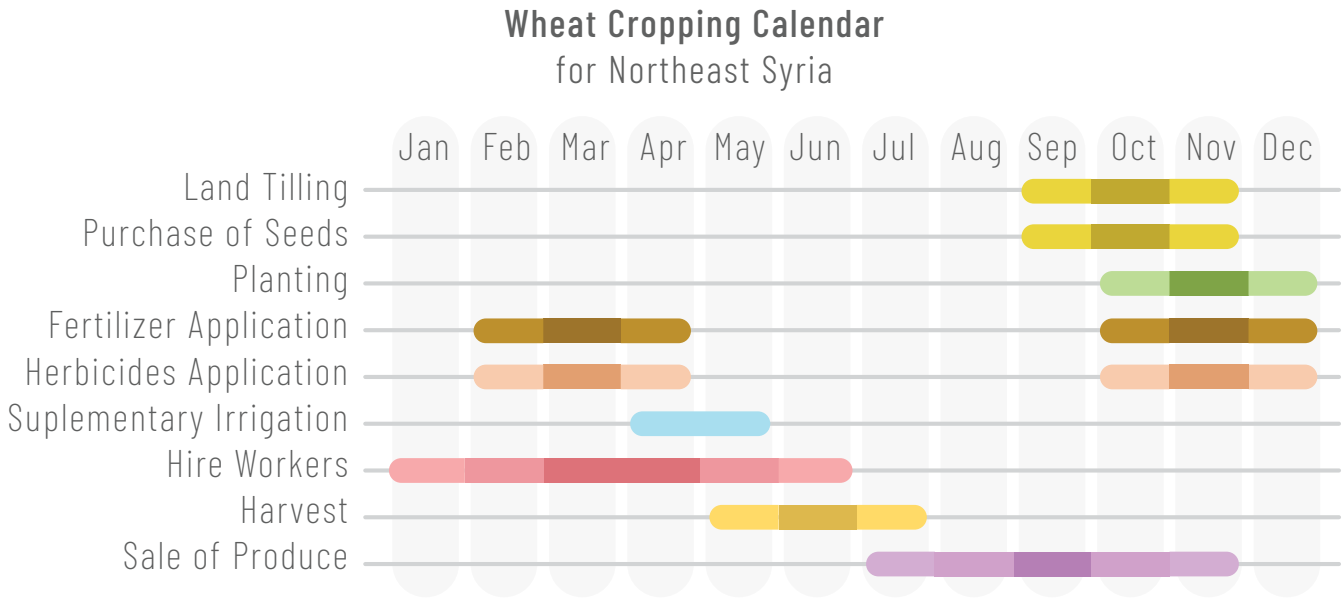

## Wheat Marketing Cycle

Research on the wheat-to-bread value chain in North East Syria released in May 2020 by iMMAP indicated that the typical wheat marketing season begins in July at the end of harvest season, peaks in September, and ends in November.[19] While the winter crop harvest concluded as of July 2021, the marketing season for wheat is ongoing through November 2021, continuing for several months after harvesting as farmers, SANES officials, and local traders work out the specifics of selling the current year's harvested wheat. Still, even if more wheat is brought into SANES silos and mills, the most likely scenario will be widespread flour shortages and price increases, due to the low harvested crop area and low crop productivity in the current year. In fact, flour shortages and price increases have already been noted this year by humanitarian partners providing support to bakeries in NES and in the most recent iMMAP and NES FSS bakery mapping exercises.[20] As indicated by SANES, imports of flour from surrounding countries are necessary, both to bolster short-term stocks as the marketing season progresses and to correct long-term deficits induced by the drought and poor grain crop harvest.

19 iMMAP & WoS FSS (May 2020). Wheat-to-Bread Value Chain Rapid Assessment for North-East Syria.

20 iMMAP & NES FSS (July 2021). Wheat-to-Bread Processing Facilities Mapping Study for North-East Syria.

**Figure 9:** *Wheat Cropping Calendar in NES (from iMMAP Wheat-to-Bread Value Chain Analysis in NES, May 2020).*




# Food and Nutrition Security Outlook

While a portion of the total crop harvest this year may remain to be sold into the market, there can be no doubt that the poor grain harvest has affected the total amount of wheat available in NES. This supply shock will certainly translate to an increase in prices of the products across the wheat-flour to bread value chain in the coming 12-18 months. As the drought- and economic crisis-induced supply shock intersects with the ongoing SYP inflation on the consumer side, the conditions are in place for massive food insecurity across NES – and by extension North West Syria and the Government-controlled areas.

