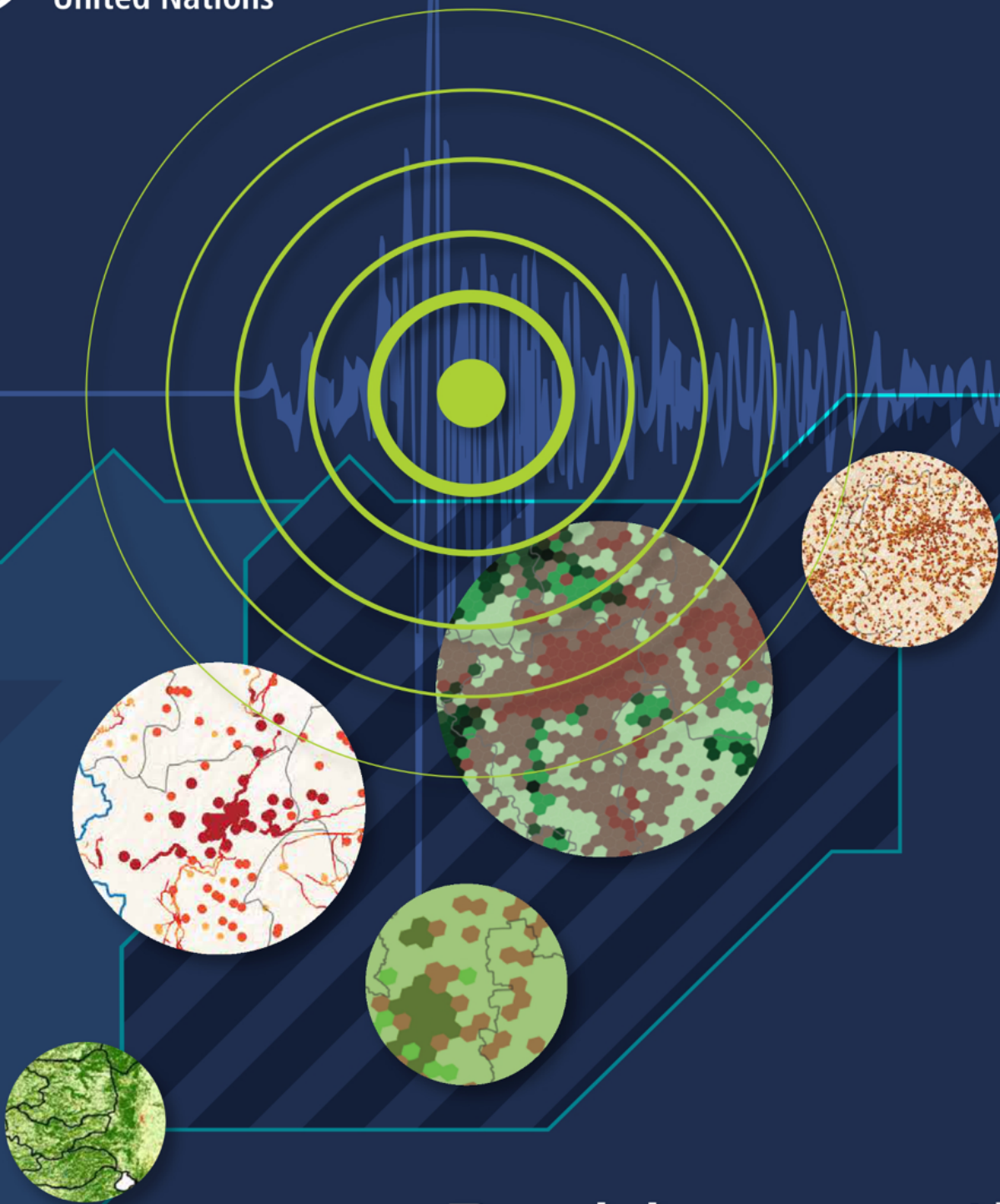




Food and Agriculture  
Organization of the  
United Nations



# Rapid geospatial assessment after **the earthquake in Syrian Arab Republic** in 2023

Impacts on infrastructure and farming community during the period February–March 2023

# **Rapid geospatial assessment after the earthquake in **Syrian Arab Republic** in 2023**

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By

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# Executive summary

On February 6, 2023, an earthquake of magnitude of 7.7 Richter scale struck near the northern and western Syrian Arab Republic, causing severe damage to infrastructure and the farming community and devastatingly impacting people, infrastructure, and the environment. A rapid geospatial impact assessment was conducted in the most impacted area in the Syrian Arab Republic. Available data and information along with satellite imagery and remote sensing techniques were used to assess geospatial indicators on impacts of the earthquake on the people, infrastructure, and cropland area.

Administrative boundary from different sources (like Global Administrative Areas–GADM) Humanitarian Data Exchange–HDX and Global Administrative Unit Layers–GAUL) were compared and HDX (GADM, HDX and GAUL) were compared, and HDX was chosen as it provided the most updated and better detailed administrative information. For a better visual representation, sub-district admin boundaries are disaggregated into a hexagon grid of area 10 km<sup>2</sup>. Hexagons have a uniform area representation, allowing for easier analysis and providing good spatial correlation. A proxy land cover map for 2022 was prepared using satellite imagery from Sentinel 1 and the land cover legend from AIT, ICARDA, and WASWC (2004) at a spatial resolution of 10 m. A derived damage proxy map on infrastructures from the Earth observatory of Singapore and population data from Worldpop (2020) were obtained and used in the assessment. The proxy indicators on people's exposure to earthquakes, characterization of irrigated cropland into high, medium and low classes, and impact on irrigation infrastructures were assessed. The results are visualised over sub-district boundaries and hexagonal grids.

The results of the assessment showed that 942 262 people, or 7 percent of the area's total population, were possibly impacted. The districts with the highest number of impacted people are Elbistan, Battalgazi, Yesilyurt, Pozanti and Golbasi. Around 110 km<sup>2</sup> where built-up area was damaged was identified and mapped. The districts with more areas of built-up damage are Jebel Saman (28.6 km<sup>2</sup>), Al Ma'ra (15.7 km<sup>2</sup>), Menbij (14.5 km<sup>2</sup>), Al Bab (10.7 km<sup>2</sup>) and A'zaz (8.2 km<sup>2</sup>). Regarding exposed irrigated cropland, Afrin, Ain Al Arab, A'zaz, As-Salamiyeh and Al Ma'ra districts were most affected. The most impacted districts with irrigated infrastructures on wells are Tartous, Lattakia, As-Salamiyeh; on waterways are As-Suqaylabiyah, Jisr-Ash-Shugur, Tell Salhib; and on dams are Bahlolieh, Mzair'a and Safita.

Experience from this assessment allows identifying several recommendations. Field data collection would help cross-checking the results, proposing agronomic advice, and using maps and spatial results to develop response plans. In the future, assessing natural resources, irrigation infrastructure, crop, and agriculture, would benefit from improved spatial information. As for example, developing a national land cover reference system using very high-resolution satellite imagery, ground validation, and accuracy assessment would significantly improve our understanding of the status of natural resources, land, water, and vegetation in general.

The current assessment also highlights the relevance of a national geospatial database and monitoring platform for irrigated land.

# Background

Earthquake impact assessment is a critical process that involves evaluating the potential consequences of an earthquake on the environment, infrastructure, and human life. It aims to provide decision-makers with information that can help them make informed decisions and take proactive measures to mitigate the impact of an earthquake (Lin *et al.*, 2011). Hazard identification and mapping involves identifying areas at risk of earthquakes and mapping out the potential impacts of an earthquake, such as ground shaking, liquefaction, and landslides. Earthquake impact assessment is critical to disaster risk reduction and can help communities and decision-makers to better prepare for and respond to earthquakes (Goda *et al.*, 2016).

On the 6th of February, a 7.8 degrees earthquake struck southern Turkey near Syria's northern border. The earthquake was centered about 33 km (20 miles) from Gaziantep. Aleppo, Latakia, Hama, Idleb and Tartous are the governorates most affected by the earthquake. In this regard, a rapid geospatial assessment has been conducted by The Food and Agriculture Organization of the United Nations (FAO) to determine the extent of the damage caused by the earthquake. The results aim to support the agricultural sector's current and future response programs.

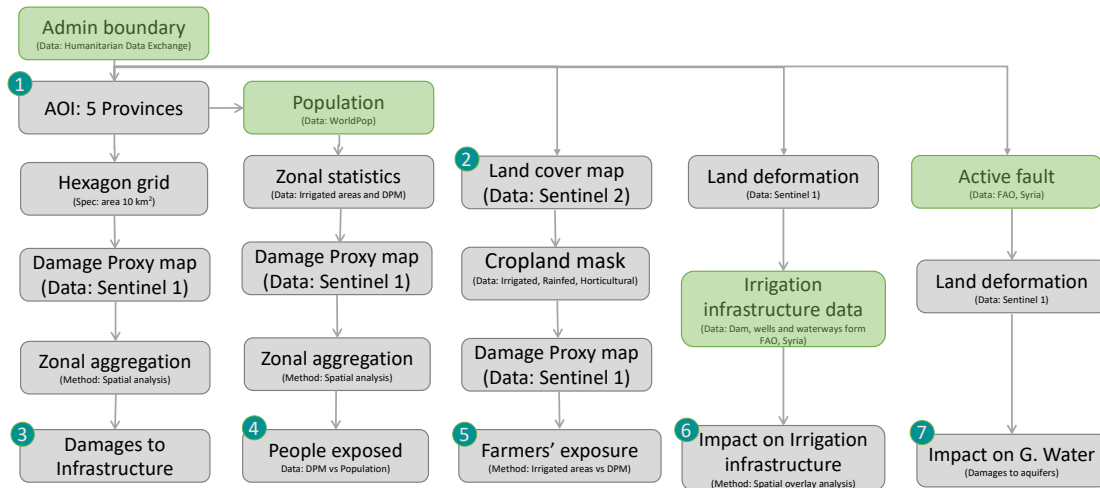
The objectives of this rapid geospatial emergency impact assessment, considering the limited time and information available to conduct this assessment, are to (1) assess the damage extent and magnitude, (2) identify affected irrigation infrastructure, (3) assess the exposure of farmers to the earthquake and (4) provide the results in support to regional, national, and local response actors.

The results have been produced within a short time period with the objective to support an emergency response process using machine learning and artificial intelligence techniques that allowed integration of available datasets and complement the analysis. However, Unavailable data and information, and the limited time to conduct this assessment, may have limited the results.

# Methodological approach

The following methodological approach was implemented to provide results for this rapid geospatial impact assessment.

Figure 1 Methodological approach for the earthquake impact assessment in the Syrian Arab Republic



Source: Authors' own elaboration

Notes:

Grey boxes: data generated under this assessment.

Green boxes: Input datasets.

Green labels: different steps followed under this assessment.

## Step 1: Selection of Area of Interest (AOI)

The selection of the AOIs was based on the damage proxy map (DPM) derived from Earth Observatory of Singapore - Remote Sensing (EOS-RS) to prioritize high-impact areas. Administrative boundary layers from Global Administrative Areas (GADM), Humanitarian Data Exchange (HDX) (UNOCHA, 2020), UNOCHA and Global Administrative Unit Layers (GAUL) were compared. HDX, UNOCHA was selected as the data source for the assessment because it provided updated and better detailed administrative information. Administrative boundaries at the provincial level defined the AOI. Statistics were prepared at district and sub-district levels.

## Step 2: Preparation of proxy land cover map

Land cover legend for Syrian Arab Republic was derived from AIT, ICARDA, and WASWC (2004). A proxy land cover was prepared at the subnational level using Sentinel 2. A normalized difference vegetation index (NDVI) mask for 2022 delineated the cultivated area mask. The land cover dataset was prepared using 2022 satellite imageries (Sentinel 2), 700 training data, and a random forest (machine learning) model in SEPAL. The spatial resolution of the land cover data is 10 m. The time series profile of Normalized Difference Vegetation Index (NDVI) of 2022 is used to classify horticulture, irrigated and rainfed cropland areas. Land cover map consists of eight different classes (built-up areas, bare areas, forest, irrigated field crops, horticultural crops, rainfed field crops, grasses and shrubs, and waterbodies). To avoid misclassification from the machine learning model, the land cover map and the reference points were compared with the WaPOR land cover

map (WaPOR, 2021) and irrigation map shared by the country office, and the post-processing of land cover was carried out.

### **Step 3: Derivation of Damage Proxy Maps (DPM)**

DPM uses the so-called Coherence Change Detection (CCD) algorithm based on Sentinel-1 SAR data (Tay et al. 2020) to produce damage proxy maps at 30m pixel size. Data is only reliable over built-up areas by detecting severe damaged building. DPM was derived from synthetic aperture radar (SAR) images acquired by the Copernicus Sentinel-1 and ALOS 2 satellites considering the pre (13 Oct 2022 to 29 Jan 2023) and post-earthquake (10 Feb 2023) events. The data were masked using built-up areas from the land cover.

### **Step 4: Assessment of population exposure**

Population exposure was estimated using the damage proxy map (DPM) and Worldpop population data (Worldpop, 2020) at the national level. The DPM layer was overlaid on the population layer to estimate the exposed population. The percentage of the population exposed is calculated using the area's total population being assessed. This methodology is commonly used in impact assessment and management to assess the potential impact of earthquake on a given population.

### **Step 5: Classification of hexagon grids by extent of Irrigated cropland**

Irrigated cropland area is obtained from a land cover map. For a better visual representation, sub-district admin boundaries are disaggregated into a hexagon grid of area 10 km<sup>2</sup>. Hexagons have a uniform area representation, allowing for easier analysis and providing good spatial correlation. Irrigated cropland areas are estimated by aggregating the area at the hexagonal level.

### **Step 6: Zonal statistics using damage proxy map and irrigated cropland**

The hexagonal grids from irrigated cropland and the damage proxy map were combined with mapping the farmers exposure to the earthquake. Humanitarian Data Exchange (HDX) boundaries (HDX, 2020) were used to get the statistics at the sub-district levels.

### **Step 7: Preparation of deformation map**

Land deformation map was prepared using multiple pre and post-event images from Sentinel-1 to estimate the horizontal displacement. This indicator helps identify areas with a potentially impacted aquifer system by earthquake damages. High displacement zones correspond to a higher impact on aquifer systems due to compaction and leakage. Based on the deformation map, the faults are classified as active and not active.

### **Step 8: Impact on irrigation infrastructure**

The locations of irrigation infrastructure (dams, surface irrigation and drainage networks and related structures, pumping stations and wells, etc) and potentially damaged area

derived from deformation map/ distance from active fault, were overlaid to stratify locations of irrigation infrastructure based on earthquake damage magnitude. Humanitarian Data Exchange (HDX) boundaries (HDX, 2020) were used to extract the statistics at the sub-district levels.

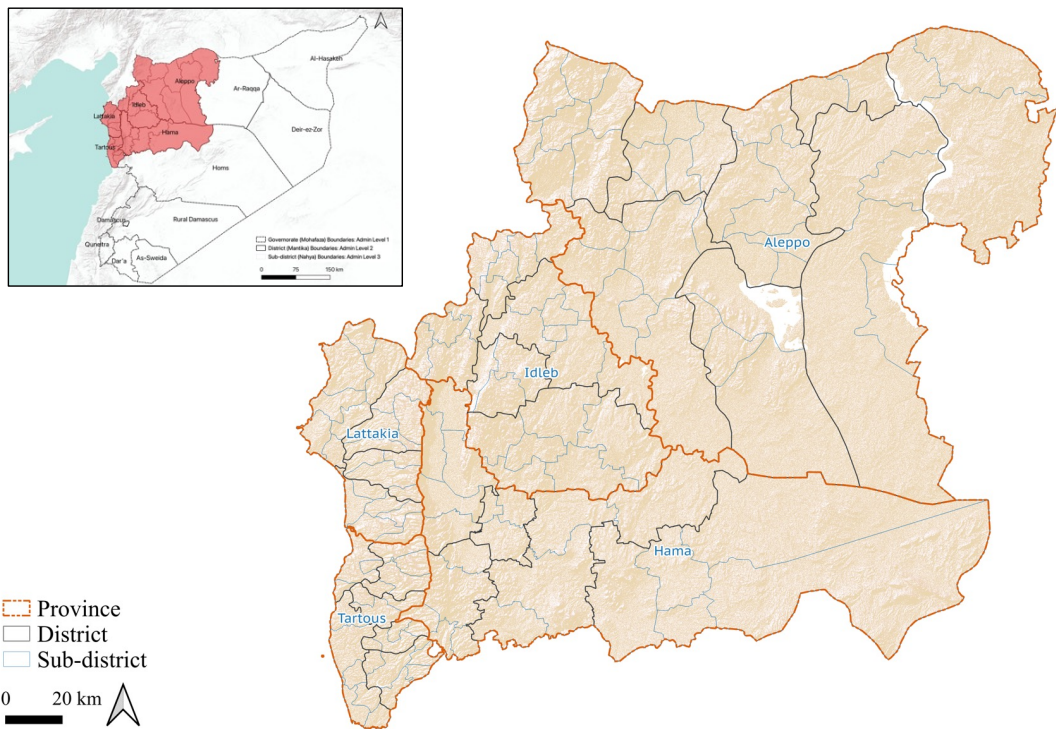


# Results

## Result 1: Area of interest (AOI)

The AOI selection aimed to prioritise the assessment areas where impacts from the earthquake were high. Considering this, the provinces of Tartous, Hama Lattakia, Idleb and Aleppo were chosen as they had a higher extent of impacted areas. For this purpose, the administrative boundaries from Global Administrative Areas (GADM), Humanitarian Data Exchange (HDX) (HDX, 2020) and Global Administrative Unit Layers (GAUL) are compared, and HDX was chosen as the data source for the assessment because it provided updated and better detailed administrative information.

