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Thematic Report

No Rain, No Gain:

Situational Analysis on Drought in Lebanon

July 2025

Credit: MEE/Rebecca Murray

The Lebanon Crisis Analytics Team (LCAT) provides reactive and in-depth context analysis to inform the aid community in Lebanon. The information and analysis contained in this report is therefore strictly to inform humanitarian and development actors and associated policymaking on Lebanon.

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Credit: Said Meallaoui

Executive Summary

Lebanon is facing a severe drought following one of its driest winters in nearly 40 years, the effects of which will be compounded by Lebanon's poor fresh water capture and retention practices. The drought is expected to drive up household costs, force farmers to pay more to access water or draw on informal sources for irrigation, increase waterborne disease transmission risks, and reduce public electricity sector production. Vulnerable populations, already under strain due to persistent economic difficulties, are expected to bear the brunt of drought-induced challenges. Despite government plans to address water shortages, it is unclear how state measures will be enforced. This paper offers a snapshot of the impact of the drought on Lebanon, government plans to address water shortages, and recommendations for key stakeholders.

Understanding Lebanon's Drought Crisis

Lebanon is facing a severe drought in 2025[1] that will heighten water scarcity for a population suffering from an economic crisis since 2019 and still recovering from the 2024 Hezbollah-Israel War. Lebanon relies on a countrywide annual average of approximately 800 millimeters (mm) of rain and snowfall to replenish its water resources,[2] 70% to 90% of which falls in the wet winter months from November through March.[3] From January through April 2025, Beirut received only 382 mm of rain, a 54% decrease compared to the historical average of 822 mm for the same period. Tripoli received 520 mm over the same period, down 37% from its average, while Zahle was hit the hardest, registering just 268 mm of rainfall – a 60% drop from the average.[4]

Lebanon was projected to draw 83% of its water in 2025 from springs and wells,[5] most of which are privately owned and unregulated.[6] Precipitation during the 2024-2025 winter has not adequately replenished aquifers, leading to a drop in water table levels overall and prompting rationing plans by Lebanon's regional public water utilities. The Beirut and Mount Lebanon Water Establishment (BMLWE) announced cutbacks to its water provisioning as early as December 2024.[7]

[1] A drought is defined as a period of dry weather severe enough to cause a serious hydrological imbalance. Droughts can further be classified as meteorological (decreased precipitation for a prolonged period), agricultural/ecological (low soil moisture creating stress for crops, plants, and the ecosystem) or hydrological (low water levels in water bodies such as streams and reservoirs).
Intergovernmental Panel on Climate Change, "Glossary of terms" in Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation 555–564, Cambridge University Press, 2012;
Douville, H. et al., "Water Cycle Changes" in Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change 1055–1210, Cambridge University Press, 2021
[2] Ministry of Energy and Water, Towards a Sustainable Water Sector: Lebanon's National Water Strategy 2024 – 2035 June 2024
[3] World Bank, Project appraisal document on a proposed loan in the amount of $257.8 million to the Lebanese Republic for a Second Greater Beirut Water Supply Project December 12, 2024
The third International Conference on Water Resources and Arid Environments (2008) and the 1st Arab Water Forum, Assessment of the Water Situation in Lebanon November 2008
[4] Key Informant Interview with senior member of the Lebanon Meteorological Service, May 22, 2025
[5] Ministry of Energy and Water, Towards a Sustainable Water Sector: Lebanon's National Water Strategy 2024 – 2035 June 2024
[6] A UNDP survey estimated Lebanon had between 55,000 to 60,000 unlicensed private wells and 20,537 officially registered ones. However, only 2,888 of registered private wells have exploitation permits. There are 841 public wells in Lebanon.
United Nations Development Programme, Assessment of Groundwater Resources of Lebanon January 11, 2016
[7] National News Agency, مياه بيروت وجبل لبنان: برنامج تقنين قاس بسبب ضآلة المتساقطات December 15, 2024