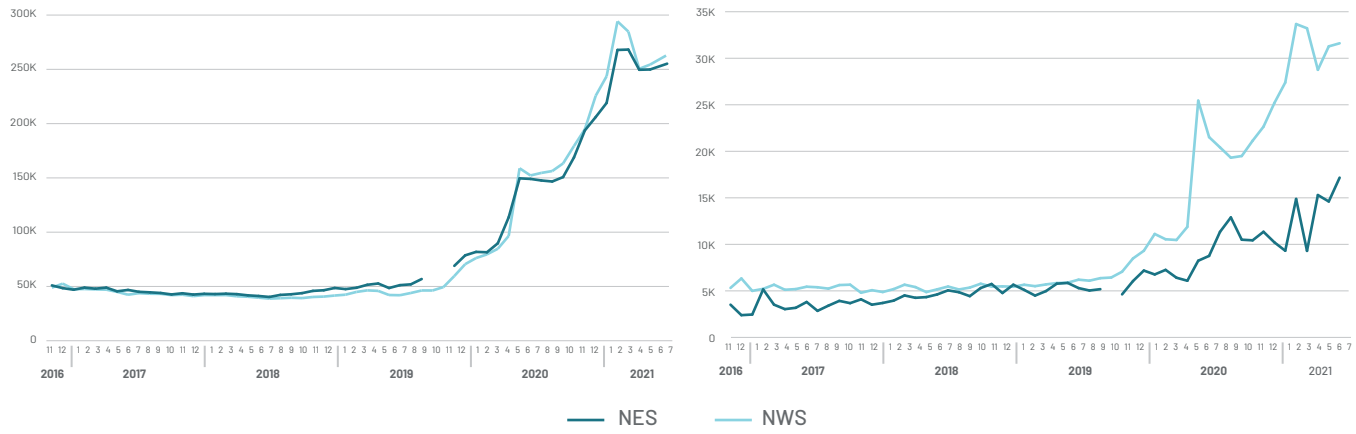
## Economic Crisis and SYP Inflation

Long-term analysis of the prices for bread – a key staple food in NES – based on REACH-conducted monthly market monitoring exercises indicated that while the price of the food component of the SMEB in NES has been subject to massive inflation over the past year and a half, the price of bread in NES was less affected, due to the strong 2019 and 2020 wheat harvests and to counter-cyclical price support provided along the wheat-to-bread value chain.[21] While the nominal SMEB bread price (the price of 37 kg of bread – the amount typically needed for an average family of 6 in NES for one month) has risen steadily over the past 18 months, the SMEB bread price in U.S. Dollars (as well as the inflation-adjusted price[22]) has steadily decreased, due to improved wheat harvests in the 2019 and 2020 seasons and continued bakery support.

21 REACH (July 2021). Dataset: Market Monitoring Northwest and Northeast Syria, July 2021.

22 The inflation-adjusted SMEB bread price is derived by dividing the bread price in SYP by an index based on the July 2017 price of the food component of the SMEB.

**Figure 10:** *Regional Average SMEB Food Basket and Bread Prices in NES vs. NWS, Nov 2016 to July 2021 (from REACH Market Monitoring).*




Comparing nominal bread prices in SYP to overall increases in the cost of the SMEB food basket, it was apparent that in NES, back-to-back larger crop harvests and humanitarian bakery support have been effective in increasing access to bread for vulnerable families. As shown in iMMAP Bakeries Mapping exercises, bread production in NES typically relies almost exclusively on locally grown wheat, whereas imports make up a substantial amount of the flour used in NWS, where bread prices have risen much higher compared to SMEB food prices. Trade impediments across areas of territorial control in northern Syria also factor in the price anomalies.

As discussed above, in the face of wheat harvest shortfall and resulting flour shortages, the share of bakeries relying on imported flour was steadily increasing in NES, from 2% in March 2021 to 9% in June 2021, according to the quarterly iMMAP and NES AWG bakery mapping exercise. Availability of locally milled flour also decreased from 81% in March to 75% in June 2021. Alarmingly, in June 2021 60% of bakeries in Al-Hasakeh governorate reported that locally milled flour was unavailable. Also, the average production cost of one MT of bread rose from 81 USD to 104 USD between March to June 2021. These shifts may foreshadow larger issues to come, as grain and flour stocks in June 2021 were mainly residual from previous seasons, while the impact of the current season will likely be felt in the end of 2021 and into 2022.[23,24]

## Long-term Food Price Trend Analysis (Alert for Price Spikes)

Long-term analysis of bread prices in USD, using the Alert for Price Spikes methodology developed by the World Food Programme,[25] demonstrated a massive shock in connection with the drought-induced poor harvests of 2018. Using the USD price allows analysis on trends not related to the dramatic recent inflation of the SYP. The Alert for Price Spikes (ALPS) methodology uses standardized regression residuals to detect anomalies from the long-term and seasonal trend in prices. In the year following the 2018 winter season harvest (July 2018-July 2019), the ALPS index for USD prices for the SMEB food basket increased into the Alert category across all governorates – a shock starting in early 2018 and continuing into the end of 2019, even after large crop harvests in July 2019. Similarly, prices of bread and a basket of non-bread staples (including rice, potatoes, and other staple substitute foods for bread) increased into the alert and crisis levels across governorates during the same period.

23 iMMAP & NES FSS (April 2021). Wheat-to-Bread Processing Facilities Mapping Study for Northeast Syria.

24 iMMAP & NES FSS (July 2021). Wheat-to-Bread Processing Facilities Mapping Study for Northeast Syria.