Figure 2 Area of interest at district level in Syrian Arab Republic



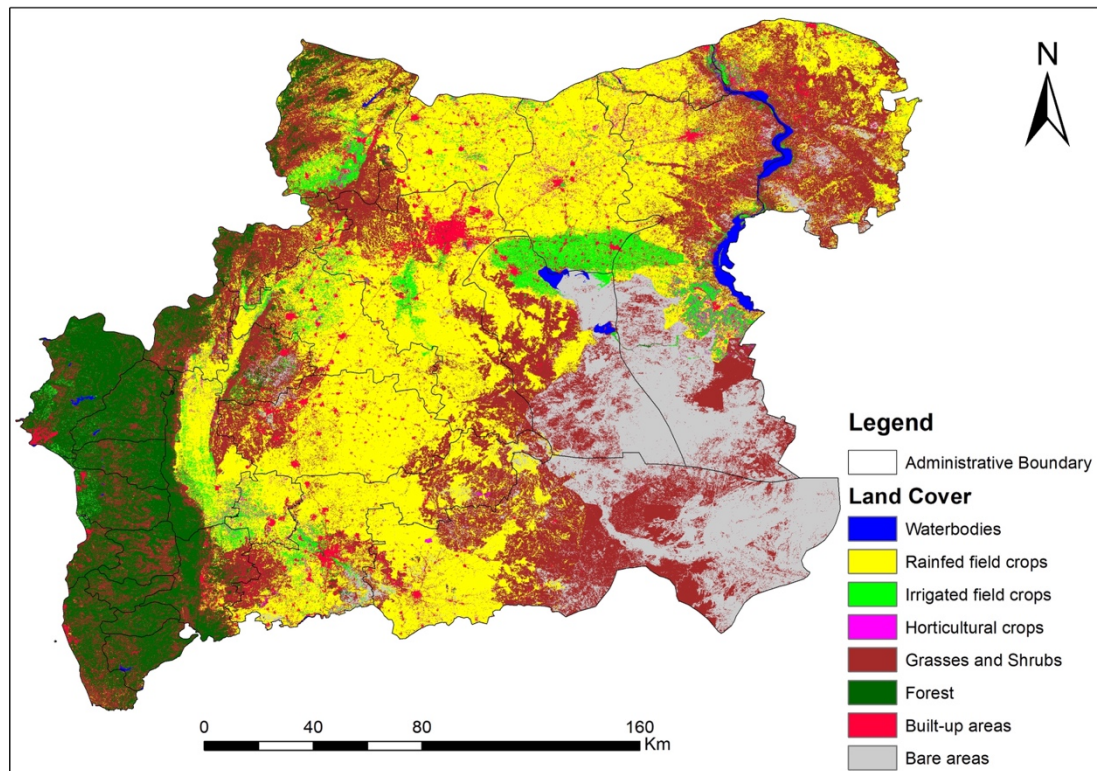
Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

## Result 2: Proxy land cover

Land cover legend for Syrian Arab Republic was derived from AIT, ICARDA, and WASWC (2004) (De Pauw, 2004). The land cover was prepared using Sentinel 2 and training data from a high-resolution map (like Google and Bing). The land cover dataset was prepared using 2022 satellite imageries (Sentinel 2), around 700 training data, and a random forest model in SEPAL. The spatial resolution of the land cover data is 10 m. Time series profile of Normalized Difference Vegetation Index (NDVI) of 2022 are used to classify horticulture, irrigated and rainfed cropland area. Land cover map covers eight classes which include built-up areas, bare areas, forest, irrigated field crops, horticultural crops, rainfed field crops, grasses and shrubs, and waterbodies.

Land cover map at national and sub-national levels for specified AOI have been prepared. Zonal statistics were extracted based on the HDX administrative boundaries. The datasets at provincial, district and sub-district levels can be found in Annexes.

Figure 3 2022 land cover map in the area of interest

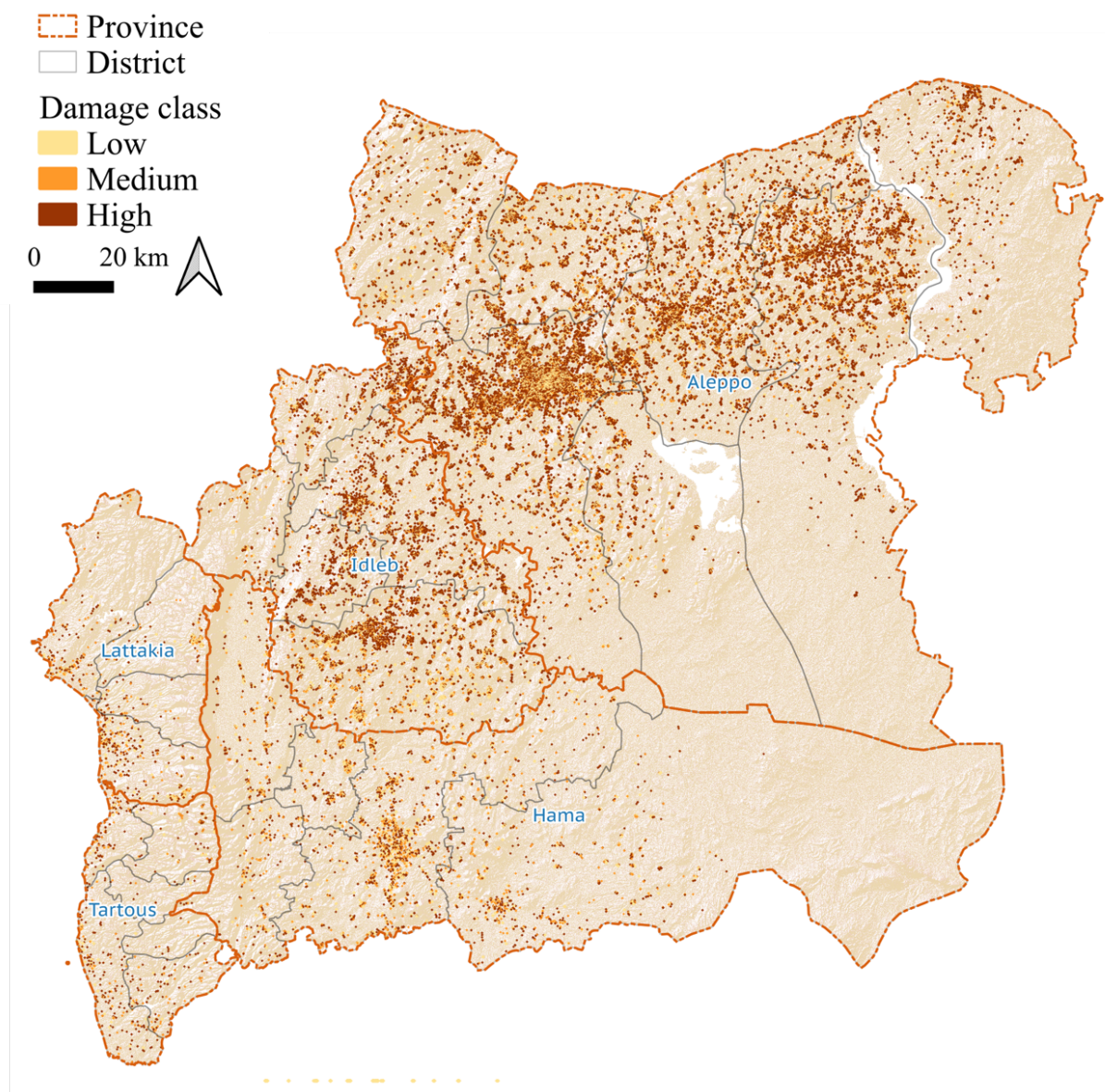


Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

## Result 3: Damage proxy map (DPM)

DPM uses the Coherence Change Detection (CCD) algorithm based on Sentinel-1 SAR data (Tay et al. 2020) to produce damage proxy maps at 30m pixel size. DPM is only reliable over built-up areas by detecting severe building collapse. DPM was derived from synthetic aperture radar (SAR) images acquired by the Copernicus Sentinel-1 and ALOS 2 satellites before (13 Oct 2022 to 29 Jan 2023) and after (10 Feb 2023) the event by EOS-RS Lab (Lauriane CHARDOT, 2023). The DPM on infrastructures for Syrian Arab Republic was obtained from the Earth observatory, Singapore. Population data (Worldpop-2020), land cover and derived damage proxy map (Earth observatory, Singapore) were combined to help identify areas with a potentially high number of affected people.

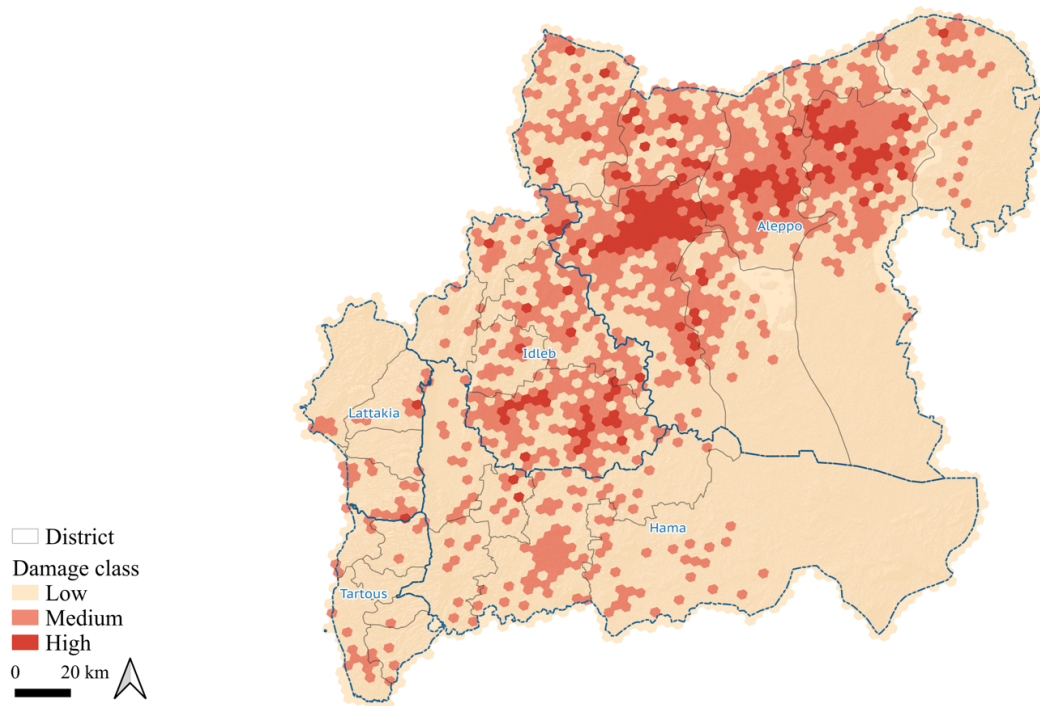
Figure 4 2023 damage proxy map of affected areas



Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.



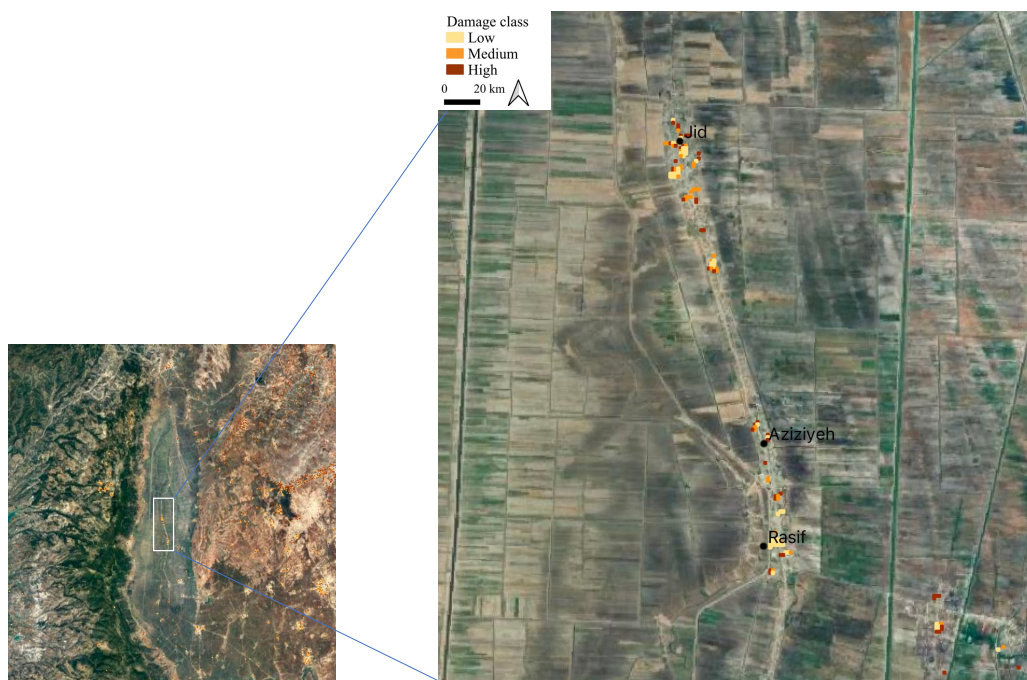
Figure 5 Aggregated proxy damage classes at hexagonal grid



Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

The results of DPM was cross-checked with coronatines of rural areas of Hama governorate, that was hit severely by the earthquake. These areas were reported damage in rural houses and animal sheds among others.

Figure 6 Cross-checking the results with three field impacted locations in Hama governorate

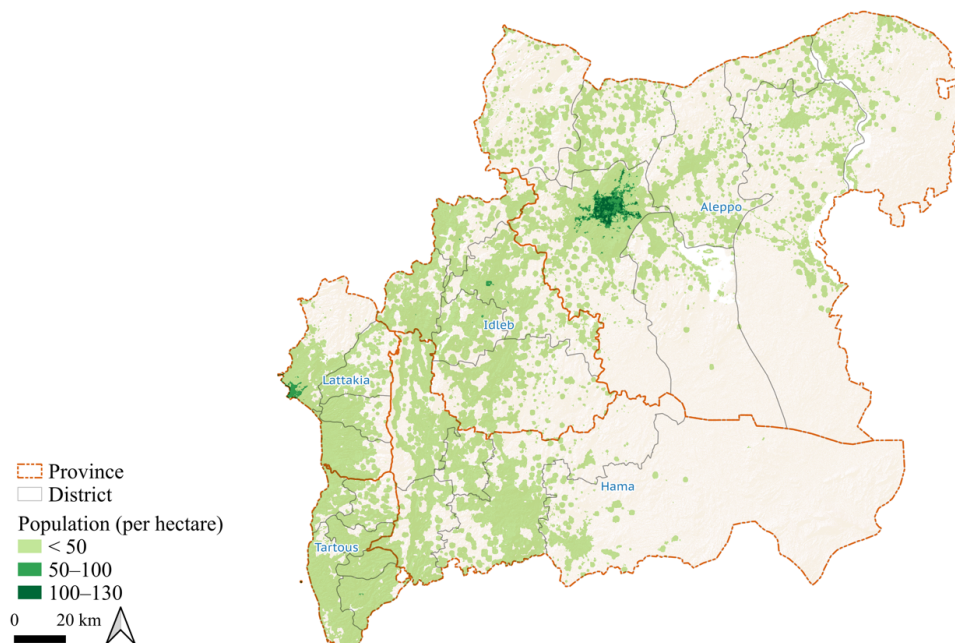


Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

## Result 4: Exposure of people

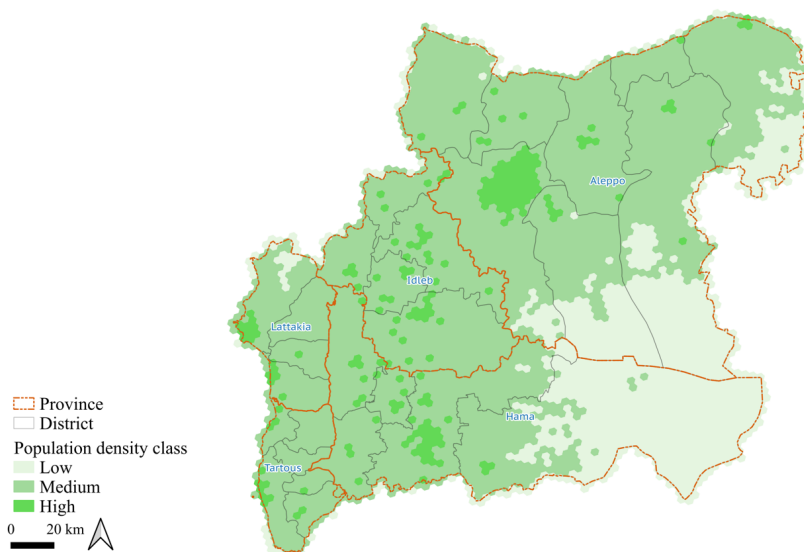
A vulnerability assessment for the population exposed to earthquakes was conducted by combining the damage and the population density at administrative levels. The assumption is that the more people in the earthquake-impacted areas, the greater the exposure is. Population data (Worldpop-2020), land cover and derived damage proxy map (Earth observatory, Singapore) were combined to help identify areas with a potentially high number of affected people. The DPM layer was overlaid on the population layer to estimate the exposure of the population potentially affected.