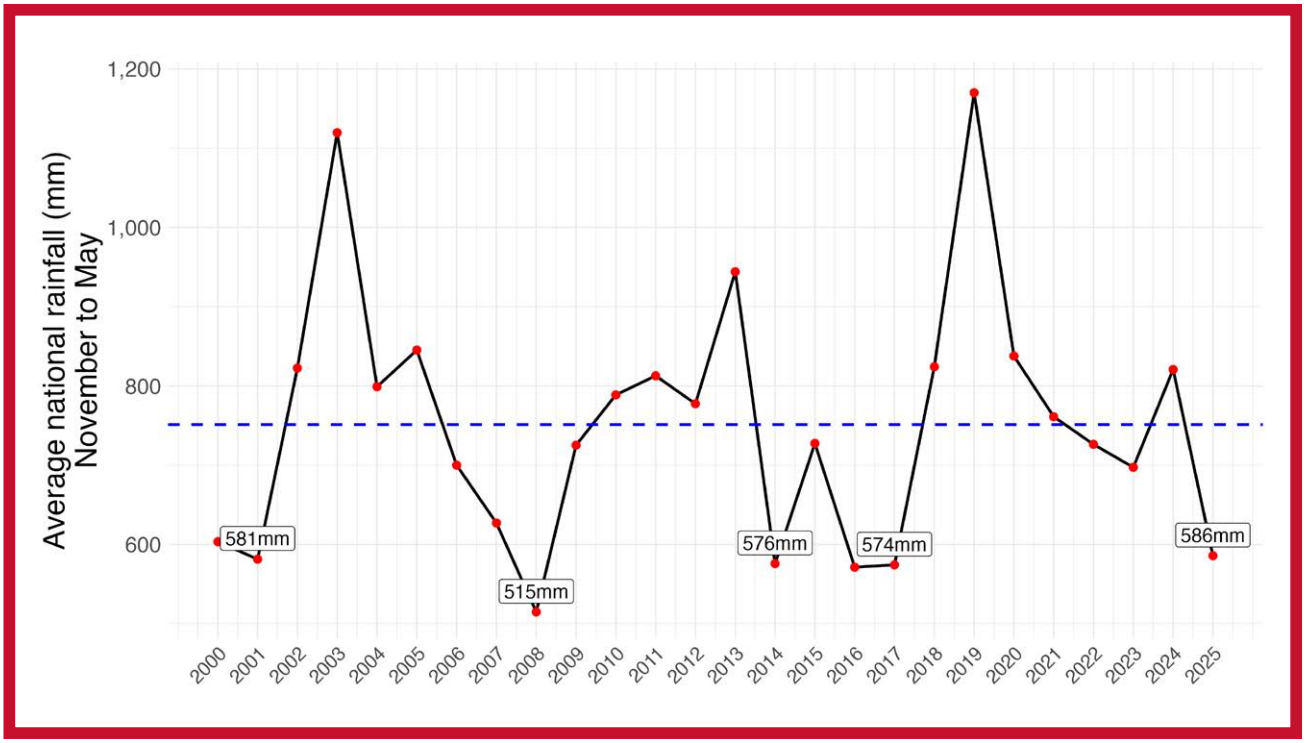

Figure 1: *Rainy season rainfall totals in Lebanon.*[8] *The horizontal blue dotted line indicates the mean seasonal rainfall from 2000 to 2025. Source: Satellite-derived (CHIRPS) rainfall aggregates published by WFP.*

The Ministry of Agriculture (MoA) also introduced a set of rationing measures including promoting drip irrigation systems, as well as discouraging soil tillage and encouraging the use of organic fertilizers to preserve ground moisture.[9] In the Bekaa valley, Lebanon's largest agricultural region, groundwater levels have reached unprecedented lows with 25% of wells going dry.[10] The rest of Lebanon's water consumption for 2025 (17%) was projected to come from surface water, mostly from reservoirs, which also rely on winter precipitation.[11] The reservoir at Chabrouh Dam in Faraya was at 30% of its total capacity (8 million m3) in May 2025, 26.5% less than in May 2024 (Figure 2). The reservoir at Qaysamani Dam in Baabda is facing similar critical shortages.[12] Compounding the impact of drought on water availability, Lebanon's regional public water utilities lose 30% to 50% of water during distribution, mainly due to an aging network and leakages.[13] The contamination of rivers and coastal areas – driven by informal wells, untreated sewage, industrial discharge, and agricultural runoff – is intensifying the impacts of drought and weak governance, pushing water resources toward critical degradation.