25 WFP VAM (April 2014). Technical Guidance Note: Calculation and Use of the Alert for Price Spikes (ALPS) Indicator.

**Figure 11:** *Alert for Price Spikes (ALPS) Index Since Nov 2016 by Governorate*

**Figure 11 A:** *SMEB Food Basket Prices*

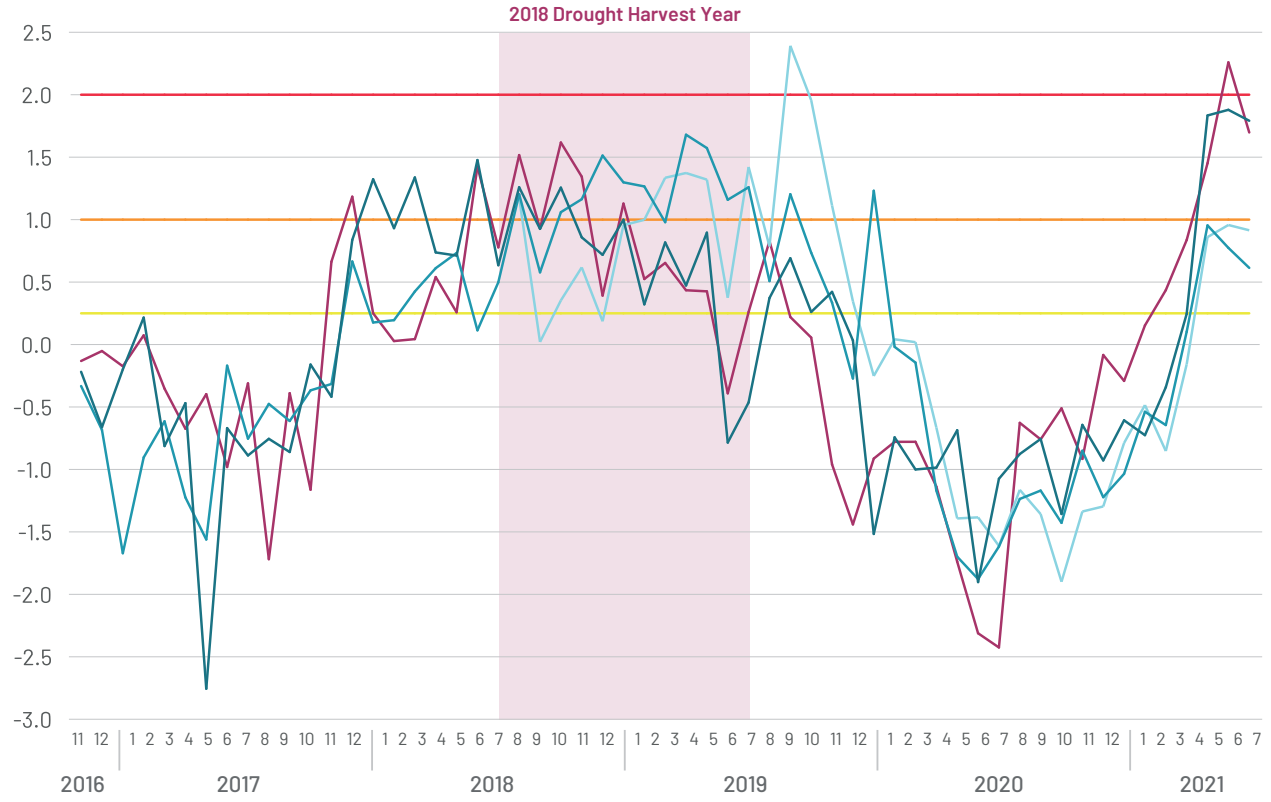



**Figure 11 B:** *SMEB Bread Prices*

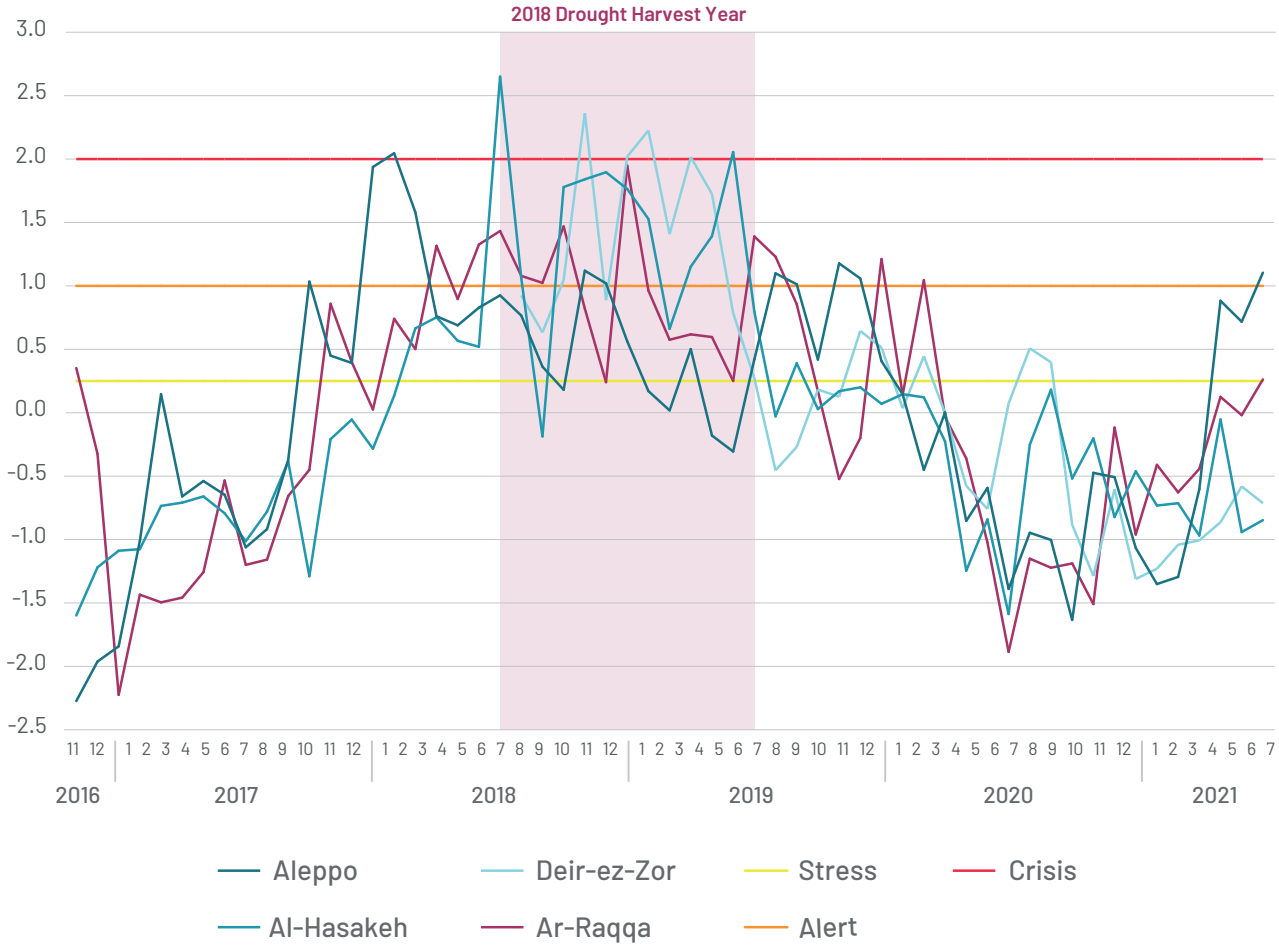


**Figure 11 C:** *Non-Bread Staples Prices*


This trend analysis highlighted likely scenarios for NES following the 2021 cropping season. The observed impact of the poor 2018 crop harvest, echoing far into the following cropping and marketing season – in some places into early 2020 – is likely to repeat itself. Regular marketing season dynamics dictate that the impact of a drought-induced supply shock is felt most acutely in the months following crop harvest, peaking in September-December of the same year. Given the massive deficit of rainfall and available grain in 2021, the impact on availability and affordability of staple foods will likely be more severe and longer lasting than following the 2018 harvest. Bread prices will also likely increase through the 2022 cropping season, into 2023, if not longer – as the previous-year harvest stocks run out and supply constraints drive prices upwards. The worst is yet to come in NES.

## Likely Future Scenarios

Alarmingly, as of July 2021, the ALPS index for the USD SMEB food basket price had reached stress for Al-Hasakeh and Deir-ez-Zor governorates, alert for the portions of Aleppo in NES, and crisis for Ar-Raqqa governorate. The ALPS index for bread and non-bread staples prices in USD had increased again, as well, reaching stress and even alert levels in some governorates. This price analysis demonstrated that even aside from the massive inflation recorded in the past 18 months, real food prices are increasing dangerously across NES. Simply adjusting support amounts of currency for inflation will not address the underlying fundamental market challenges. **North East Syria is now facing converging crises of currency depreciation and historically low agricultural production, all exacerbated by conflict, displacement, and the COVID-19 pandemic. Such concurrent shocks risk a potentially catastrophic hunger crisis as vulnerable households struggle to find or afford basic food items.