Figure 7 Population density map at district and sub-district administrative levels



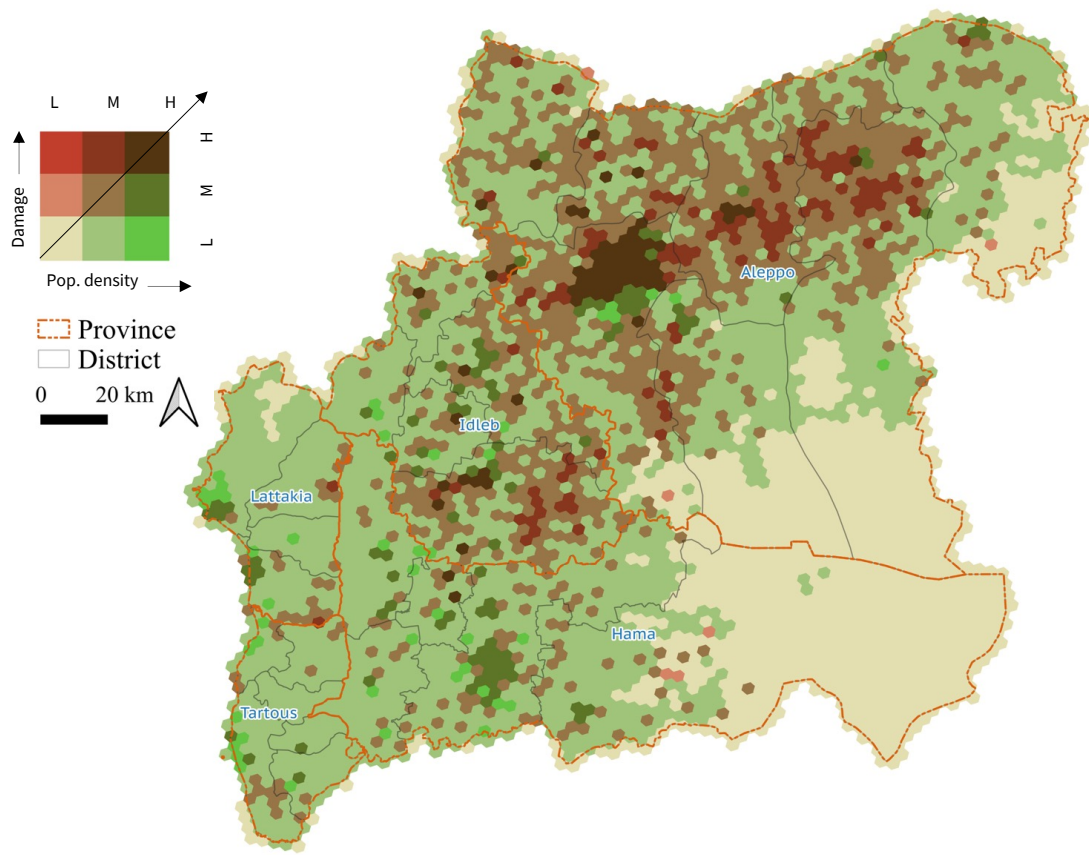
Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Figure 8 Categories of population density at 10 km<sup>2</sup> hexagonal level



Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Figure 9 Potential exposure of people to earthquake



Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.



## Result 5: Irrigated cropland

Irrigated cropland area is obtained from a land cover map. For a better visual representation, sub-district boundaries are disaggregated into a hexagon grid of area 10 km<sup>2</sup>. As, hexagons have a uniform area representation, allowing for easier analysis and providing good spatial correlation, irrigated cropland areas are estimated and visualized aggregating the area at the hexagonal level. Extent of irrigated areas was compared with WaPOR land cover map and irrigation map received from country office.

Figure 10 Extent of irrigated area over admin boundaries

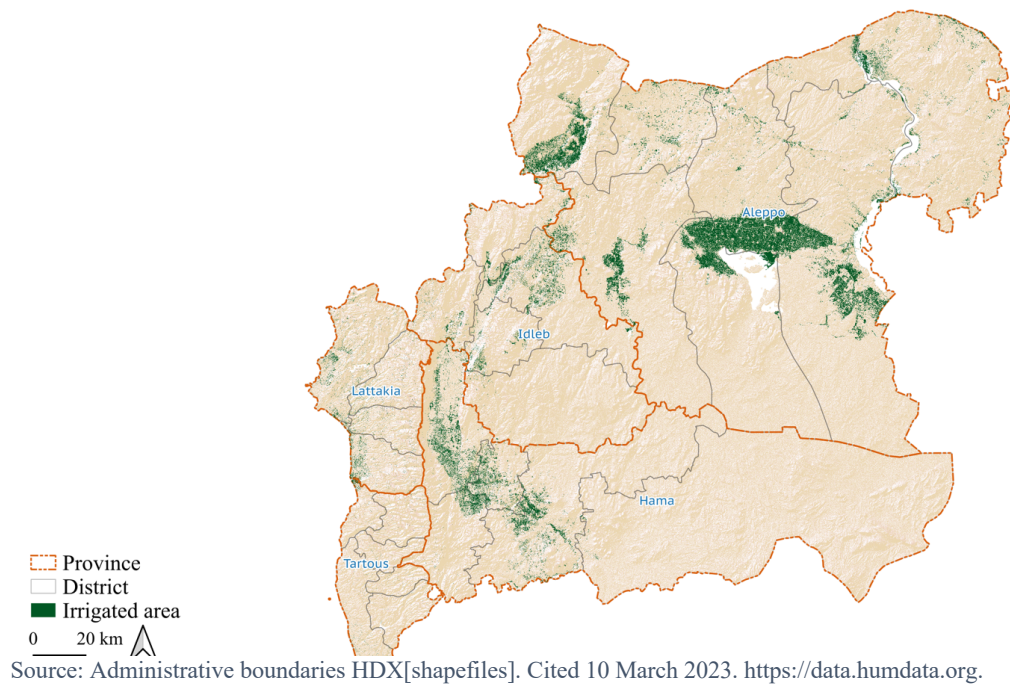
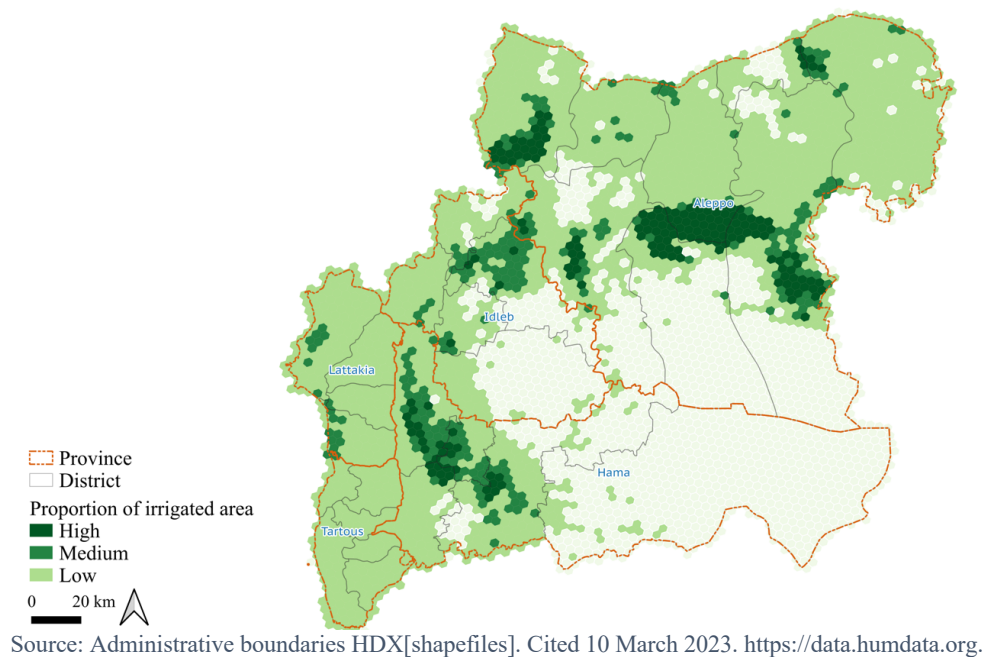


Figure 11 Irrigated cropland area extent

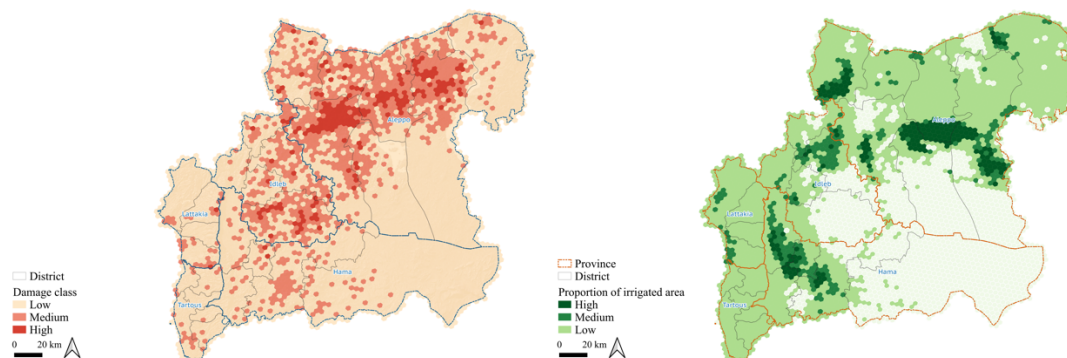




## Result 6: Impact on irrigated cropland

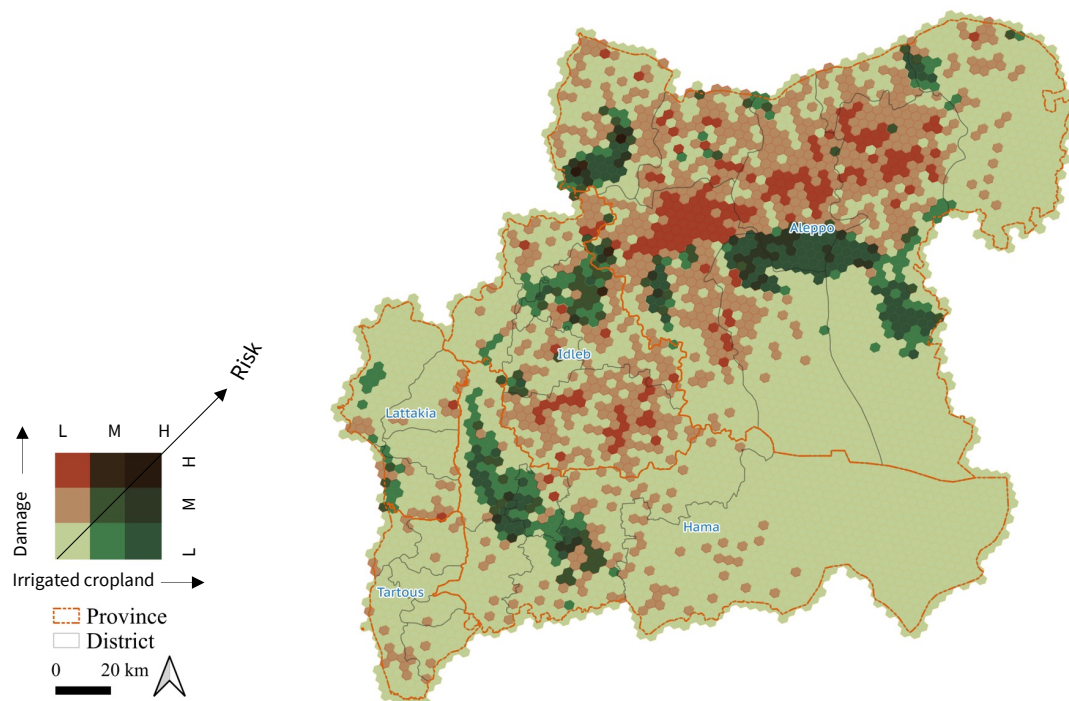
Proxy indicator of exposure of agricultural sector was prepared by combining irrigated cropland from land cover and derived damage proxy map (Earth observatory, Singapore). The proxy indicator helps identify areas with a potentially higher degree of farmers' exposure to earthquake damage.

Figure 12 Hexagons grids of DPM and irrigated areas



Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Figure 13 Farmers' exposure to earthquake

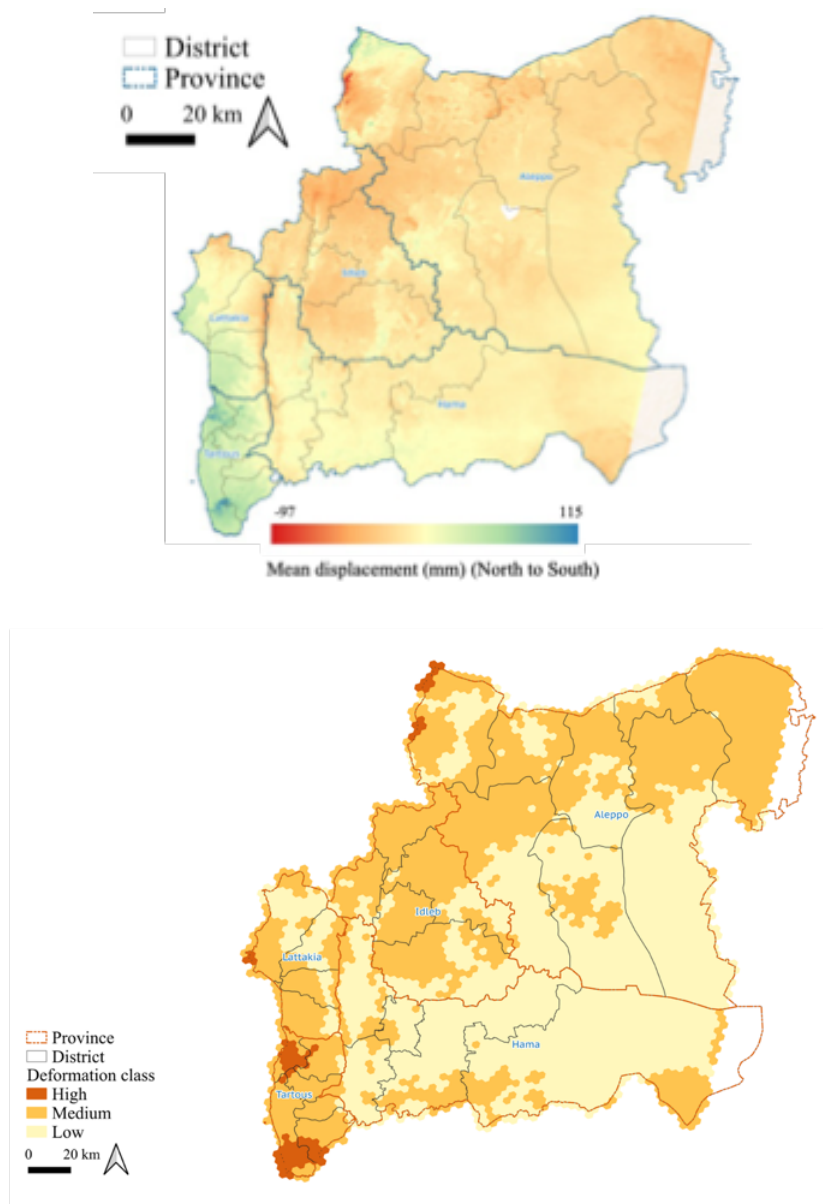


Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

## Result 7: Land deformation

A land deformation map was prepared using multiple pre- and post-earthquake sentinel 1 time series images to estimate the horizontal displacement. This indicator helps identify areas with a potentially impacted aquifer system to earthquake damages. High displacement zones correspond to higher impact on aquifer systems due to compaction and leakage.