[8] Rainfall data recorded by dekad (10-day period) at the district (qadaa) level; therefore, the national aggregate is calculated as the average seasonal rainfall per district.
[9] Ministry of Agriculture, وزارة الزراعة تدعو إلى ترشيد استهلاك المياه في ظل شح الأمطار March 18, 2025
[10] National News Agency, مياه لبنان الشمالي تعلن اتباع برامج تقنين June 3, 2025;
L'Orient Today, Chabrouh dam in Faraya stored only 30% of its capacity this year May 23, 2025;
GrandLB, العطش يهدد البقاع June 22, 2025;
Al-Raii, البقاع يختنق عطشًا... والمزارع يدفن موسمه بيديه June 27, 2025
[11] Ministry of Energy and Water, Towards a Sustainable Water Sector: Lebanon's National Water Strategy 2024 – 2035 June 2024
[12] L'Orient Today, Chabrouh dam in Faraya stored only 30% of its capacity this year May 23, 2025
[13] Ministry of Energy and Water, Updated National Water Sector Strategy 2020-2035 2022;
The Lebanese Center for Policy Studies, Review of National Water Sector Governance in Lebanon January 2025;
L'Orient Today, Summer water rationing looms after light winter snowfall June 14, 2023

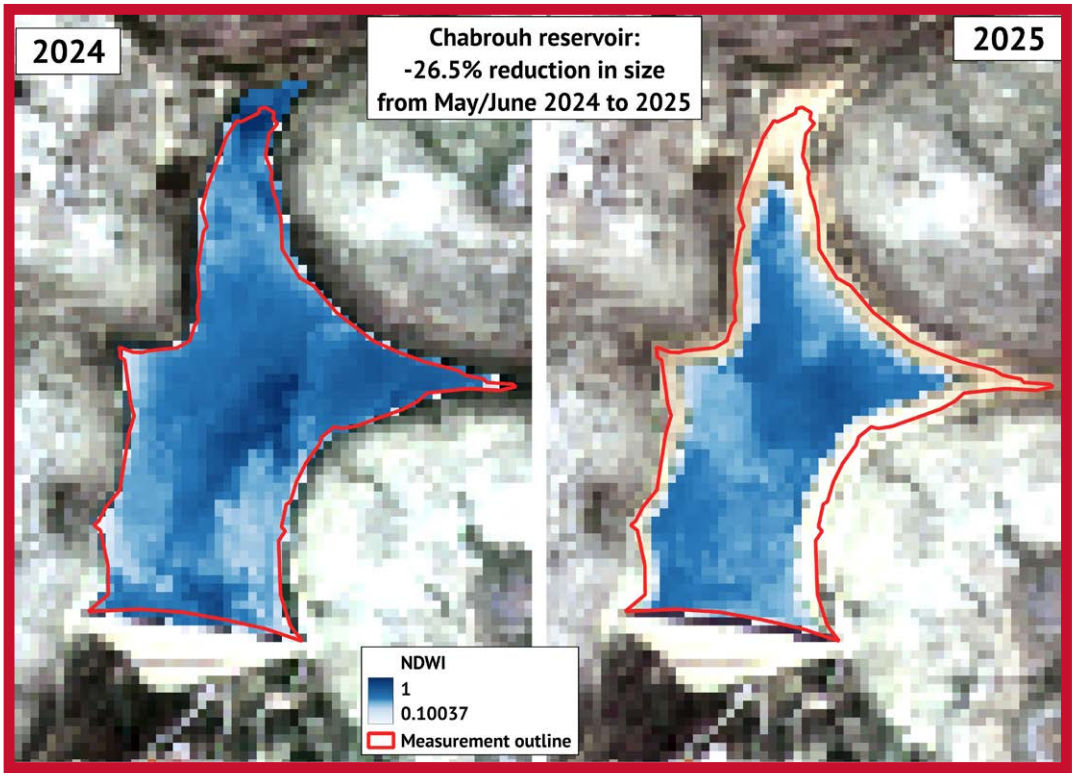

Figure 2: *Chabrouh reservoir water extent, year-on-year comparison. Water extent is measured using the Normalized Difference Water Index (NDWI).*[14]
Source: LCAT analysis using Sentinel-2 satellite imagery.

Drought in Lebanon will severely impact the country's agriculture sector, which accounts for nearly 62% of Lebanon's water demand.[15] The agriculture sector, a primary livelihood source in the Bekaa valley, Nabatieh, and South Lebanon, is projected to account for 6% of Lebanon's GDP in 2025.[16] The sector has already been reeling from the impacts of the economic and financial crises that began in 2019 and Israeli bombing of southern Lebanon and the Bekaa valley since October 2023. According to the World Bank's assessment of conflict-induced damage, which included widespread hostilities from September to November 2024, the agriculture sector suffered 79 million US dollars (USD) in direct damage and USD 742 million in indirect economic losses.[17] Households, projected to make up 29.7% of Lebanon's water demand this year,[18] will suffer the direct impacts of water scarcity and face increased prices to access private water sources. They will also face knock-on effects across other sectors including public health and state electricity provision.