** In the absence of increased and sustained support to actors along the wheat-to-bread value chain, a very real risk exists for massive and long-lasting food insecurity across NES.

## Nutritional Status Outlook

This food security scenario also has important nutritional implications. Lower availability of staple foods due to price shocks and lack of income among families relying on agriculture to afford adequately diverse diets are both likely to contribute to declining nutritional status in NES. Water-borne diseases and increased spending on water trucking for communities suffering lack of access to clean drinking water will also affect both food accessibility and utilization. The Nutrition Working Group in NES lacked sufficient funding and support to conduct regular nutritional monitoring of the population. However, rapid studies of acute malnutrition using middle upper arm circumference (MUAC) in children presenting for healthcare by an NGO in Ar-Raqqa governorate demonstrated alarmingly high rates of proxy Global Acute Malnutrition (GAM, defined as MUAC < 125mm) – 13% proxy GAM and 3% severe acute malnutrition (SAM).[26,27]

Furthermore, reports of increased diarrheal disease, including acute watery diarrhea especially in camp settings, in NES from REACH and NES Forum (via Health Working Group) suggested that the water crisis has further complicated the health and nutrition status of the population. Enteric disease further erodes the ability of people – children in particular – to access essential nutrients from food sources, due to the impact on digestive processes. Taken together, food security and nutritional status of the population in NES will continue to decline unless urgent action is taken to ensure the availability, affordability, and uptake of critical food items. This includes nutrition monitoring and treatment for malnourished and infectious disease-stricken people, and the availability of foods containing essential nutrients and supplemental feeding solutions.