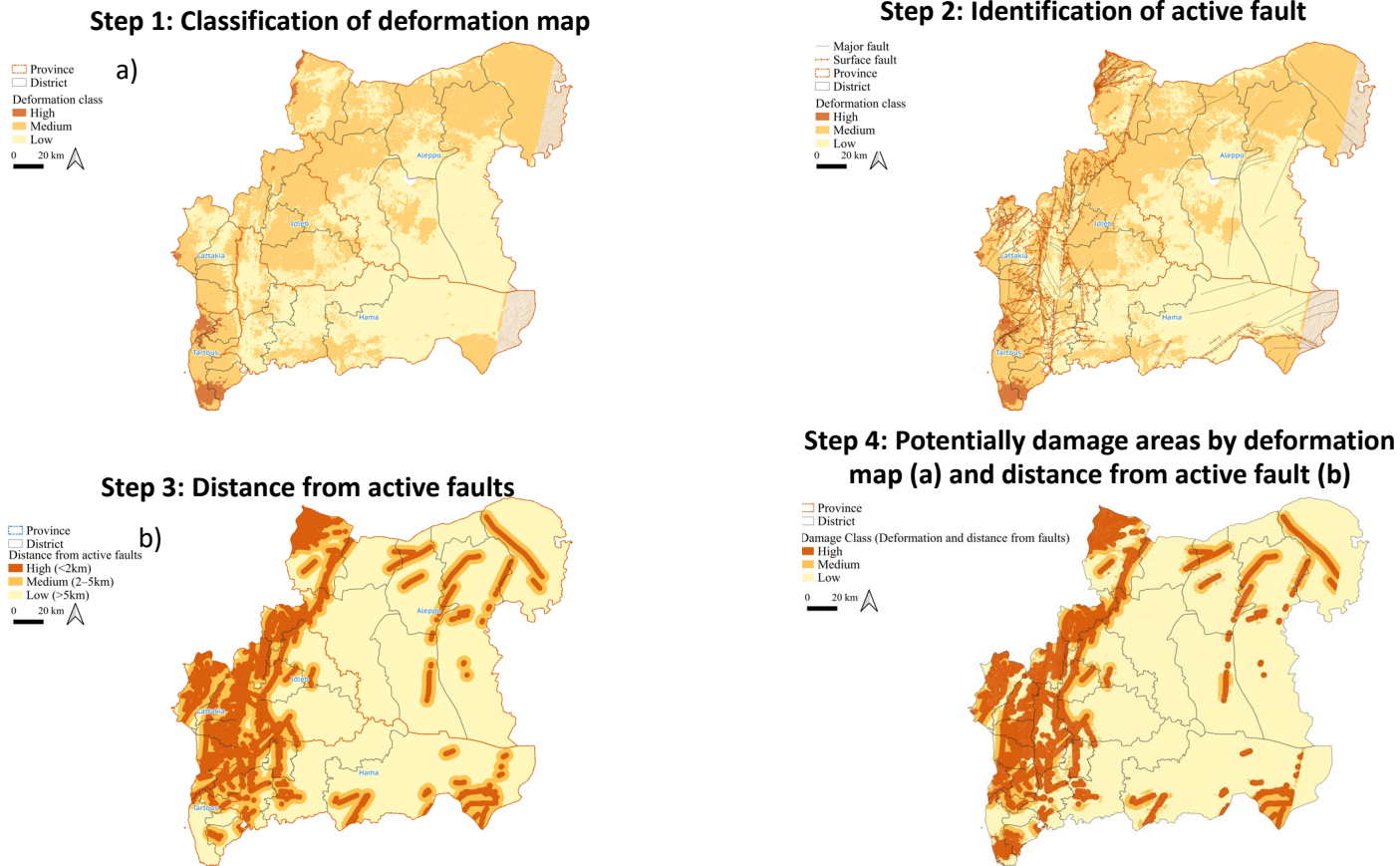
Figure 14 land deformation map a) Admin level b) Hexagons.



Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

At this stage this map shows some apparent anomalies to be investigated, including the high apparent deformation in Tartous which may be due to local factors or some possible introduced error in the methodology of estimation of deformation.

Figure 15 Potentially damage areas from land deformation and distance from active faults



Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

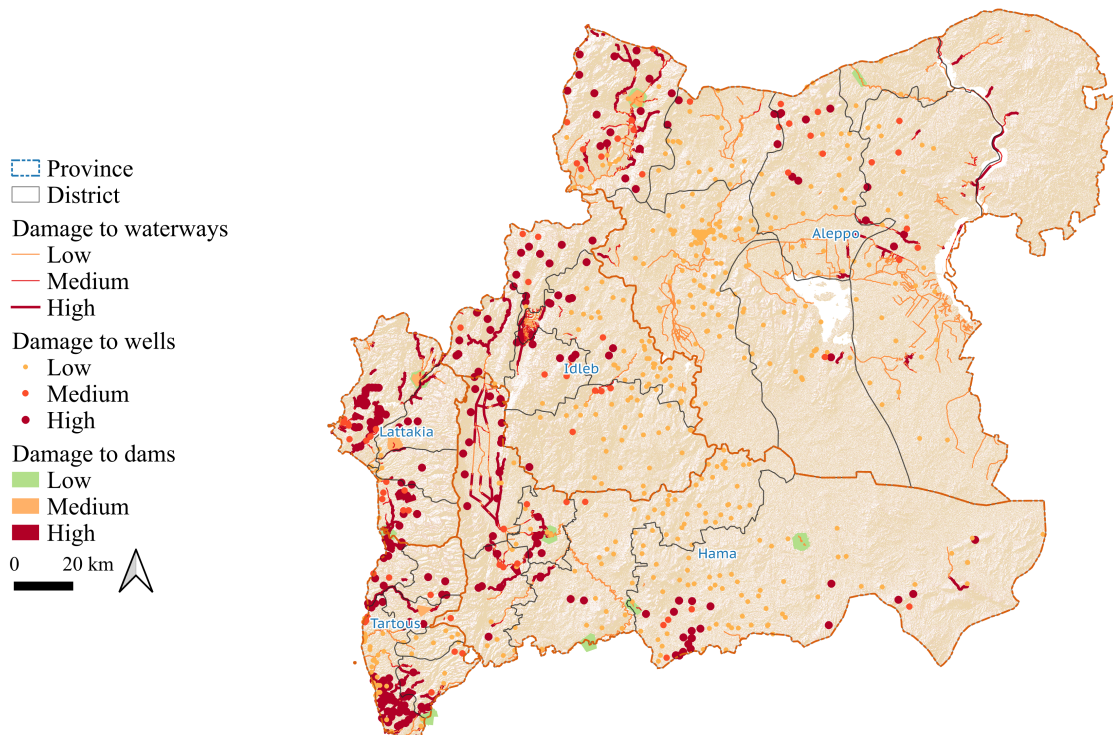
## Result 8: Exposure of on irrigation infrastructure

To identify the impact on irrigation infrastructure, deformation maps were classified into different severity classes. The detailed steps are as follows:

- Step 1: Land deformations map was classified into three classes of severity (high, medium and low) based on the magnitude of deformation.
- Step 2: Active faults were identified by overlaying the layer of tectonic faults over reclassified land deformation map. All the faults falling into high and medium land deformation classed were classified as active faults.
- Step 3: Active faults were classified into three classes based on the distance to active fault. All the areas falling around the 2 km are classified as high, 2-5 km as medium and > 5 km as less susceptible to damage.
- Step 4: The results of land deformation and distance of faults were merged to identify potentially damaged areas.

The locations of irrigation infrastructure (dams, waterways and wells) and potentially damaged areas derived from deformation map/ distance from the active fault, were overlaid on the irrigation infrastructure based on earthquake damage magnitude. The proxy indicator helps identify irrigation facilities likely to be impacted by the earthquake.

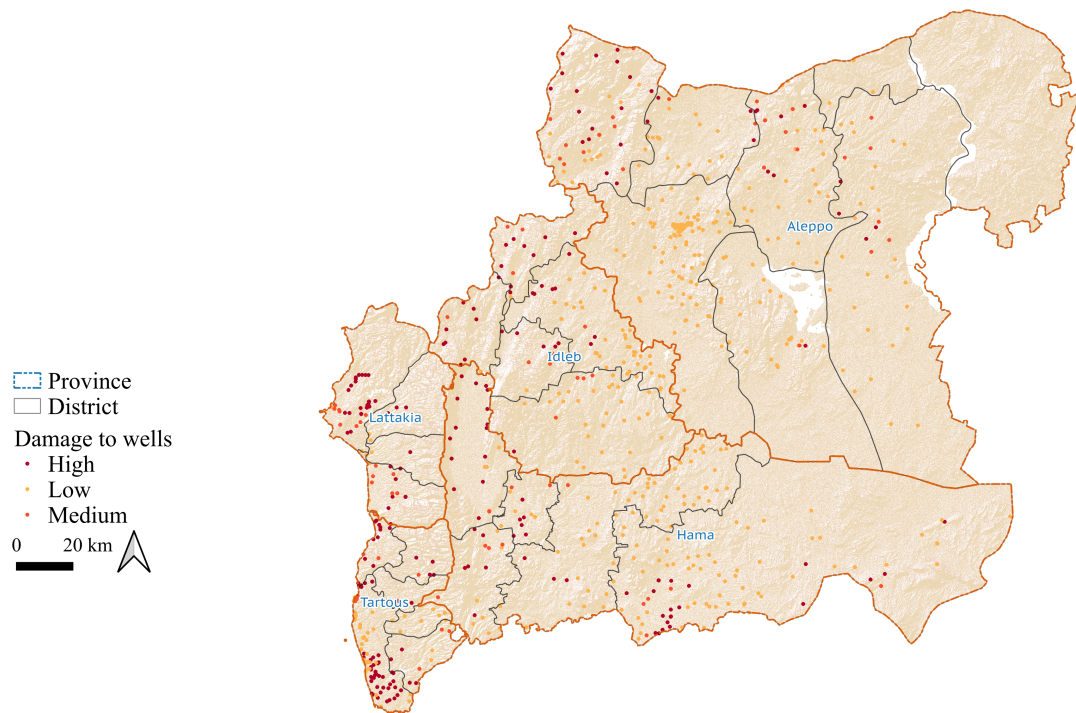
Figure 16 Impact on Irrigation infrastructure



Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

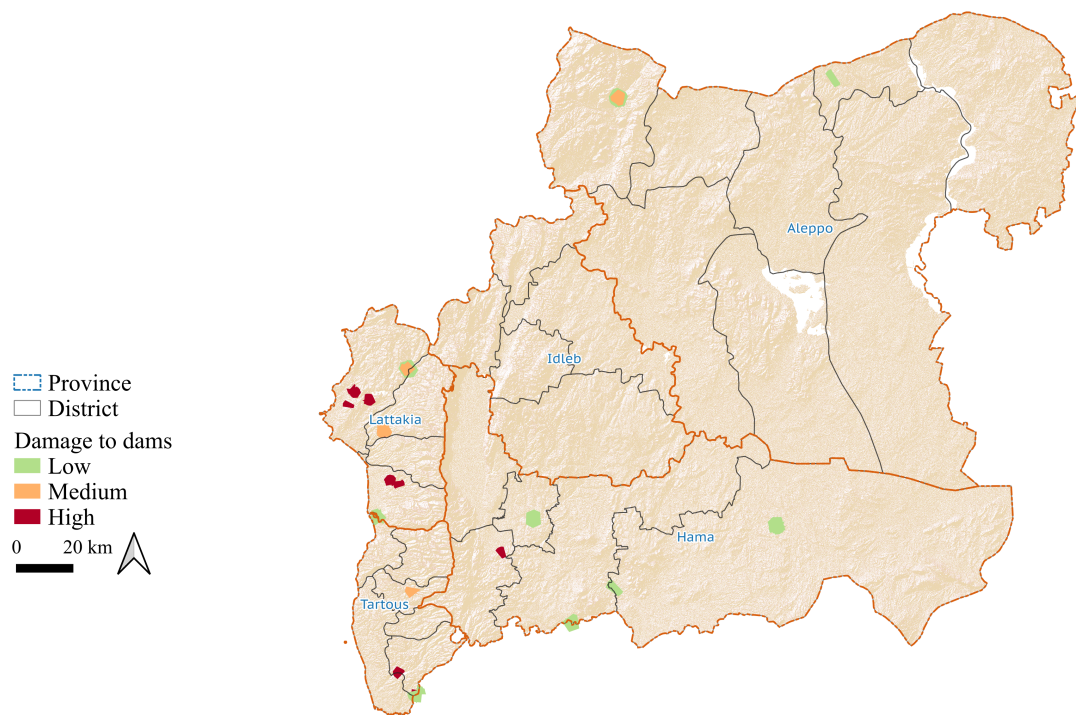


Figure 17 Location of potential impacted groundwater wells



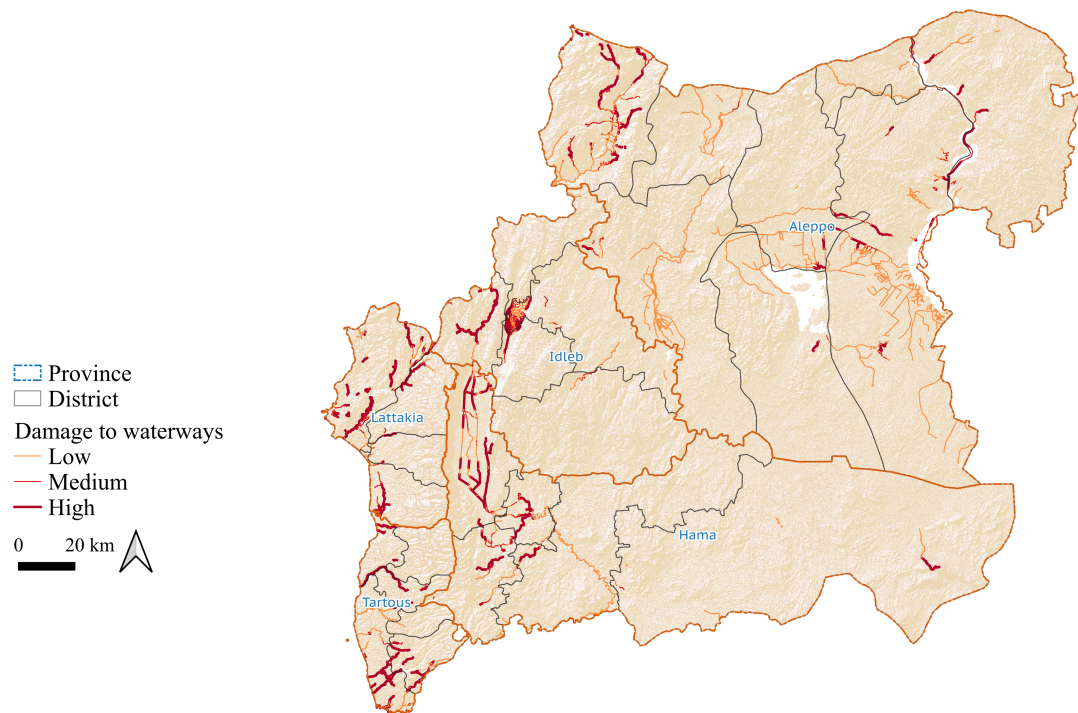
Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Figure 18 Location of dams and possibility of damage given deformation and other maps



Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Figure 19 Location of potential impacted waterways



Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

# Conclusion and recommendations

The assessment highlighted that 942 262 people were potentially impacted, which is 7 percent of the total population of the affected area. The districts with a greater number of impacted people are Elbistan, Battalgazi, Yesilyurt, Pozanti and Golbasi. Around 110 km<sup>2</sup> of the built-up area was damaged, and the districts with more areas of built-up damage are Jebel Saman (28.6 km<sup>2</sup>), Al Ma'ra (15.7 km<sup>2</sup>), Membij (14.5 km<sup>2</sup>), Al Bab (10.7 km<sup>2</sup>) and A'zaz (8.2 km<sup>2</sup>). Regarding exposed irrigated cropland, Afrin, Ain Al Arab, A'zaz, As-Salamiyeh and Al Ma'ra districts were most affected. The most impacted districts with irrigated infrastructures on wells are Tartous, Lattakia, As-Salamiyeh; on waterways are As-Suqaylabiyah, Jisr-Ash-Shugur, Tell Salhib; and on dams are Bahlolieh, Mzair'a and Safita.

It is important to highlight that the results of the current geospatial assessment might not align with national assessment for several reasons, such as the unavailability of satellite images within a particular time frame, discrepancies in the definitions of terminologies, methodologies, datasets, the spatial and temporal resolution of datasets or imageries. Nevertheless, combining geospatial technologies, field data, and national databases can aid in creating efficient and sustainable agricultural monitoring and planning strategies, as well as conducting speedy emergency impact assessments in the future.

As such, it is strongly advised that a comprehensive evaluation of all accessible information and datasets be conducted for effective methodological formulation. Additionally, there should be increased interaction between field/ground data for validation and accuracy assessment of remote sensing data and an enhancement of national technical capabilities in evaluating the vulnerability of affected areas, crops, and populations to support national recovery efforts. It is also necessary to generate consistent annual statistics that are frequently updated while establishing crop types and calendars at the smallest administrative level for integration with geospatial emergency response measures. Finally, innovative, cost-effective geospatial technologies must be utilized promptly for damage assessment purposes within a set timeframe.