This year's drought must also be considered within the broader context of climate change and its long-term repercussions on Lebanon. Over the coming decades, Lebanon is projected to receive less winter precipitation while contending with soil moisture evaporation, leading to more frequent droughts and exacerbating water scarcity. The country is also expected to face increased extreme weather events, including torrential rains that cause flash floods.[19]

[14] The Normalized Difference Water Index (NDWI) is a remote sensing indicator that measures the presence of water. An NDWI equal to or greater than 0.1 generally indicates the presence of some water, when visually comparing the NDWI values to true color images.
[15] According to Lebanon's National Water Strategy 2024-2035, the agriculture sector was projected to use 874 million cubic meters of water in 2025 out of a total annual demand of 1.414 billion cubic meters.
Ministry of Energy and Water, Towards a Sustainable Water Sector: Lebanon's National Water Strategy 2024 – 2035 June 2024
[16] World Bank, Fragile Stabilization Fuels Growth in Lebanon June 19, 2025
[17] World Bank, Lebanon Rapid Damage and Needs Assessment (RDNA) 2025 Report March 7, 2025
[18] According to Lebanon's National Water Strategy 2024-2035, households were projected to use 421 million cubic meters of water in 2025 out of a total annual demand of 1.414 billion cubic meters.
Ministry of Energy and Water, Towards a Sustainable Water Sector: Lebanon's National Water Strategy 2024 – 2035 June 2024
[19] World Bank, Droughts and Agriculture in Lebanon : Causes, Consequences, and Risk Management October 1, 2018;
Red Cross Red Crescent Climate Center, Climate Fact Sheet – Lebanon 2024

Hand-in-hand with temperature increases and drought, Lebanon faces a greater risk of forest fires as the impacts of climate change grow in the country.[20] In March 2025, Lebanon's Ministry of the Environment declared a state of emergency for the forest sector and issued a series of directives aiming to prevent and mitigate forest fires.[21]

This report aims to inform humanitarian and development actors about the context and impact of drought in Lebanon. LCAT's analysis, based on a desk review of relevant literature and news reports, is complemented by visualizations based on remote sensing data to explain the drought's magnitude.