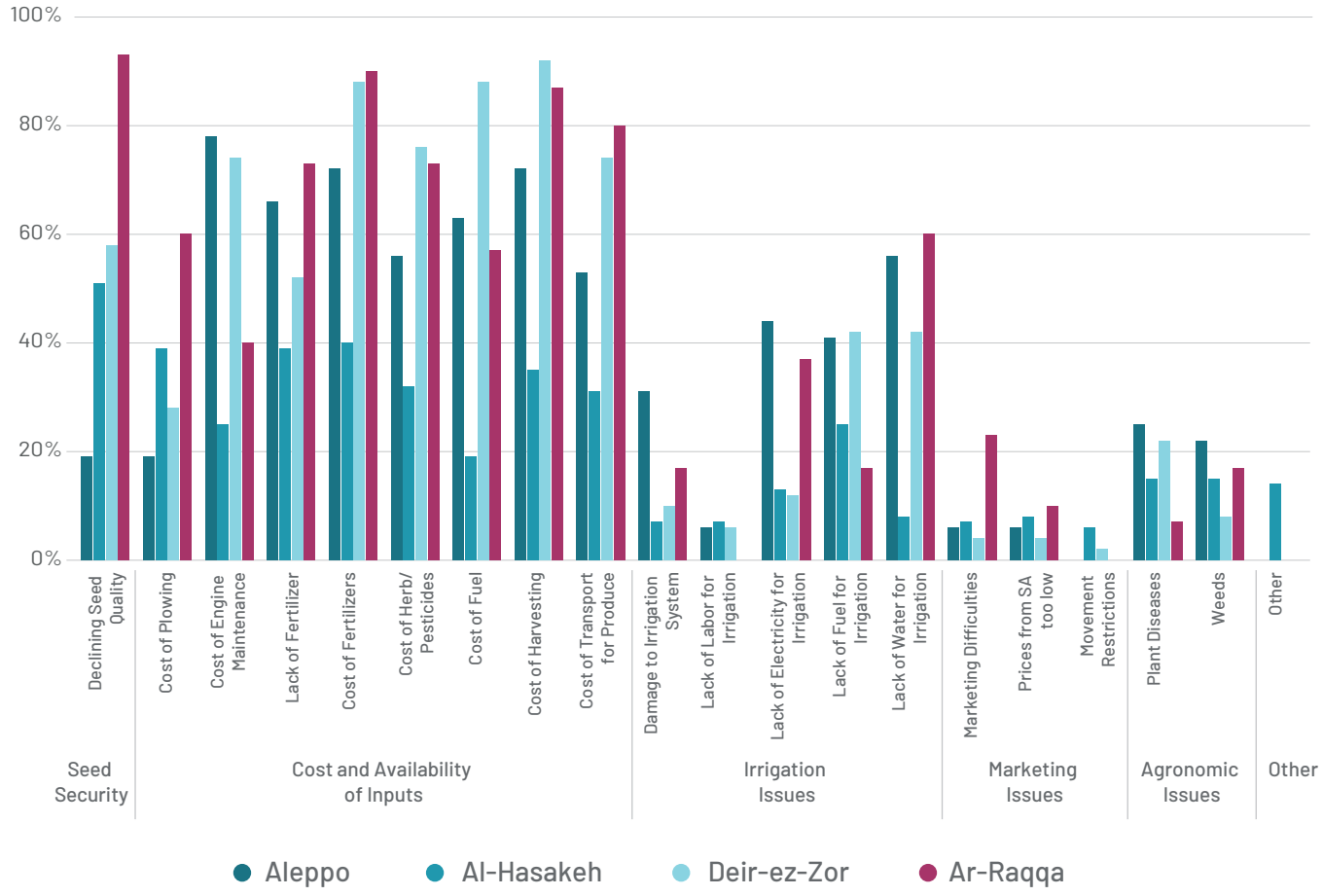
26 Food Security Cluster (2020). FSC Indicators Handbook: Proxy Global Acute Malnutrition by MUAC. fscluster.org

27 OCHA (September 2021). Water Crisis in Northeastern Syria: Immediate Response and Funding Requirements. reliefweb.int

# Challenges and Needs for Future Resilience

The ACTED post-harvest survey also asked farmers to name the key challenges they faced during the 2021 winter cropping season, how they coped with those challenges, as well as needed interventions for future cropping seasons. Challenges included lack and/or cost of various agricultural inputs, irrigation issues (e.g., water scarcity, rehabilitation needs, high fuel cost) and marketing, transportation, SANES purchasing prices, and others. Interestingly, agricultural input costs and seed security were cited by the largest share of farmers in each governorate, ahead of irrigation concerns – including lack of sufficient irrigation water. Cost of fertilizer, harvesting operational costs, fuel, and pest/herbicides were consistently the top concerns, alongside deteriorating quality of available seeds. In Ar-Raqqa governorate, lack of efficient quantities of irrigation water was cited by 60% of farmers – the most in any governorate – but seed quality was cited by 93%, fertilizer costs by 90%, harvesting costs by 87%, post-harvest shipping costs by 80%, and pest/herbicide costs by 73%.