At the same time, there is the need to link this type of analysis with operational research questions to make the best use of the power of geospatial analysis. In the early days of a response to a natural disaster such as an earthquake, for FAO, these questions are typically:

- How many people have been affected in rural areas – through immediate damage to their farms, houses, animal sheds, etc?
- What is the extent of damage to agriculture-related community infrastructure – including irrigation canals, dams and equipment; market infrastructure (markets, rural roads, bridges, processing centres, cold chain facilities, etc).

From these two questions – combined with a deep local understanding of the farming system - can be derived estimates of likely disruption to agricultural production.

It is worth noting that in order to answer the second set of questions, it is helpful to have base level maps of the location of assets, and a geographical representation of the food system in question.



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# Annex I – Results at sub-district level

Table 1 Total land area, potentially affected built-up areas at sub- district level

ID	Provinces	Districts	Sub-districts	Land area (km <sup>2</sup> )	Damage proxy class (km <sup>2</sup> )		
					High	Low	Medium
1	Aleppo	Jebel Saman	Jebel Saman	663.87	2.5	4.05	9.97
2	Aleppo	Jebel Saman	Atareb	308.26	0.31	0.58	1.94
3	Aleppo	Jebel Saman	Tall Ed-daman	1146.75	0.71	0.9	1.87
4	Aleppo	Jebel Saman	Haritan	232.73	0.4	0.72	2.27
5	Aleppo	Jebel Saman	Daret Azza	227.5	0.05	0.18	0.79
6	Aleppo	Jebel Saman	Zarbah	354.8	0.08	0.19	0.7
7	Aleppo	Jebel Saman	Hadher	131.33	0.04	0.08	0.28
8	Aleppo	Al Bab	Al Bab	489.12	0.49	0.93	3.34
9	Aleppo	Al Bab	Tadaf	321.11	0.54	0.9	2.62
10	Aleppo	Al Bab	Dayr Hafir	112.17	0.01	0.02	0.08
11	Aleppo	Al Bab	Ar-Ra'ee	352.17	0.15	0.29	0.84
12	Aleppo	Al Bab	Eastern Kwaives	218.56	0.05	0.14	0.49
13	Aleppo	Al Bab	Rasm Haram EL-Imam	203.49	0.08	0.19	0.66
14	Aleppo	Al Bab	A'rima	317.24	0.37	0.59	1.77
15	Aleppo	Afrin	Afrin	427.76	0.21	0.3	0.76
16	Aleppo	Afrin	Bulbul	203.39	0.07	0.12	0.35
17	Aleppo	Afrin	Jandairis	319.51	0.36	0.4	0.67
18	Aleppo	Afrin	Raju	283.19	0.1	0.16	0.48
19	Aleppo	Afrin	Sharan	305.19	0.2	0.38	0.8
20	Aleppo	Afrin	Sheikh El-Hadid	93.55	0.06	0.07	0.14
21	Aleppo	Afrin	Ma'btali	208.55	0.04	0.07	0.23
22	Aleppo	A'zaz	A'zaz	180.11	0.25	0.41	0.93
23	Aleppo	A'zaz	Aghtrin	341.7	0.24	0.47	1.37
24	Aleppo	A'zaz	Tall Refaat	204.51	0.09	0.24	0.61
25	Aleppo	A'zaz	Mare'	191.39	0.16	0.32	0.86
26	Aleppo	A'zaz	Nabul	174.78	0.11	0.21	0.68
27	Aleppo	A'zaz	Suran	167.29	0.35	0.51	0.91
28	Aleppo	Menbij	Menbij	1219.18	1.18	2.16	7.19
29	Aleppo	Menbij	Abu Qalqal	394.13	0.47	0.67	2.2
30	Aleppo	Menbij	Al-Khafsa	3061.68	0.18	0.3	1.21
31	Aleppo	Menbij	Maskana	505.96	0.01	0.03	0.15
32	Aleppo	Ain Al Arab	Ain al Arab	745.06	0.19	0.29	0.97
33	Aleppo	Ain Al Arab	Lower Shyookh	318.65	0.06	0.07	0.26
34	Aleppo	Ain Al Arab	Sarin	2002.1	0.08	0.14	0.59
35	Aleppo	As-Safira	As-Safira	846.09	0.17	0.32	0.91
36	Aleppo	As-Safira	Khanaser	1603.31	0.05	0.06	0.17
37	Aleppo	As-Safira	Banan	140.02	0.16	0.29	0.69

ID	Provinces	Districts	Sub-districts	Land area (km <sup>2</sup> )	Damage proxy class (km <sup>2</sup> )		
					High	Low	Medium
38	Aleppo	As-Safira	Hajeb	260.08	0.18	0.27	0.51
39	Aleppo	Jarablus	Jarablus	316.34	0.13	0.18	0.7
40	Aleppo	Jarablus	Ghandorah	290.81	0.08	0.12	0.61
41	Hama	Hama	Hama	870.17	0.37	0.62	0.74
42	Hama	Hama	Suran	469.19	0.35	0.51	0.91
43	Hama	Hama	Harbanifse	310.56	0.05	0.08	0.08
44	Hama	Hama	Hamra	903.82	0.11	0.15	0.15
45	Hama	As-Suqaylabiyah	As-Suqaylabiyah	224.69	0.04	0.06	0.08
46	Hama	As-Suqaylabiyah	Tell Salhib	202.95	0.04	0.07	0.06
47	Hama	As-Suqaylabiyah	Ziyara	208.89	0.02	0.05	0.09
48	Hama	As-Suqaylabiyah	Shat-ha	186.71	0	0	0.02
49	Hama	As-Suqaylabiyah	Madiq Castle	286.87	0.08	0.1	0.12
50	Hama	As-Salamiyeh	As-Salamiyeh	862.62	0.15	0.28	0.33
51	Hama	As-Salamiyeh	Eastern Bari	240.78	0.02	0.06	0.05
52	Hama	As-Salamiyeh	As-Saan	1937.23	0.03	0.04	0.05
53	Hama	As-Salamiyeh	Saboura	463.12	0.02	0.05	0.07
54	Hama	As-Salamiyeh	Oqeirbat	2687.1	0.05	0.1	0.12
55	Hama	Masyaf	Masyaf	409.25	0.03	0.07	0.05
56	Hama	Masyaf	Jeb Ramleh	160.99	0.02	0.04	0.04
57	Hama	Masyaf	Oj	87.62	0.01	0.02	0.03
58	Hama	Masyaf	Ein Halaqim	69.71	0.01	0.01	0.01
59	Hama	Masyaf	Wadi El-oyoun	76.99	0	0	0.01
60	Hama	Muhradah	Muhradah	226.07	0.05	0.08	0.12
61	Hama	Muhradah	Kafr Zeita	146.47	0.12	0.17	0.16
62	Hama	Muhradah	Karnaz	62.32	0.01	0	0.02
63	Lattakia	Lattakia	Lattakia	114.97	0.06	0.05	0.08
64	Lattakia	Lattakia	Bahlolieh	99.49	0	0.01	0.01
65	Lattakia	Lattakia	Rabee'a	212.24	0	0	0
66	Lattakia	Lattakia	Ein El-Bayda	135.29	0.01	0.01	0.02
67	Lattakia	Lattakia	Qastal Maaf	246.03	0	0	0.01
68	Lattakia	Lattakia	Kasab	98.85	0.01	0.01	0.01
69	Lattakia	Lattakia	Hanadi	66.29	0.01	0.03	0.04
70	Lattakia	Jablah	Jablah	91.61	0.05	0.08	0.13
71	Lattakia	Jablah	Ein Elsharqiyeh	67.26	0	0.01	0.03
72	Lattakia	Jablah	Qteilbiyyeh	108.03	0.02	0.02	0.03
73	Lattakia	Jablah	Ein Shaqaq	62.42	0.01	0.02	0.03
74	Lattakia	Jablah	Dalyeh	93.41	0.17	0.14	0.09
75	Lattakia	Jablah	Beit Yashout	63.26	0.02	0.02	0.02
76	Lattakia	Al-Haffa	Al-Haffa	115.21	0	0.01	0.02
77	Lattakia	Al-Haffa	Salanfa	140.3	0.2	0.15	0.11
78	Lattakia	Al-Haffa	Ein Et-teeneh	54.13	0	0	0
79	Lattakia	Al-Haffa	Kansaba	169.55	0.01	0.01	0.01

ID	Provinces	Districts	Sub-districts	Land area (km2)	Damage proxy class (km2)		
					High	Low	Medium
80	Lattakia	Al-Haffa	Mzair'a	91.12	0.01	0.01	0.01
81	Lattakia	Al-Qardaha	Al-Qardaha	171.18	0.01	0.01	0.02
82	Lattakia	Al-Qardaha	Harf Elmseitra	54.94	0	0	0
83	Lattakia	Al-Qardaha	Fakhura	70.06	0	0.01	0.02
84	Lattakia	Al-Qardaha	Jobet Berghal	65.07	0	0	0
85	Idleb	Idleb	Idleb	252.19	0.07	0.14	0.57
86	Idleb	Idleb	Abul Thohur	327.71	0.18	0.32	1.02
87	Idleb	Idleb	Bennsh	100.32	0.02	0.03	0.16
88	Idleb	Idleb	Saraqab	378.38	0.1	0.22	0.98
89	Idleb	Idleb	Teftnaz	98.92	0.05	0.1	0.3
90	Idleb	Idleb	Maaret Tamsrin	235.11	0.02	0.07	0.32
91	Idleb	Idleb	Sarmin	44.58	0.01	0.01	0.08
92	Idleb	Al Ma'ra	Ma'arrat An Nu'man	409.28	0.25	0.57	2.08
93	Idleb	Al Ma'ra	Khan Shaykun	203.05	0.15	0.23	0.21
94	Idleb	Al Ma'ra	Sanjar	590.03	0.51	0.78	1.84
95	Idleb	Al Ma'ra	Kafr Nobol	273.3	0.29	0.46	0.82
96	Idleb	Al Ma'ra	Tamanaah	369.67	0.79	0.72	0.5
97	Idleb	Al Ma'ra	Heish	183.94	0.12	0.15	0.17
98	Idleb	Harim	Harim	45.81	0.04	0.06	0.1
99	Idleb	Harim	Dana	214.69	0.11	0.24	0.91
100	Idleb	Harim	Salqin	131.28	0.13	0.1	0.18
101	Idleb	Harim	Kafr Takharim	92.5	0.02	0.03	0.08
102	Idleb	Harim	Qourqeena	122.36	0	0.02	0.1
103	Idleb	Harim	Armanaz	130.11	0.02	0.04	0.11
104	Idleb	Jisr-Ash-Shugur	Jisr-Ash-Shugur	259.83	0.02	0.04	0.09
105	Idleb	Jisr-Ash-Shugur	Badama	113.5	0	0	0.01
106	Idleb	Jisr-Ash-Shugur	Darkosh	118.08	0.02	0.02	0.02
107	Idleb	Jisr-Ash-Shugur	Janudiyeh	119.89	0.02	0.03	0.03
108	Idleb	Ariha	Ariha	274.99	0.06	0.13	0.55
109	Idleb	Ariha	Ehsem	204.3	0.02	0.08	0.41
110	Idleb	Ariha	Mhambal	124.22	0.01	0.03	0.11
111	Tartous	Tartous	Tartous	181.1	0.04	0.04	0.06
112	Tartous	Tartous	Arwad	0.23	0	0	0
113	Tartous	Tartous	Hameidiyyeh	69.81	0.01	0.01	0.02
114	Tartous	Tartous	Kherbet Elma'aza	55.65	0	0.01	0.02
115	Tartous	Tartous	Soda Khawabi	107.28	0	0.01	0.01
116	Tartous	Tartous	Kareemeh	55.38	0	0	0.01
117	Tartous	Tartous	Safsafa	67.85	0	0.01	0.03
118	Tartous	Banyas	Banyas	153.2	0.03	0.05	0.09
119	Tartous	Banyas	Rawda	31.22	0	0	0.02
120	Tartous	Banyas	Taleen	28.06	0	0	0
121	Tartous	Safita	Safita	125.58	0	0.02	0.05

ID	Provinces	Districts	Sub-districts	Land area (km <sup>2</sup> )	Damage proxy class (km <sup>2</sup> )		
					High	Low	Medium
122	Tartous	Safita	Mashta Elhiu	52.02	0	0.01	0
123	Tartous	Safita	Bariqiyeh	38.35	0	0	0
124	Tartous	Safita	Sibbeh	20.42	0	0	0
125	Tartous	Safita	Sisniyyeh	72.48	0	0.02	0.03
126	Tartous	Safita	Ras El-Khashufeh	47.21	0	0	0.01
127	Tartous	Dreikish	Dreikish	84.35	0	0	0
128	Tartous	Dreikish	Jneinet Raslan	38.75	0	0	0
129	Tartous	Dreikish	Hamin	27.22	0	0	0
130	Tartous	Dreikish	Dweir Raslan	35.71	0	0	0
131	Tartous	Sheikh Badr	Sheikh Badr	102.75	0	0	0.01
132	Tartous	Sheikh Badr	Baramanet Elmashayekh	65.04	0	0	0
133	Tartous	Sheikh Badr	Qumseyyeh	46.75	0	0	0
134	Tartous	Qadmous	Anaza	101.35	0.02	0.03	0.03
135	Tartous	Qadmous	Qadmous	136.52	0.01	0.01	0.02
136	Tartous	Qadmous	Hamam Wasil	45.26	0	0	0
137	Tartous	Qadmous	Tawahin	86.22	0.02	0.04	0.05

Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Table 2 Total land area, areas of land cover classes at district level

ID	Provinces	Districts	Sub-districts	Land cover classes (km2)							
				Builtup	Bareland	Forest	Irrigated cropland	Horticultural crops	Rainfed crops	Grass and shrubs	Waterbodies
1	Aleppo	Jebel Saman	Jebel Saman	6.36	0.00	70.57	188.05	3.00	12.67	8.12	375.10
2	Aleppo	Jebel Saman	Atareb	5.20	0.00	58.22	38.45	0.91	22.90	0.18	182.40
3	Aleppo	Jebel Saman	Tall Ed-daman	0.43	0.00	348.86	16.42	18.84	2.92	1.97	757.31
4	Aleppo	Jebel Saman	Haritan	2.12	0.00	26.65	31.47	0.85	1.20	0.30	170.14
5	Aleppo	Jebel Saman	Daret Azza	0.00	0.00	177.32	0.26	0.63	0.94	0.95	47.41
6	Aleppo	Jebel Saman	Zarbah	0.21	0.00	3.14	22.22	0.08	40.18	3.18	285.79
7	Aleppo	Jebel Saman	Hadher	0.00	0.00	2.89	8.70	0.08	25.35	1.30	93.00
8	Aleppo	Al Bab	Al Bab	21.75	0.00	3.19	36.07	2.26	6.16	0.00	419.69
9	Aleppo	Al Bab	Tadaf	6.79	0.00	6.16	17.14	0.75	1.83	0.00	288.45
10	Aleppo	Al Bab	Dayr Hafir	0.00	0.37	0.12	16.58	1.57	78.44	0.00	15.10
11	Aleppo	Al Bab	Ar-Ra'ee	11.13	0.00	1.60	10.54	0.31	13.00	2.73	312.85
12	Aleppo	Al Bab	Eastern Kwaieres	0.00	5.80	1.01	26.56	1.62	122.57	0.00	61.00
13	Aleppo	Al Bab	Rasm Haram El-Imam	0.60	0.00	7.18	18.09	1.41	47.37	0.00	128.83
14	Aleppo	Al Bab	A'rima	14.55	0.00	1.69	14.05	1.05	8.01	0.00	277.89
15	Aleppo	Afrin	Afrin	15.74	0.02	147.45	41.65	0.24	77.46	7.77	137.42
16	Aleppo	Afrin	Bulbul	0.00	0.00	90.95	0.00	0.02	0.10	38.44	73.88
17	Aleppo	Afrin	Jandairis	1.32	0.01	109.46	18.71	0.04	78.68	22.73	88.55
18	Aleppo	Afrin	Raju	0.00	0.00	133.18	0.05	0.01	0.68	104.31	44.95
19	Aleppo	Afrin	Sharan	1.81	5.34	98.13	4.55	0.11	3.43	22.08	169.75
20	Aleppo	Afrin	Sheikh El-Hadid	0.00	0.00	63.01	0.00	0.02	0.18	22.86	7.48
21	Aleppo	Afrin	Ma'btali	0.00	0.00	109.20	0.10	0.01	5.58	22.71	70.96
22	Aleppo	A'zaz	A'zaz	2.86	0.00	1.08	18.76	0.20	4.77	2.18	150.27
23	Aleppo	A'zaz	Aghtrin	6.30	0.00	1.37	15.85	0.77	12.37	0.00	305.03
24	Aleppo	A'zaz	Tall Refaat	1.09	0.00	0.16	10.40	0.02	6.56	0.05	186.21
25	Aleppo	A'zaz	Mare'	5.65	0.00	0.45	11.46	0.34	11.74	0.00	161.75
26	Aleppo	A'zaz	Nabul	0.16	0.00	69.45	10.35	0.57	0.33	0.22	93.70
27	Aleppo	A'zaz	Suran	12.04	0.00	33.88	35.33	0.39	22.00	0.75	532.09
28	Aleppo	Menbij	Menbij	29.86	18.18	254.67	87.22	35.86	16.72	4.49	772.20
29	Aleppo	Menbij	Abu Qalqal	2.49	16.15	244.50	19.84	12.59	4.33	0.41	93.81
30	Aleppo	Menbij	Al-Khafsa	40.41	41.60	827.47	68.32	1498.14	209.76	2.65	373.32
31	Aleppo	Menbij	Maskana	63.03	83.71	98.09	23.48	16.22	107.43	0.00	114.00
32	Aleppo	Ain Al Arab	Ain al Arab	10.31	0.00	262.00	33.13	1.60	18.06	0.00	419.95
33	Aleppo	Ain Al Arab	Lower Shyookh	14.67	8.59	110.87	41.11	0.83	33.95	0.00	108.64
34	Aleppo	Ain Al Arab	Sarin	6.01	69.34	1160.53	74.01	186.48	27.71	3.39	474.61
35	Aleppo	As-Safira	As-Safira	2.15	52.26	121.73	53.21	248.68	175.22	0.22	192.62
36	Aleppo	As-Safira	Khanaser	0.22	0.01	541.51	8.72	908.75	1.42	0.71	141.97
37	Aleppo	As-Safira	Banan	0.33	0.00	29.02	3.75	0.11	0.26	0.12	106.43