[20] L'Orient Today, Greenpeace warns of climate change in Lebanon after recent fires April 11, 2025
[21] National News Agency, وزير الزراعة أعلن حالة طوارئ زراعية بيئية لحماية الغابات في لبنان March 23, 2025

Key Takeaways:

- Severe rationing by public sector water utilities in the dry summer months will force Lebanese households to source water from unregulated and unlicensed private sources – including monopolistic and profit-seeking water trucking services expected to engage in price gouging – which will disproportionately affect lower-income residents.

- Drought is expected to take a particularly high toll on the agricultural sector, threatening both livelihoods and food security. Water scarcity is forcing many farmers to use untreated water sources, raising health risks and worsening soil conditions. Others will pay significantly more for alternative water sources or accept lower crop yields.

- Drought and water scarcity are associated with increased risks of waterborne diseases. The 2022 cholera outbreak in Lebanon was attributed to clean and safe water access constraints. Drought incentivizes households and businesses to overexploit existing water sources and use unsafe and non-sanitized alternatives.

- The Litani River Authority (LRA) – which provides electricity to 109 municipalities in southeast Lebanon and generated 15.5% of state-produced electricity in 2024 – will likely have to shut down its hydropower plants due to low water levels in the Lake Qaraoun reservoir. This will negatively impact household livelihoods in southeastern Lebanon, disrupt regional infrastructure, and could further reduce national electrical power supply, raising the risk of social tensions.

- The Lebanese government has drawn up and enacted several policies to mitigate the impact of water shortages and drought, including the 2012 National Water Sector Strategy and the 2016 National Agricultural Strategy. Political tensions, the 2019 economic crisis, and damage inflicted during the 2024 Hezbollah-Israel conflict have contributed to delayed implementation of these plans.


Credit: UNICEF

Drought impacts on Lebanon

Household level:

Residents of Lebanon will contend with severe water rationing this summer, with the head of the Beirut and Mount Lebanon Water Establishment (BMLWE) warning that supplies will struggle to meet demand by September.[22] In June 2025, the North Lebanon Water Establishment and its Bekaa counterpart also announced that they plan to institute more strict rationing regimes.[23] Even during the summer months in past years when annual rainfall levels were higher, Lebanon's regional public water utilities have struggled to provide consistent service. For example, Beirut residents have suffered from chronic shortages of water provided by BMLWE, especially in the western areas of the capital that are underserviced due to logistical constraints. In 2018, 87% of buildings in western neighborhoods of Beirut received supplies of public water less than three times a week in summer.[24] BMLWE has the highest service coverage rate compared to other regional water utility providers. While BMLWE covers 92% of its target population, other regional utilities service between 33% to 66% of their target populations.[25] As such, Lebanese households have had to resort to using their own unlicensed private wells[26] or supplying water through unregulated, private firms to cover gaps.[27] In September 2019, just prior to the start of Lebanon's economic crisis, 26% of the country's population depended on water transported by truck, a figure that surged to 44% in 2023.[28]

[22] L'Orient Today, Chabrouh dam in Faraya stored only 30% of its capacity this year May 23, 2025
[23] National News Agency, مياه لبنان الشمالي تعلن اتباع برامج تقنين June 3, 2025;
GrandLB, العطش يهدد البقاع June 22, 2025
[24] L'Orient Today, Why are Beirut's water shortages worse on the west side of the city? September 2, 2022;
Beirut Urban Labs, Beirut Built Environment Database January 26, 2021
[25] Nora Fayssal et al., Navigating the water–energy nexus amidst the Lebanese economic crisis 917–929 AQUA - Water Infrastructure, Ecosystems and Society, May 3, 2024
[26] AUB Issam Fares Institute for Public Policy and International Affairs, The Way Forward to Safeguard Water in Lebanon - National Water Integrity Risk Assessment April 2015;
United Nations Development Programme, Assessment of Groundwater Resources of Lebanon January 11, 2016
[27] Nora Fayssal et al., Navigating the water–energy nexus amidst the Lebanese economic crisis 917–929, AQUA - Water Infrastructure, Ecosystems and Society, May 3, 2024;
Yasmina Choueiri et al., (Un)Affordability of Informal Water Systems: Disparities in a Comparative Case Study in Beirut, Lebanon Water, August 31, 2022;
L'Orient Today, The water informality trap July 3, 2022
[28] Nora Fayssal et al., Navigating the water–energy nexus amidst the Lebanese economic crisis 917–929, AQUA - Water Infrastructure, Ecosystems and Society, May 3, 2024