**Figure 12:** *Challenges faced by farmers during 2021 harvest year (% of farmers answering yes to each challenge)*

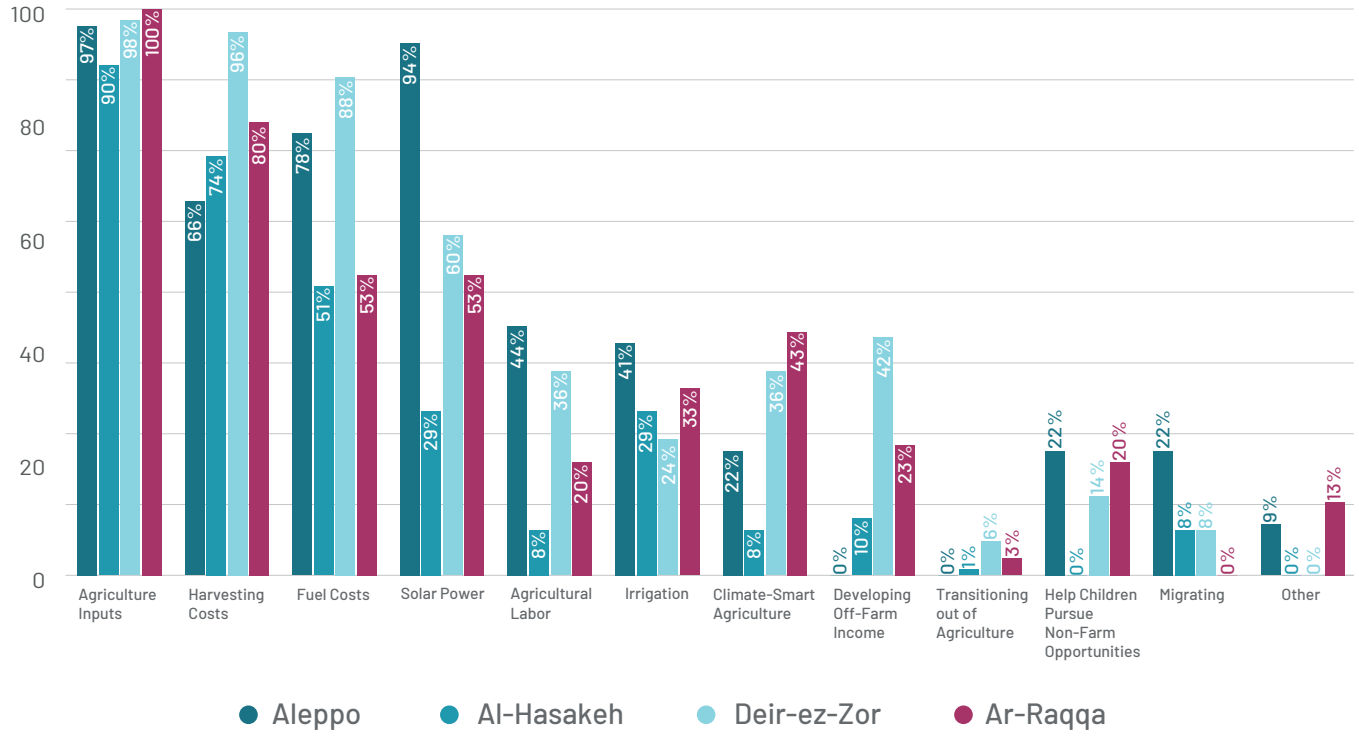



**Note: Al-Hasakeh governorate figures reduced due to lower citation of non-rainfall related challenges among farmers on rainfed lands.*

Use of specific coping strategies also shed light on the relative prevalence of challenges faced. Ninety percent of farmers on irrigated croplands in Al-Hasakeh governorate increased the number of irrigations in 2021, while only 33% of farmers in Deir-ez-Zor governorate and no farmers in Ar-Raqqa governorate or Aleppo governorate used this strategy. While the average number of irrigations increased in Al-Hasakeh governorate from 3.3 per year in 2020 to 5.5 in 2021, Deir-ez-Zor governorate reported a slight increase from 5.1 to 5.4, and Aleppo and Ar-Raqqa governorates decreased. Twenty-seven percent of farmers on rainfed croplands and 45% on irrigated crop lands in Al-Hasakeh governorate, and 37-41% on irrigated crop lands in Deir-ez-Zor governorate reported using no fertilizer or pest/herbicides. Seventy percent of farmers in Ar-Raqqa governorate and 50% of farmers in Aleppo governorate reported not using any coping strategies because they did not need to adopt any. Seventeen percent in Ar-Raqqa governorate, 24% in Deir-ez-Zor governorate, and 24% on rainfed crop lands in Al-Hasakeh governorate reported not using any coping strategies because the cost of coping strategies was too expensive.

Finally, preferences for interventions to weather future droughts demonstrates the importance of providing agricultural inputs and reducing crop harvest costs for farmers in NES. Ninety to hundred percent of farmers in each governorate believe that support with agricultural inputs will help them withstand future droughts, making this the most frequently selected intervention. Except for solar power in Aleppo (94%) governorate and fuel support in Deir-ez-Zor (88%) governorate, request for support with harvest-related costs was the next most frequently selected, with between 66% (Aleppo governorate) and 96% (Deir-ez-Zor governorate) of farmers preferring this option. Support for irrigation networks was far behind in terms of preference, with 24-41% of farmers in each governorate selecting this option. Among farmers on rainfed crop lands in NES, only 16% selected irrigation network support. Solar power interventions were also popular, with 64% of farmers on irrigated croplands selecting this option – 53% of all farmers in Ar-Raqqa governorate, 60% in Deir-ez-Zor governorate, and 94% in Aleppo governorate – while 18% of farmers on rainfed crop lands selected this option. This discrepancy is likely because solar power is the most immediately applicable to supply power for irrigation pumping. A similar breakdown was observed for fuel support, with 79% of farmers on irrigated crop lands supporting this option, compared to 27% of those on rainfed crop lands.