ID	Provinces	Districts	Sub-districts	Land cover classes (km2)							
				Builtup	Bareland	Forest	Irrigated cropland	Horticultural crops	Rainfed crops	Grass and shrubs	Waterbodies
38	Aleppo	As-Safira	Hajeb	0.17	0.00	127.68	3.40	0.08	0.00	0.10	128.66
39	Aleppo	Jarablus	Jarablus	8.40	4.37	91.55	21.48	12.51	13.07	2.21	162.75
40	Aleppo	Jarablus	Ghandorah	16.32	0.93	1.53	14.33	4.58	2.39	11.68	239.06
41	Hama	Hama	Hama	14.51	0.27	208.07	110.04	54.49	72.65	11.70	398.43
42	Hama	Hama	Suran	12.04	0.00	33.88	35.33	0.39	22.00	0.75	532.09
43	Hama	Hama	Harbanifse	7.24	1.84	60.69	37.84	8.94	6.59	9.37	178.04
44	Hama	Hama	Hamra	4.34	0.00	372.25	9.74	68.38	0.03	1.32	447.76
45	Hama	As-Suqaylabiyah	As-Suqaylabiyah	5.68	0.00	33.35	4.48	0.00	42.66	48.99	89.52
46	Hama	As-Suqaylabiyah	Tell Salhib	7.92	0.00	23.60	1.16	0.01	25.66	95.21	49.40
47	Hama	As-Suqaylabiyah	Ziyara	14.50	0.13	27.15	0.00	0.00	10.74	17.72	138.65
48	Hama	As-Suqaylabiyah	Shat-ha	0.49	0.00	35.06	0.00	0.00	23.05	57.70	70.41
49	Hama	As-Suqaylabiyah	Madiq Castle	1.26	0.28	62.48	0.98	0.00	25.53	0.01	196.34
50	Hama	As-Salamiyeh	As-Salamiyeh	8.58	0.00	81.11	58.89	41.94	2.42	4.49	665.19
51	Hama	As-Salamiyeh	Eastern Bari	6.01	0.00	37.50	4.11	2.89	0.01	1.58	188.69
52	Hama	As-Salamiyeh	As-Saan	0.38	0.00	970.90	9.99	747.53	0.00	0.32	208.12
53	Hama	As-Salamiyeh	Saboura	4.71	0.00	145.01	9.14	21.92	0.00	0.89	281.45
54	Hama	As-Salamiyeh	Oqeirbat	0.44	0.00	1029.53	5.31	1571.62	0.00	0.16	80.00
55	Hama	Masyaf	Masyaf	0.00	0.00	174.30	31.49	0.01	0.70	169.15	33.60
56	Hama	Masyaf	Jeb Ramleh	4.09	0.00	39.93	9.59	0.01	32.46	31.33	43.57
57	Hama	Masyaf	Oj	0.00	0.00	28.39	3.90	0.00	0.11	43.66	11.56
58	Hama	Masyaf	Ein Halaqim	0.00	0.00	25.11	0.52	0.00	0.19	41.52	2.36
59	Hama	Masyaf	Wadi El-oyoun	0.00	0.00	23.40	0.00	0.00	0.72	52.63	0.25
60	Hama	Muhradah	Muhradah	17.27	0.01	12.79	13.99	0.04	41.74	0.26	139.97
61	Hama	Muhradah	Kafr Zeita	4.85	0.00	6.82	1.88	0.01	3.62	0.00	129.30
62	Hama	Muhradah	Karnaz	6.82	0.00	0.32	0.49	0.00	12.85	0.00	41.84
63	Lattakia	Lattakia	Lattakia	0.00	1.23	14.59	29.27	0.00	5.45	64.25	0.17
64	Lattakia	Lattakia	Bahlolieh	0.00	6.18	14.28	0.05	0.00	3.64	75.34	0.01
65	Lattakia	Lattakia	Rabee'a	0.00	0.01	25.39	0.00	0.00	2.28	184.55	0.01
66	Lattakia	Lattakia	Ein El-Bayda	0.00	1.60	28.17	1.21	0.00	10.31	93.88	0.12
67	Lattakia	Lattakia	Qastal Maaf	0.00	1.86	54.21	2.34	0.00	7.73	179.85	0.03
68	Lattakia	Lattakia	Kasab	0.00	0.01	8.43	0.00	0.00	1.41	88.90	0.09
69	Lattakia	Lattakia	Hanadi	0.00	0.00	5.57	3.40	0.00	5.38	51.90	0.05
70	Lattakia	Jablah	Jablah	0.00	0.00	9.91	7.04	0.00	12.32	62.17	0.16
71	Lattakia	Jablah	Ein Elsharqiyeh	0.00	0.49	25.81	0.00	0.00	1.12	39.66	0.17
72	Lattakia	Jablah	Qteilibiyeh	0.00	0.04	31.58	0.08	0.00	4.18	72.01	0.14
73	Lattakia	Jablah	Ein Shaqq	0.00	0.22	21.26	0.36	0.00	3.16	37.40	0.01
74	Lattakia	Jablah	Dalyeh	0.00	0.00	26.34	0.00	0.00	1.02	65.96	0.09
75	Lattakia	Jablah	Beit Yashout	0.00	0.00	19.95	0.00	0.00	0.97	42.28	0.06



ID	Provinces	Districts	Sub-districts	Land cover classes (km2)							
				Builtup	Bareland	Forest	Irrigated cropland	Horticultural crops	Rainfed crops	Grass and shrubs	Waterbodies
76	Lattakia	Al-Haffa	Al-Haffa	0.00	0.00	15.89	0.00	0.00	3.71	95.54	0.07
77	Lattakia	Al-Haffa	Salanfa	0.00	0.00	36.24	0.00	0.00	2.23	101.55	0.28
78	Lattakia	Al-Haffa	Ein Et-teeneh	0.00	0.00	13.81	0.00	0.00	1.09	39.24	0.01
79	Lattakia	Al-Haffa	Kansaba	0.00	0.01	37.33	0.00	0.00	2.39	129.38	0.44
80	Lattakia	Al-Haffa	Mzair'a	0.00	1.75	14.37	0.00	0.00	2.72	72.26	0.01
81	Lattakia	Al-Qardaha	Al-Qardaha	0.00	0.36	37.67	0.10	0.00	4.00	128.91	0.13
82	Lattakia	Al-Qardaha	Harf Elmseitra	0.00	0.00	9.74	0.00	0.00	1.13	44.04	0.01
83	Lattakia	Al-Qardaha	Fakhura	0.00	0.00	21.80	0.00	0.00	2.98	45.27	0.01
84	Lattakia	Al-Qardaha	Jobet Berghal	0.00	0.00	9.71	0.00	0.00	1.04	54.30	0.02
85	Idleb	Idleb	Idleb	4.47	0.00	51.42	19.33	0.09	20.61	14.27	142.00
86	Idleb	Idleb	Abul Thohur	0.78	0.00	19.55	7.31	0.49	2.52	0.49	296.57
87	Idleb	Idleb	Bennsh	2.39	0.00	0.08	6.73	0.01	17.44	0.00	73.66
88	Idleb	Idleb	Saraqab	3.48	0.00	9.94	24.70	0.23	2.23	0.83	336.97
89	Idleb	Idleb	Teftnaz	1.06	0.00	0.12	5.04	0.01	6.31	0.00	86.38
90	Idleb	Idleb	Maaret Tamsrin	5.14	0.00	35.23	19.18	0.42	29.85	5.91	139.38
91	Idleb	Idleb	Sarmin	2.23	0.00	0.04	3.31	0.00	9.71	0.00	29.28
92	Idleb	Al Ma'ra	Ma'arrat An Nu'man	0.32	0.00	52.48	46.87	7.19	0.00	0.47	301.94
93	Idleb	Al Ma'ra	Khan Shaykun	1.45	0.00	33.07	8.82	0.03	0.73	0.29	158.66
94	Idleb	Al Ma'ra	Sanjar	0.61	0.00	59.62	19.42	0.58	0.01	0.37	509.42
95	Idleb	Al Ma'ra	Kafr Nobol	0.99	0.00	158.69	25.28	11.58	2.41	6.46	67.89
96	Idleb	Al Ma'ra	Tamanaah	0.79	0.00	25.32	7.71	0.33	0.02	0.19	335.32
97	Idleb	Al Ma'ra	Heish	0.00	0.00	43.26	20.55	0.50	0.10	0.47	119.07
98	Idleb	Harim	Harim	0.00	0.00	23.59	0.00	0.01	0.21	17.87	4.13
99	Idleb	Harim	Dana	0.04	0.00	114.05	16.82	1.85	10.07	4.70	67.16
100	Idleb	Harim	Salqin	0.00	0.00	64.08	0.00	0.01	2.13	59.95	5.11
101	Idleb	Harim	Kafr Takharim	0.00	0.00	70.20	0.00	0.03	0.00	12.04	10.22
102	Idleb	Harim	Qourqeena	0.12	0.00	94.97	0.00	0.04	0.10	5.00	22.12
103	Idleb	Harim	Armanaz	3.40	0.00	63.10	0.00	0.02	11.56	13.46	38.56
104	Idleb	Jisr-Ash-Shugur	Jisr-Ash-Shugur	11.90	0.00	101.78	0.00	0.03	11.11	41.78	93.22
105	Idleb	Jisr-Ash-Shugur	Badama	0.00	0.00	59.95	0.00	0.00	3.03	49.70	0.81
106	Idleb	Jisr-Ash-Shugur	Darkosh	0.94	0.07	67.95	0.00	0.00	0.81	31.63	16.67
107	Idleb	Jisr-Ash-Shugur	Janudiyeh	0.00	0.00	43.53	0.00	0.01	1.06	69.69	5.59
108	Idleb	Ariha	Ariha	0.02	0.00	144.05	16.69	21.63	5.99	24.80	61.82
109	Idleb	Ariha	Ehsem	0.00	0.00	107.24	9.12	25.03	10.08	30.90	21.93
110	Idleb	Ariha	Mhambal	3.64	0.00	43.11	0.00	0.00	7.21	9.10	61.16
111	Tartous	Tartous	Tartous	0.00	0.00	51.61	13.64	0.01	0.91	113.54	1.39
112	Tartous	Tartous	Hameidiyyeh	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00

ID	Provinces	Districts	Sub-districts	Land cover classes (km2)							
				Builtup	Bareland	Forest	Irrigated cropland	Horticultural crops	Rainfed crops	Grass and shrubs	Waterbodies
113	Tartous	Tartous	Kherbet Elma'aza	0.00	0.00	44.89	1.63	0.00	1.83	18.68	2.78
114	Tartous	Tartous	Soda Khawabi	0.00	0.00	12.55	4.73	0.02	0.30	37.76	0.29
115	Tartous	Tartous	Kareemeh	0.00	0.00	29.07	3.44	0.01	0.66	73.76	0.32
116	Tartous	Tartous	Safsafa	0.00	0.00	29.40	0.00	0.00	1.00	23.45	1.53
117	Tartous	Banyas	Banyas	0.00	0.47	22.57	3.70	0.00	0.78	39.36	0.96
118	Tartous	Banyas	Rawda	0.00	0.01	34.90	14.79	0.02	3.76	99.02	0.70
119	Tartous	Banyas	Taleen	0.00	0.01	3.43	3.97	0.00	0.09	23.61	0.11
120	Tartous	Safita	Safita	0.00	0.00	13.28	0.00	0.00	0.22	14.53	0.03
121	Tartous	Safita	Mashta Elhiu	0.00	2.60	30.90	6.53	0.00	0.34	84.96	0.25
122	Tartous	Safita	Bariqiyeh	0.00	0.00	16.07	0.00	0.00	0.36	35.53	0.06
123	Tartous	Safita	Sibbeh	0.00	0.00	11.67	0.00	0.00	0.18	26.46	0.04
124	Tartous	Safita	Sisniyyeh	0.00	0.00	5.49	0.00	0.00	0.10	14.83	0.00
125	Tartous	Safita	Ras El-Khashufeh	0.00	0.76	24.93	0.00	0.00	0.17	45.46	1.15
126	Tartous	Dreikish	Dreikish	0.00	0.00	19.16	0.27	0.00	0.13	27.41	0.24
127	Tartous	Dreikish	Jneinet Raslan	0.00	0.00	21.23	0.00	0.00	0.59	62.47	0.06
128	Tartous	Dreikish	Hamin	0.00	0.10	7.95	0.00	0.00	0.32	30.35	0.02
129	Tartous	Dreikish	Dweir Raslan	0.00	0.00	7.24	0.00	0.00	0.18	19.78	0.02
130	Tartous	Sheikh Badr	Sheikh Badr	0.00	0.00	7.74	0.00	0.00	0.24	27.71	0.02
131	Tartous	Sheikh Badr	Baramanet Elmashayekh	0.00	0.00	31.61	0.00	0.00	0.85	70.17	0.12
132	Tartous	Sheikh Badr	Qumseyyeh	0.00	0.01	20.27	0.00	0.00	0.34	44.39	0.04
133	Tartous	Qadmous	Anaza	0.00	0.00	17.94	0.00	0.00	0.34	28.24	0.24
134	Tartous	Qadmous	Qadmous	0.00	0.00	25.56	0.00	0.00	1.14	74.57	0.08
135	Tartous	Qadmous	Hamam Wasil	0.00	0.00	55.10	0.00	0.00	0.80	80.09	0.53
136	Tartous	Qadmous	Tawahin	0.00	0.00	11.93	0.00	0.00	0.33	32.91	0.10
137	Tartous	Tartous	Arwad	0.00	0.00	43.57	0.00	0.00	0.51	41.18	0.96

Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Table 3 Total population and number of people potentially affected at the district level

ID	Provinces	Districts	Number of people		
			Affected	Total	Affected (%)
1	A'zaz	Aleppo	82693	331093	24.98%
2	Afrin	Aleppo	50935	225892	22.55%
3	Ain Al Arab	Aleppo	15958	252516	6.32%
4	Al-Haffa	Lattakia	3766	96858	3.89%
5	Al-Qardaha	Lattakia	388	89417	0.43%
6	Al Bab	Aleppo	70962	384502	18.46%
7	Al Ma'ra	Idleb	80551	485159	16.60%
8	Ariha	Idleb	16369	229053	7.15%
9	As-Safira	Aleppo	20801	235811	8.82%
10	As-Salamiyeh	Hama	6211	236228	2.63%
11	As-Suqaylabiyah	Hama	11583	300504	3.85%
12	Banyas	Tartous	1985	103529	1.92%
13	Dreikish	Tartous	232	71622	0.32%
14	Hama	Hama	42988	821091	5.24%
15	Harim	Idleb	32234	226525	14.23%
16	Idleb	Idleb	59256	499460	11.86%
17	Jablah	Lattakia	8160	201366	4.05%
18	Jarablus	Aleppo	4276	77153	5.54%
19	Jebel Saman	Aleppo	1495140	3297775	45.34%
20	Jisr-Ash-Shugur	Idleb	4109	195138	2.11%
21	Lattakia	Lattakia	16496	508055	3.25%
22	Masyaf	Hama	3425	216790	1.58%
23	Menbij	Aleppo	43650	538731	8.10%
24	Muhradah	Hama	14098	182590	7.72%
25	Qadmous	Tartous	668	69856	0.96%
26	Safita	Tartous	998	153515	0.65%
27	Sheikh Badr	Tartous	78	62004	0.13%
28	Tartous	Tartous	3843	266489	1.44%

Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Table 4 Area of hexagons(km2) combining extent of irrigated areas and damage classes

Irrigated cropland class				High			Low			Medium		
Damage classes				Low	Medium	High	Low	Medium	High	Low	Medium	High
ID	Governorates	Districts	Sub-districts	Area of Hexagons (km2)								
14	Aleppo	A'zaz	A'rima	0	0	0	250	1620	590	0	50	10
22	Aleppo	A'zaz	A'zaz	0	0	0	510	530	330	0	0	0
29	Aleppo	A'zaz	Abu Qalqal	0	0	0	880	1130	800	0	0	0
15	Aleppo	A'zaz	Afrin	600	240	50	910	1180	0	160	130	20
23	Aleppo	A'zaz	Aghtrin	0	0	0	730	1480	250	50	60	30
32	Aleppo	A'zaz	Ain al Arab	0	0	0	3870	1190	140	100	20	0
8	Aleppo	Afrin	Al Bab	0	0	0	410	2340	960	0	0	0
30	Aleppo	Afrin	Al-Khafsa	1640	290	0	15710	1590	120	1300	240	0
11	Aleppo	Afrin	Ar-Ra'ee	0	0	0	1170	1250	50	200	100	40
35	Aleppo	Afrin	As-Safira	1260	680	60	2910	740	110	150	80	10
2	Aleppo	Afrin	Atareb	60	50	20	250	950	550	190	240	50
37	Aleppo	Afrin	Banan	0	0	0	250	710	190	0	0	0
16	Aleppo	Afrin	Bulbul	0	0	0	1190	340	70	0	0	0
5	Aleppo	Ain Al Arab	Daret Azza	0	0	0	700	980	70	0	0	0
10	Aleppo	Ain Al Arab	Dayr Hafir	860	70	0	0	0	0	0	0	0
12	Aleppo	Ain Al Arab	Eastern Kwaires	630	560	0	140	270	0	20	70	0
40	Aleppo	Al Bab	Ghandorah	0	0	0	880	1240	70	0	0	0
7	Aleppo	Al Bab	Hadher	180	160	0	260	230	0	100	90	0
38	Aleppo	Al Bab	Hajeb	0	0	0	980	870	100	0	0	0
4	Aleppo	Al Bab	Haritan	20	60	20	120	920	900	0	0	0
17	Aleppo	Al Bab	Jandairis	630	150	110	750	260	0	340	110	30
39	Aleppo	Al Bab	Jarablus	100	60	0	1080	1070	0	50	70	0
1	Aleppo	Al Bab	Jebel Saman	0	0	0	290	1570	2570	120	220	50
36	Idleb	Al Ma'ra	Khanaser	0	0	0	10580	490	0	40	0	0
33	Idleb	Al Ma'ra	Lower Shyookh	270	30	0	1240	410	0	380	90	0
21	Idleb	Al Ma'ra	Ma'btali	0	0	0	760	630	0	130	80	0
25	Idleb	Al Ma'ra	Mare'	0	0	0	450	630	280	80	70	30
31	Idleb	Al Ma'ra	Maskana	1080	40	0	1380	180	0	1060	40	0
28	Idleb	Al Ma'ra	Menbij	0	0	0	1550	5000	1890	40	90	30
26	Lattakia	Al-Haffa	Nabul	0	0	0	360	820	140	0	0	0
18	Lattakia	Al-Haffa	Raju	0	0	0	1350	880	0	0	0	0
13	Lattakia	Al-Haffa	Rasm Haram El-Imam	330	230	0	200	670	70	70	160	10
34	Lattakia	Al-Haffa	Sarin	0	0	0	12780	1090	0	180	40	0
19	Lattakia	Al-Haffa	Sharan	10	20	0	1270	810	70	70	30	0
20	Lattakia	Al-Qardaha	Sheikh El-Hadid	0	0	0	530	270	0	0	0	0
27	Lattakia	Al-Qardaha	Suran	110	0	0	2580	1750	200	250	70	0
9	Lattakia	Al-Qardaha	Tadaf	0	0	0	270	1190	860	0	10	10

Irrigated cropland class				High			Low			Medium		
Damage classes				Low	Medium	High	Low	Medium	High	Low	Medium	High
ID	Governorates	Districts	Sub-districts	Area of Hexagons (km2)								
3	Lattakia	Al-Qardaha	Tall Ed-daman	20	0	0	4950	2810	370	90	0	0
24	Idleb	Ariha	Tall Refaat	0	0	0	630	690	140	60	10	10
6	Idleb	Ariha	Zarbah	250	190	0	1000	990	20	120	130	10
52	Idleb	Ariha	As-Saan	0	0	0	13290	110	0	0	0	0
50	Aleppo	As-Safira	As-Salamiyeh	0	0	0	5030	1210	0	20	10	0
45	Aleppo	As-Safira	As-Suqaylabiyah	460	10	0	550	30	0	620	70	0
51	Aleppo	As-Safira	Eastern Bari	0	0	0	1700	160	0	0	0	0
58	Aleppo	As-Safira	Ein Halaqim	0	0	0	610	70	0	0	0	0
41	Hama	As-Salamiyeh	Hama	250	200	0	3390	1500	0	610	640	0
44	Hama	As-Salamiyeh	Hamra	0	0	0	6120	660	0	0	0	0
43	Hama	As-Salamiyeh	Harbanifse	0	0	0	1920	440	0	70	50	0
56	Hama	As-Salamiyeh	Jeb Ramleh	400	80	0	470	160	0	100	20	0
61	Hama	As-Salamiyeh	Kafr Zeita	0	0	0	660	200	140	100	50	0
62	Hama	As-Suqaylabiyah	Karnaz	170	20	0	80	10	0	330	30	0
49	Hama	As-Suqaylabiyah	Madiq Castle	120	40	0	1230	220	0	580	130	0
55	Hama	As-Suqaylabiyah	Masyaf	0	0	0	2710	290	0	0	0	0
60	Hama	As-Suqaylabiyah	Muhradah	390	50	0	320	100	0	730	150	0
57	Hama	As-Suqaylabiyah	Oj	0	0	0	570	200	0	0	0	0
54	Tartous	Banyas	Oqeirbat	0	0	0	18080	380	0	0	0	0
53	Tartous	Banyas	Saboura	0	0	0	3020	390	0	0	0	0
48	Tartous	Banyas	Shat-ha	90	0	0	720	100	20	510	80	0
46	Tartous	Dreikish	Tell Salhib	280	120	0	730	120	0	290	100	0
59	Tartous	Dreikish	Wadi El-oyoun	0	0	0	710	0	0	0	0	0
47	Tartous	Dreikish	Ziyara	0	0	0	1260	300	0	220	20	0
86	Tartous	Dreikish	Abul Thohur	0	0	0	1200	1200	130	30	10	0
108	Hama	Hama	Ariha	0	0	0	1400	680	60	90	20	10
103	Hama	Hama	Armanaz	40	0	0	510	150	0	360	20	0
105	Hama	Hama	Badama	0	0	0	970	30	0	0	0	0
87	Idleb	Harim	Bennsh	20	20	0	70	110	10	200	480	20
99	Idleb	Harim	Dana	0	0	0	510	810	170	70	110	20
106	Idleb	Harim	Darkosh	0	0	0	950	120	0	0	0	0
109	Idleb	Harim	Ehsem	30	40	0	810	470	0	100	120	0
98	Idleb	Harim	Harim	0	0	0	390	80	70	0	0	0
97	Idleb	Harim	Heish	0	0	0	780	650	0	0	0	0
85	Idleb	Idleb	Idleb	90	40	0	660	460	40	390	220	30
107	Idleb	Idleb	Janudiyeh	0	0	0	870	130	0	0	0	0
104	Idleb	Idleb	Jisr-Ash-Shugur	0	0	0	1540	130	0	230	30	0

Irrigated cropland class				High			Low			Medium		
Damage classes				Low	Medium	High	Low	Medium	High	Low	Medium	High
ID	Governorates	Districts	Sub-districts	Area of Hexagons (km2)								
95	Idleb	Idleb	Kafr Nobol	0	0	0	530	1100	280	10	50	0
101	Idleb	Idleb	Kafr Takharim	0	0	0	410	350	20	0	0	0
93	Idleb	Idleb	Khan Shaykun	0	0	0	1060	550	70	0	0	0
92	Idleb	Idleb	Ma'arrat An Nu'man	0	0	0	1180	1480	350	0	0	0
90	Lattakia	Jablah	Maaret Tamsrin	90	20	0	410	340	0	580	370	0
110	Lattakia	Jablah	Mhambal	0	0	0	730	270	0	80	70	0
102	Lattakia	Jablah	Qourqeena	0	0	0	810	250	20	0	0	0
100	Lattakia	Jablah	Salqin	0	0	0	740	260	60	0	0	0
94	Lattakia	Jablah	Sanjar	0	0	0	1610	2120	660	0	0	0
88	Lattakia	Jablah	Saraqab	0	0	0	1500	1190	70	50	60	0
91	Aleppo	Jarablus	Sarmin	20	20	0	20	20	0	210	170	0
96	Aleppo	Jarablus	Tamanaah	0	0	0	1270	1180	390	0	0	0
89	Aleppo	Jebel Saman	Teftnaz	0	0	0	170	300	30	70	170	30
76	Aleppo	Jebel Saman	Al-Haffa	0	0	0	880	90	0	0	0	0
81	Aleppo	Jebel Saman	Al-Qardaha	0	0	0	1310	40	0	60	0	0
64	Aleppo	Jebel Saman	Bahlolieh	0	0	0	980	0	0	0	0	0
75	Aleppo	Jebel Saman	Beit Yashout	0	0	0	470	160	0	0	0	0
74	Aleppo	Jebel Saman	Dalyeh	0	0	0	500	330	40	0	0	0
66	Aleppo	Jebel Saman	Ein El-Bayda	0	0	0	870	0	0	300	0	0
71	Idleb	Jisr-Ash-Shugur	Ein Elsharqiyeh	0	0	0	620	50	0	0	0	0
78	Idleb	Jisr-Ash-Shugur	Ein Et-teeneh	0	0	0	580	20	0	0	0	0
73	Idleb	Jisr-Ash-Shugur	Ein Shaqaq	0	0	0	290	130	0	60	60	0
83	Idleb	Jisr-Ash-Shugur	Fakhura	0	0	0	610	0	0	60	0	0
69	Lattakia	Lattakia	Hanadi	0	0	0	350	130	0	80	10	0
82	Lattakia	Lattakia	Harf Elmseitra	0	0	0	360	40	0	0	0	0
70	Lattakia	Lattakia	Jablah	0	0	0	230	140	0	260	140	0
84	Lattakia	Lattakia	Jobet Berghal	0	0	0	580	0	0	0	0	0
79	Lattakia	Lattakia	Kansaba	0	0	0	1260	120	0	0	0	0
68	Lattakia	Lattakia	Kasab	0	0	0	840	0	0	0	0	0
63	Lattakia	Lattakia	Lattakia	0	0	0	690	230	0	70	0	0
80	Hama	Masyaf	Mzair'a	0	0	0	770	100	0	0	0	0
67	Hama	Masyaf	Qastal Maaf	0	0	0	1760	0	0	160	0	0
72	Hama	Masyaf	Qteilbiyyeh	0	0	0	500	220	0	130	20	0
65	Hama	Masyaf	Rabee'a	0	0	0	1570	0	0	0	0	0
77	Hama	Masyaf	Salanfa	0	0	0	760	250	60	0	0	0
133	Aleppo	Menbij	Anaza	0	0	0	580	220	40	0	0	0
137	Aleppo	Menbij	Arwad	0	0	0	10	0	0	0	0	0

Irrigated cropland class				High			Low			Medium		
Damage classes				Low	Medium	High	Low	Medium	High	Low	Medium	High
ID	Governorates	Districts	Sub-districts	Area of Hexagons (km2)								
117	Aleppo	Menbij	Banyas	0	0	0	1110	200	0	90	20	0
131	Aleppo	Menbij	Baramanet Elmashayekh	0	0	0	510	0	0	0	0	0
122	Hama	Muhradah	Bariqiyeh	0	0	0	390	0	0	0	0	0
126	Hama	Muhradah	Dreikish	0	0	0	590	60	0	0	0	0
129	Hama	Muhradah	Dweir Raslan	0	0	0	370	0	0	0	0	0
135	Tartous	Qadmous	Hamam Wasil	0	0	0	440	10	0	0	0	0
112	Tartous	Qadmous	Hameidiyyeh	0	0	0	620	110	0	0	0	0
128	Tartous	Qadmous	Hamin	0	0	0	290	0	0	0	0	0
127	Tartous	Qadmous	Jneinet Raslan	0	0	0	390	0	0	0	0	0
115	Tartous	Safita	Kareemeh	0	0	0	420	40	0	0	0	0
113	Tartous	Safita	Kherbet Elma'aza	0	0	0	330	220	0	0	0	0
121	Tartous	Safita	Mashta Elhiu	0	0	0	450	0	0	0	0	0
134	Tartous	Safita	Qadmous	0	0	0	1040	70	0	0	0	0
132	Tartous	Safita	Qumseyyeh	0	0	0	430	0	0	0	0	0
125	Tartous	Safita	Ras El-Khashufeh	0	0	0	470	20	0	0	0	0
118	Tartous	Sheikh Badr	Rawda	0	0	0	270	90	0	0	0	0
120	Tartous	Sheikh Badr	Safita	0	0	0	770	240	0	0	0	0
116	Tartous	Sheikh Badr	Safsafa	0	0	0	370	230	0	0	0	0
130	Tartous	Tartous	Sheikh Badr	0	0	0	910	0	0	0	0	0
123	Tartous	Tartous	Sibbeh	0	0	0	270	0	0	0	0	0
124	Tartous	Tartous	Sisniyyeh	0	0	0	530	120	0	0	0	0
114	Tartous	Tartous	Soda Khawabi	0	0	0	870	10	0	0	0	0
119	Tartous	Tartous	Taleen	0	0	0	310	0	0	0	0	0
111	Tartous	Tartous	Tartous	0	0	0	1270	120	0	0	0	0
136	Tartous	Tartous	Tawahin	0	0	0	710	40	0	0	0	0

Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Table 5 Area under deformation class at sub-district level

ID	Governorates	Districts	Sub-districts	Deformation class (km2)		
				High	Low	Medium
1	Aleppo	Jebel Saman	Jebel Saman	6.77	535400.57	128522.68
2	Aleppo	Jebel Saman	Atareb	690.69	304100.37	3467.00
3	Aleppo	Jebel Saman	Tall Ed-daman	0.00	125028.60	1021728.23
4	Aleppo	Jebel Saman	Haritan	0.00	196088.50	36593.08
5	Aleppo	Jebel Saman	Daret Azza	27.09	226993.54	426.60
6	Aleppo	Jebel Saman	Zarbah	27.09	190617.15	164160.98
7	Aleppo	Jebel Saman	Hadher	33.86	34554.86	96757.67
8	Aleppo	Al Bab	Al Bab	568.80	342467.58	146162.39
9	Aleppo	Al Bab	Tadaf	0.00	147882.34	173194.13
10	Aleppo	Al Bab	Dayr Hafir	0.00	3290.94	108892.16
11	Aleppo	Al Bab	Ar-Ra'ee	771.95	297410.15	53853.58
12	Aleppo	Al Bab	Eastern Kwaires	0.00	19129.43	191409.41
13	Aleppo	Al Bab	Rasm Haram El-Imam	0.00	46872.18	156624.32
14	Aleppo	Al Bab	A'rima	94.80	207640.65	109427.11
15	Aleppo	Afrin	Afrin	135.43	289704.21	137833.47
16	Aleppo	Afrin	Bulbul	744.86	119753.62	82733.94
17	Aleppo	Afrin	Jandairis	1225.64	215630.99	102405.08
18	Aleppo	Afrin	Raju	47400.36	171954.95	63482.62
19	Aleppo	Afrin	Sharan	0.00	160355.41	144706.52
20	Aleppo	Afrin	Sheikh El-Hadid	18702.83	65933.90	8816.47
21	Aleppo	Afrin	Ma'btali	47.40	155317.43	53264.46
22	Aleppo	A'zaz	A'zaz	94.80	139194.53	40730.45
23	Aleppo	A'zaz	Aghtrin	399.52	250219.71	91035.77
24	Aleppo	A'zaz	Tall Refaat	237.00	154545.48	49655.26
25	Aleppo	A'zaz	Mare'	13.54	113727.00	77628.24
26	Aleppo	A'zaz	Nabul	0.00	172537.30	2281.99
27	Aleppo	A'zaz	Suran	6.77	64572.83	102540.51
28	Aleppo	Menbij	Menbij	0.00	1126157.99	93046.90
29	Aleppo	Menbij	Abu Qalqal	0.00	337260.31	56853.34
30	Aleppo	Menbij	Al-Khafsa	0.00	167302.94	2864877.56
31	Aleppo	Menbij	Maskana	0.00	15493.15	489896.23
32	Aleppo	Ain Al Arab	Ain al Arab	47.40	661404.26	6866.28
33	Aleppo	Ain Al Arab	Lower Shyookh	0.00	294437.47	24167.41
34	Aleppo	Ain Al Arab	Sarin	0.00	1248579.57	95755.49
35	Aleppo	As-Safira	As-Safira	0.00	196846.91	613834.62
36	Aleppo	As-Safira	Khanaser	0.00	289914.12	1313287.82
37	Aleppo	As-Safira	Banan	0.00	41515.94	98497.94
38	Aleppo	As-Safira	Hajeb	0.00	161574.27	98525.03