**Figure 13:** *Farmers' needs for future drought resilience (% of farmers answering yes to individual resilience strategies)*



Variation in the relative prevalence of challenges and coping strategy used across governorates demonstrated that interventions for the water shortage should be tailored to local conditions and priorities. **However, the consistently high prevalence of high agricultural input costs and poor seed security as key challenges showed that viewing the crisis as simply one of insufficient water is inaccurate.** The water crisis overlaps with, and is deepened by, the economic and public health crises raging because of COVID-19 and the lack of access to quality seeds (discussed in more detail below) in the absence of agricultural development institutions in NES. **While ensuring access to sustainable water sources may help reduce the impact of future dry years, improving support to farmers for agricultural inputs and seed security will be essential to ensuring that farmers can take advantage of future years in cases of good rainfall distribution to rebuild grain stocks and food markets in NES.** Indeed, whatever rainfall may come in the next year, easing the challenges associated with the economic crisis and long-term seed quality deterioration must be at the core of relief efforts.

# Agriculture Sector Outlook

Recovery of bread prices and agriculture-based livelihoods from the poor crop harvests of 2018 was facilitated by above-average rainfall and crop production in the 2018-2019 and 2019-2020 winter cropping seasons. However, such bumper seasons cannot be relied upon to lift NES out of the current crisis, given the current drought conditions and the well-reported long-term decreases in rainfall and water availability in NES and across the broader Eastern Mediterranean basin (driven in part by climate change and in part by geopolitical issues with cross-border water supply from Turkey).[28]

## Irrigation and Agricultural Production

In the current season, rehabilitation of agricultural infrastructure damaged or disused due to active conflict in Aleppo, Ar-Raqqa and Deir-ez-Zor governorates – have resulted in localized gains relative to recent years in agricultural production. This relative success compared to recent years and to rainfed areas in Al-Hasakeh governorate shows that improved irrigation infrastructure can play an important role in sustaining agricultural production in NES even amidst extreme climate conditions. Improved irrigation infrastructure continues to be a major need in NES – as shown in the REACH Briefing Note.[29] A detailed mapping of irrigation infrastructure, including water pumping stations from major water resources (such as the Euphrates River) and the more localized boreholes in Al-Hasakeh governorate, is required to facilitate further investment in such infrastructure by AWG partners, stabilization, and development actors alike.

Still, such investments should not be confused for secure and sustainable water resources. As detailed in iMMAP's July 2021 report on regional water dynamics, NES remains downstream of major riverine water resources under the full control of Turkey, which can disrupt water supplies flowing downstream to NES at any time. Climate change is causing extreme variability in rainfall outlook, as evidenced by both the dramatic droughts of 2018 and 2021 and the exceptionally high rainfall year of 2019, which resulted in bumper crops, but also widespread flooding. Surface and groundwater supplies are often of poor quality and are not an unlimited resource, as they require recharge from ever-more-erratic rainfall. Increasing the ability to capture rainfall by implementing recharge infrastructure and climate-smart soil conservation practices are potential solutions to increase the availability of locally sourced agricultural water. Reducing surface pollution resulting from conflict and associated environmental hazards is also crucial to ensuring that local water resources are sustainably accessible.

28 National Aeronautics and Space Administration (NASA) (March 2016). NASA Finds Drought in Eastern Mediterranean Worst of Past 900 Years.iMMAP (July 2021). Water Dynamics, Crises, and Challenges in Northeastern Syria.

29 REACH (June 2021). Briefing Note: Humanitarian Situation Overview in Northeast Syria, June 2021.

## Agricultural Inputs and Seed Security

Still, increasing available water cannot fully solve the problem. As documented by FAO, REACH and reflected in the ACTED post-harvest survey, unaffordable prices of agricultural inputs were a major driver of the poor crop harvest this cropping season. As recorded in the ACTED post-harvest assessment and anecdotally in iMMAP's mid-season crop monitoring, farmers were unable to afford or access inputs such as fertilizers, pesticides and herbicides, mechanized equipment, and fuel or electricity for irrigation. Due to these soaring prices and low rainfall, many farmers opted against applying inputs at vital stages of the plant development process during the 2021 cropping season, particularly fertilizer around the February-March period, which decreased the viability and productivity of many crops.

Declining seed quality across NES is also a major contributor to the poor crop harvest/yield. Numerous AWG partners have reported a lack of quality seeds available, particularly in terms of open-pollinated variety (OPV) seeds recycled well beyond the four-season maximum. The post-harvest survey data backs this up, particularly in Ar-Raqqa governorate. Access to improved and drought-tolerant varieties is also much lower than in other parts of Syria. The chief factors in this dynamic are limited operational access for FAO and ICARDA and lack of adequate laboratory and distribution infrastructure to receive, analyze, and propagate seeds. As detailed above, farmers listed concerns with availability and accessibility of agricultural inputs, including seeds, above irrigation concerns in the current year and preferred support for agricultural inputs to expanding irrigation access for future drought resilience.