ID	Governorates	Districts	Sub-districts	Deformation class (km2)		
				High	Low	Medium
39	Aleppo	Jarablus	Jarablus	0.00	273649.03	42423.32
40	Aleppo	Jarablus	Ghandorah	13.54	181306.36	109433.88
41	Hama	Hama	Hama	27.09	259550.81	610333.76
42	Hama	Hama	Suran	6.77	42267.58	426948.56
43	Hama	Hama	Harbanifse	20.31	150834.71	159204.26
44	Hama	Hama	Hamra	0.00	4956.72	898839.42
45	Hama	As-Suqaylabiyah	As-Suqaylabiyah	6.77	73192.92	151505.08
46	Hama	As-Suqaylabiyah	Tell Salhib	0.00	115128.69	87771.92
47	Hama	As-Suqaylabiyah	Ziyara	6.77	82354.73	126416.75
48	Hama	As-Suqaylabiyah	Shat-ha	2823.71	84474.21	99513.66
49	Hama	As-Suqaylabiyah	Madiq Castle	13.54	84968.53	201803.63
50	Hama	As-Salamiyeh	As-Salamiyeh	0.00	370995.82	490999.98
51	Hama	As-Salamiyeh	Eastern Bari	0.00	82693.31	157856.73
52	Hama	As-Salamiyeh	As-Saan	0.00	16454.70	1874040.82
53	Hama	As-Salamiyeh	Saboura	0.00	53460.83	409654.20
54	Hama	As-Salamiyeh	Oqairbat	0.00	521383.61	1504771.72
55	Hama	Masyaf	Masyaf	0.00	90338.31	318977.31
56	Hama	Masyaf	Jeb Ramleh	0.00	70037.41	90880.03
57	Hama	Masyaf	Oj	0.00	7753.34	79720.63
58	Hama	Masyaf	Ein Halaqim	0.00	5572.93	63895.68
59	Hama	Masyaf	Wadi El-oyoun	0.00	37649.43	39342.30
60	Hama	Muhradah	Muhradah	74.49	68554.46	157531.70
61	Hama	Muhradah	Kafr Zeita	121.89	25271.16	121046.97
62	Hama	Muhradah	Karnaz	0.00	11552.14	50772.55
63	Lattakia	Lattakia	Lattakia	19298.72	93967.82	291.17
64	Lattakia	Lattakia	Bahlolieh	325.03	40798.16	58471.73
65	Lattakia	Lattakia	Rabee'a	0.00	52864.94	159258.43
66	Lattakia	Lattakia	Ein El-Bayda	182.83	103332.78	31744.70
67	Lattakia	Lattakia	Qastal Maaf	0.00	62907.04	181624.62
68	Lattakia	Lattakia	Kasab	920.92	87033.83	10746.34
69	Lattakia	Lattakia	Hanadi	0.00	66184.44	40.63
70	Lattakia	Jablah	Jablah	507.86	90886.80	0.00
71	Lattakia	Jablah	Ein Elsharqiyeh	318.26	66015.15	954.78
72	Lattakia	Jablah	Qteilbiyyeh	1239.18	101876.91	4787.44
73	Lattakia	Jablah	Ein Shaqaq	74.49	62345.01	0.00
74	Lattakia	Jablah	Dalyeh	0.00	45077.74	48388.99
75	Lattakia	Jablah	Beit Yashout	0.00	43770.84	19508.63
76	Lattakia	Al-Haffa	Al-Haffa	0.00	42348.83	72840.81
77	Lattakia	Al-Haffa	Salanfa	6927.22	94631.43	38746.41
78	Lattakia	Al-Haffa	Ein Et-teeneh	27.09	22264.62	31778.55

ID	Governorates	Districts	Sub-districts	Deformation class (km2)		
				High	Low	Medium
79	Lattakia	Al-Haffa	Kansaba	33.86	66137.04	103305.69
80	Lattakia	Al-Haffa	Mzair'a	0.00	65967.75	25230.53
81	Lattakia	Al-Qardaha	Al-Qardaha	176.06	147421.88	23503.81
82	Lattakia	Al-Qardaha	Harf Elmseitra	6.77	40804.94	14077.91
83	Lattakia	Al-Qardaha	Fakhura	13.54	69610.81	385.97
84	Lattakia	Al-Qardaha	Jobet Berghal	209.92	34013.14	30891.49
85	Idleb	Idleb	Idleb	47.40	200334.22	51707.02
86	Idleb	Idleb	Abul Thohur	0.00	127012.64	200659.25
87	Idleb	Idleb	Bennsh	33.86	97055.62	3141.97
88	Idleb	Idleb	Saraqab	27.09	209712.72	168731.73
89	Idleb	Idleb	Teftnaz	379.20	97834.34	697.46
90	Idleb	Idleb	Maaret Tamsrin	528.18	233081.10	1428.78
91	Idleb	Idleb	Sarmin	216.69	40879.42	3548.26
92	Idleb	Al Ma'ra	Ma'arrat An Nu'man	0.00	280860.66	128366.94
93	Idleb	Al Ma'ra	Khan Shaykun	0.00	50102.18	152967.72
94	Idleb	Al Ma'ra	Sanjar	0.00	211243.08	378810.11
95	Idleb	Al Ma'ra	Kafr Nobol	13.54	257011.51	16305.72
96	Idleb	Al Ma'ra	Tamanaah	0.00	116537.16	253151.76
97	Idleb	Al Ma'ra	Heish	6.77	165163.16	18723.14
98	Idleb	Harim	Harim	338.57	45037.11	291.17
99	Idleb	Harim	Dana	169.29	213037.52	1408.47
100	Idleb	Harim	Salqin	2376.79	127737.19	927.69
101	Idleb	Harim	Kafr Takharim	4557.21	87968.29	27.09
102	Idleb	Harim	Qourqeena	352.12	121812.15	20.31
103	Idleb	Harim	Armanaz	6.77	114289.03	15811.40
104	Idleb	Jisr-Ash-Shugur	Jisr-Ash-Shugur	0.00	172063.29	87880.26
105	Idleb	Jisr-Ash-Shugur	Badama	0.00	62439.81	50853.81
106	Idleb	Jisr-Ash-Shugur	Darkosh	291.17	103888.04	13779.96
107	Idleb	Jisr-Ash-Shugur	Janudiyeh	0.00	97103.02	22711.54
108	Idleb	Ariha	Ariha	0.00	261941.14	13089.27
109	Idleb	Ariha	Ehsem	0.00	204254.91	6.77
110	Idleb	Ariha	Mhambal	0.00	57909.69	66299.56
111	Tartous	Tartous	Tartous	2850.79	178096.68	0.00
112	Tartous	Tartous	Hameidiyyeh	57462.78	12100.63	0.00
113	Tartous	Tartous	Kherbet Elma'aza	25765.48	29862.22	0.00
114	Tartous	Tartous	Soda Khawabi	16346.35	90825.85	0.00
115	Tartous	Tartous	Kareemeh	12134.49	42992.12	40.63
116	Tartous	Tartous	Safsafa	67599.68	189.60	0.00
117	Tartous	Banyas	Banyas	90311.22	62683.59	0.00

ID	Governorates	Districts	Sub-districts	Deformation class (km2)		
				High	Low	Medium
118	Tartous	Banyas	Rawda	8687.81	22481.31	0.00
119	Tartous	Banyas	Taleen	19793.03	8274.75	0.00
120	Tartous	Safita	Safita	44014.62	81555.70	13.54
121	Tartous	Safita	Mashta Elhiu	0.00	38015.09	13820.59
122	Tartous	Safita	Bariqiyeh	507.86	37710.37	6.77
123	Tartous	Safita	Sibbeh	0.00	13028.33	7421.54
124	Tartous	Safita	Sisniyyeh	46648.72	25677.45	0.00
125	Tartous	Safita	Ras El-Khashufeh	318.26	46838.32	0.00
126	Tartous	Dreikish	Dreikish	6.77	81406.73	2952.37
127	Tartous	Dreikish	Jneinet Raslan	0.00	37304.08	1415.24
128	Tartous	Dreikish	Hamin	0.00	27221.35	0.00
129	Tartous	Dreikish	Dweir Raslan	0.00	20307.67	15418.66
130	Tartous	Sheikh Badr	Sheikh Badr	3040.39	99689.72	6.77
131	Tartous	Sheikh Badr	Baramanet Elmashayekh	162.52	59155.65	5762.53
132	Tartous	Sheikh Badr	Qumseyyeh	14314.91	32428.62	0.00
133	Tartous	Qadmous	Anaza	9358.18	76361.97	15689.52
134	Tartous	Qadmous	Qadmous	13705.47	108709.33	14050.82
135	Tartous	Qadmous	Hamam Wasil	6798.57	38475.55	0.00
136	Tartous	Qadmous	Tawahin	223.46	68127.86	17876.71
137	Tartous	Tartous	Arwad	0.00	94.80	0.00

Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Table 6 Number of wells under DPM classes at district level

District/ DPM	Number of wells				
	High		Medium		Low
A'zaz	4	A'zaz	2	A'zaz	18
Afrin	17	Afrin	11	Afrin	14
Al Bab	7	Al Bab	7	Al Bab	27
Al Ma'ra	1	Al Ma'ra	5	Al Ma'ra	30
Al-Haffa	3	Al-Haffa	1	Al-Haffa	2
Al-Qardaha	1	Al-Qardaha		Al-Qardaha	1
Ariha	5	Ariha	3	Ariha	1
As-Safira	1	As-Safira	1	As-Safira	24
As-Salamiyeh	21	As-Salamiyeh	5	As-Salamiyeh	62
As-Suqaylabiyah	15	As-Suqaylabiyah	2	As-Suqaylabiyah	3
Banyas	12	Banyas	2	Banyas	
Dreikish		Dreikish		Dreikish	6
Hama	3	Hama	1	Hama	52
Harim	10	Harim	3	Harim	1
Idleb	9	Idleb	1	Idleb	42
Jablah	9	Jablah	7	Jablah	3
Jarablus		Jarablus		Jarablus	3
Jebel Saman		Jebel Saman		Jebel Saman	108
Jisr-Ash-Shugur	8	Jisr-Ash-Shugur	1	Jisr-Ash-Shugur	1
Lattakia	25	Lattakia	8	Lattakia	2
Masyaf	6	Masyaf	4	Masyaf	7
Menbij	3	Menbij	6	Menbij	26
Muhradah	6	Muhradah	2	Muhradah	6
Qadmous	4	Qadmous	1	Qadmous	
Safita	5	Safita	3	Safita	3
Sheikh Badr	2	Sheikh Badr		Sheikh Badr	
Tartous	44	Tartous	4	Tartous	34

Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Table 7 Affected area of dam (km2) under DPM classes at district level

District/ DPM	Affected area of dam (km2)		
	High	Medium	Low
As-Saan			30142.07
As-Salamiyeh			16316.182
Bahlolieh	71299.929		
Banyas	12546.162		101.73
Baramanet Elmashayekh		11776.631	
Ein El-Bayda	12055.258		
Ein Shaqaq	32211.601		
Ghandorah			13312.911
Hama			23339.31
Jeb Ramleh	34014.276		
Kansaba			424.618
Lattakia	5993.955		
Muhradah			12250.995
Mzair'a	44966.604	80938.469	
Qteilbiyyeh	727.023		299.788
Rabee'a		4582.531	110017.643
Safita	43514.379		
Safsafa	14898.988		
Sharan		15929.359	70611.55
Sisniyyeh	2972.934		19206.851

Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.

Table 8 Affected length of waterways under DPM classes at district level

District/ DPM	Waterways length in m		
	High	Medium	Low
A'zaz			7073.313
Abu Qalqal	24604.719	4924.233	14450.104
Abul Thohur			7742.99
Afrin	45382.059	29560.829	74602.039
Aghtrin		4702.581	58679.053
Ain al Arab			33783.057
Al Bab			47866.119
Al-Khafsa	35329.576	17796.8	510956.829
Al-Qardaha	383.095	3925.813	
Ariha		1209.098	1216.492
Armanaz	12842.534	5303.61	6289.652
As-Saan			5799.811
As-Safira			119199.57
As-Salamiyeh		2322.845	3396.068
As-Suqaylabiyah	98908.786	12581.296	53561.176
Atareb	3778.295	8178.349	20028.95
Badama	9875.324		498.777
Bahlolieh	46136.078	13168.201	3943.419
Banyas	46815.084		32.447
Baramanet Elmashayekh	2104.695	3109.984	
Bariqiyeh	1302.165	41.961	12762.167
Bulbul	38388.436		8978.678
Dana			7390.838
Darkosh	31949.69		124.755
Dayr Hafir	11434.383		58508.147
Dreikish			14663.026
Eastern Bari			9763.564
Eastern Kwares			144945.072
Ein El-Bayda	18457.266	538.359	
Ein Shaqaq		8443.352	
Fakhura	4911.082	6111.201	14643.751
Ghandorah			64590.293
Hadher			83185.403
Hama	12806.623	298.975	142976.484
Hamam Wasil	16249.857		
Hameidiyyeh	21671.343		10562.025
Hamin			14663.026
Hanadi	22486.832	6623.244	11054.97



District/ DPM	Waterways length in m		
	High	Medium	Low
Harbanifse			40331.526
Haritan			64209.874
Idleb	68450.535	31242.305	65369.125
Jablah	17377.639	14354.016	15789.748
Jandairis	5280.579	12025.202	85505.32
Janudiyeh	19219.208	1545.789	591.133
Jarablus		33435.553	93963.314
Jeb Ramleh	28332.665	12209.851	21807.748
Jebel Saman			102500.694
Jisr-Ash-Shugur	80998.829	9012.995	36220.322
Kafr Zeita	6990.775		13365.721
Kansaba	21153.158	2774.602	11762.465
Kareemeh	8623.195		25618.408
Karnaz	3553.13	4163.84	9709.129
Khanaser	4509.744	548.051	19305.945
Kherbet Elma'aza	9194.327	5581.564	
Lattakia	30440.173	5518.014	2015.164
Lower Shyookh	4594.812	37537.544	47681.302
Ma'arrat An Nu'man		7024.967	28127.312
Ma'btali	23614.356	15340.301	31189.671
Maaret Tamsrin		4573.454	
Madiq Castle	58012.891	7382.777	41683.689
Mare'			70507.007
Maskana		1528.585	236156.213
Masyaf	14921.673	6501.35	34586.387
Menbij	14694.914	38646.174	134061.391
Mhambal	39341.242	6372.811	9391.346
Muhradah	29146.473	5160.963	120924.553
Mzair'a	4911.082	7688.035	8523.046
Oj			6178.492
Oqeirbat	10325.522		13094.89
Qadmous		3109.984	
Qastal Maaf	6969.258		10741.256
Qteilbiyyeh	25738.025	3518.753	209.198
Qumseyyeh	30549.473		
Rabee'a	53851.004	4556.989	32467.999
Raju	5378.052	76.353	286.836
Ras El-Khashufeh	15804.687	9359.344	
Rasm Haram El-Imam	7654.218	9579.414	108391.882

District/ DPM	Waterways length in m		
	High	Medium	Low
Rawda	14299.616		
Safita	32165.723	360.605	
Safsafa	39308.875		78.589
Salqin		170.584	1795.628
Saraqab		7024.967	28127.312
Sarin	32436.954	38967.353	63472.96
Sharan	52996.624	26788.039	34071.217
Shat-ha	52624.268	13727.551	55033.109
Sheikh Badr	19736.87	5283.808	
Sheikh El-Hadid			15788.112
Sisniyyeh	19991.633		15633.438
Soda Khawabi	14378.828		21716.511
Suran			121468.512
Tadaf			48991.099
Tall Ed-daman			63276.87
Tartous	8981.545	9082.735	56968.986
Tell Salhib	78090.254	14928.745	52087.124
Wadi El-oyoun		736.44	
Zarbah			169409
Ziyara	76583.812	15395.119	85212.487

Source: Administrative boundaries HDX[shapefiles]. Cited 10 March 2023. <https://data.humdata.org>.



# Rapid geospatial assessment after **the earthquake in Syrian Arab Republic** in 2023

Impacts on infrastructure and farming community during the period  
February-March 2023

On February 6, 2023, an earthquake of magnitude of 7.7 Richter scale struck near the northern and western Syrian Arab Republic, causing severe damage to infrastructure and the farming community and devastatingly impacting people, infrastructure, and the environment. A rapid geospatial impact assessment was conducted in the most impacted area in the Syrian Arab Republic. Available data and information along with satellite imagery and remote sensing techniques were used to assess geospatial indicators on impacts of the earthquake on the people, infrastructure, and cropland area.

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