## Livelihood Security

This reality has implications for crop development, profitability, and thus the long-term livelihood outlook for agricultural producers. The timeframe to provide high quality seeds is tight. Most farmers buy seeds from September to November and plant October through December. Proceeds from sales of crop produce from July to November normally fund these purchases. Lower proceeds may reduce farmers' ability to buy the needed seeds, as well as other needed agricultural inputs. Support to distribute high quality OPV seeds at discounted prices is thus likely needed to interrupt a negative cycle of declining crop productivity and livelihood prospects. If the next season is poor again – or even if support for recovery from the drought and low crop harvest is insufficient – farmers may begin adopting negative coping strategies that could lead to a further implosion of the agricultural sector in NES.

It is also important to note the impact of the current crisis on the livelihoods of agricultural workers. Across NES, an average of 82% of those involved in the agricultural sector own their operations, while 3% are formally contracted employees and the remaining 15% are informal or temporary workers. Thus, about one in five people in the agricultural sector in NES are dependent on investments to ensure the viability of farming operations, but also far more vulnerable to shocks to agricultural markets than farm owners, lacking the capital or employment security to weather poor seasons.

Loss of the agricultural labor force also reinforces negative prospects for the agricultural production in coming seasons. Accounts of agricultural producers and farm laborers migrating and/or selling capital inputs, and the massive gap in access to irrigation water, quality and drought-tolerant seeds, and other inputs, means that even strong rains in the coming seasons will not be sufficient on their own to rectify the long-term decline of agriculture production and food security in NES. Urgent investment in agricultural input support, improved seed and irrigation access, and knowledge-sharing for climate-smart agriculture are needed to counter these trends.

## Planned NES AWG Response

The NES Food Security Sector Agriculture Working Group (AWG) identified several key areas of intervention and response indicators to guide the response to the impact of drought conditions in the 2020-2021 cropping season. A full overview of the AWG response plan is available within the OCHA report Water Crisis in Northern and Northeast Syria: Immediate Response and Funding Requirements[30] - the following summarizes the priority interventions and indicators. In the immediate term support for basic needs, including food baskets and meals ready-to-eat (RTEs), in the face of disrupted livelihoods and rising food prices. In support of this intervention, AWG will continue to map people in need (PIN) and acute PIN and food security status of the population throughout NES, as well as population access to food.

The AWG is also aiming to intervene directly to improve farmers' access to agriculture-based livelihood activities, especially essential inputs for agricultural producers. The AWG will continue to monitor agricultural lands impacted by drought, water shortages, and other agricultural stressors. It will also continue monitoring communities affected by these disruptions, particularly vulnerable farmers at risk of falling into acute food insecurity and losing assets due to limited inputs - for example lack of fertilizers, seeds, irrigation for crop producers or feed and water for livestock producers. The AWG further plans to improve resilience of farmers' livelihood by supplying inputs including certified wheat, barley, and/or vegetable seeds, fertilizers, pesticides, fungicides, and agricultural equipment and machinery. Increasing access to improved irrigation systems and climate-smart agriculture practices through farmer field schools will also serve to increase resilience to extreme climate conditions in future seasons - including both drought and flooding. Finally, in order to support this response, the AWG will monitor the number of farmers receiving input support and training.



30 OCHA (September 2021). Water Crisis in Northern and Northeast Syria: Immediate Response and Funding Requirements. humanitarianresponse.info

# Recommendations

- Continue and increase support to bakeries and other wheat-to-bread value chain actors over the coming year to 18 months to ensure supply meets demand and to correct for price increases due to poor harvests.
- Provide short-term food support to households relying on agriculture-based livelihood activities to ensure food security before the next winter crop harvest - particularly in the lean months leading up to harvest in June-July of 2022.
- Humanitarian partners to arrange for an emergency response plan for importation of additional flour to fill the gaps inflicted by the poor harvests.
- Support silos, bakeries, and mills with rehabilitation and production costs to increase production capacity of wheat-to-bread actors and availability of bread.
- Support farmers with agricultural inputs like working capital for harvesting costs and seed access to ensure that they can produce in future seasons and implement agronomic strategies to adapt to erratic rainfall patterns.
- Support the development of a sustainable value chain to procure, process, and disseminate high-quality and drought-tolerant varieties of seeds within NES, including laboratory capacity to test, store, and propagate such varieties. This will increase access to needed seed varieties to stretch the thinning water budget of the region and increase the speed with which humanitarian and development actors can move to shore up production if subsequent bad seasons strike again.
- Support rehabilitation and expansion of irrigation infrastructure and access to sustainable, safe, and consistent water resources. Continue to support repair of irrigation infrastructure in conflict-affected areas. Focus on improved, water-efficient irrigation technology and on sustainable water sources not dependent on cross-border provision.
- Support the development of a strong humanitarian nutrition monitoring program – and continue monitoring the nutritional quality of bread produced and the nutritional status of the population in NES. Also, support the capacity of actors deploy malnutrition interventions, including support to the Nutrition Working Group in Whole of Syria and NES, inclusion of nutrition-sensitive interventions in Food Security and Livelihoods programming, and prepositioning of malnutrition treatment supplies.