Impending water shortages in the hot and dry months of 2025 will deepen households' dependence on private-sector water suppliers, which are costlier than their public sector counterparts. Nationwide, Lebanese households pay 6% of their annual income on average for water, higher than the average global benchmarks of 3% to 5%, according to a 2022 study.[29] This statistic glosses over the even higher percentage of income spent by more impoverished households, with the study finding that lower-income residents had to adopt stringent water conservation measures due to the unaffordability of informal water.[30] According to a 2016 study, an average household in Beirut might spend up to 16% of its income for trucked water during the summer.[31] This percentage will likely be higher in 2025, considering the decreased income values and spending power of Lebanese residents compared to pre-crisis levels. Severe drought conditions are also expected to drive the growth of informal water supply businesses. The informal water sector is largely unregulated and operates through monopolistic zones of control that enable price gouging, especially during periods of scarcity. A 2016 study reported that trucked water providers could achieve profit margins as high as 700%.[32]

Agricultural and Food Security:

Lebanon's agriculture sector is highly vulnerable to drought due to inadequate water capture and distribution, and limited availability and access to arable land. Agriculture accounts for some 60% of total water consumption countrywide.[33] To address shortfalls in public water provisioning, farmers are turning to informal irrigation sources, including untreated water. Such practices not only threaten public health by raising the risk of contamination, but will also have longer-term effects such as reducing soil health.[34,35]

In 2024, the Food and Agriculture Organization (FAO) warned that water scarcity was the main limiting factor to crop area expansion and intensification in Lebanon. Due to the overuse of fertilizers, other agrochemicals, and a lack of clean water sources, Lebanese farmers have reported a decrease in soil fertility, which has forced many to leave land unplanted for multiple seasons.[36] The FAO estimated that water scarcity and changes in weather conditions have precipitated a reduction of cereal production, which fell 34% below the five-year average in 2024, while farmers were forced to delay planting winter cereals in 2025.[37]

[29] Yasmina Choueiri et al., (Un)Affordability of Informal Water Systems: Disparities in a Comparative Case Study in Beirut, Lebanon Water, August 31, 2022
[30] ibid.
[31] Synaps, Water-rich and thirsty: Tapping Lebanon's renewable wealth July 18, 2022
[32] The Public Source, Riding with the Black Hose Brigade: The Truckers Who Bring You Water When the Government Fails May 22, 2024
[33] Food and Agriculture Organization, Lebanon - Water Efficiency in the Near East and North Africa
[34] Lebanon Files, لجفاف يُهدّد لبنان هذا الصيف... الزراعة والأمن الغذائي في مهب الريح April 23, 2025
[35] Anera, A Climate Change Wake-Up Call January 31, 2025
[36] Food and Agriculture Organization, Special Report – 2024 FAO/WFP Crop and Food Security Assessment Mission (CFSAM) to the Lebanese Republic November 2024
[37] ibid.

According to LCAT's cropland change remote sensing analysis, the top five agricultural governorates in Lebanon all showed significantly decreases in cropland cover in the 2025 season, compared to the 2024 season. Specifically, Baalbek-Hermel lost 63.1% of its 2024 cropland cover, the South lost 50.6%, Nabatieh 47.7%, Akkar 30.2%, and Bekaa 25.9%. These regional cropland losses partially result from the 2024 Hezbollah-Israel conflict, but the significant loss of cropland in Akkar (30%) suggests that the drought has had singular negative impacts on crop performance.

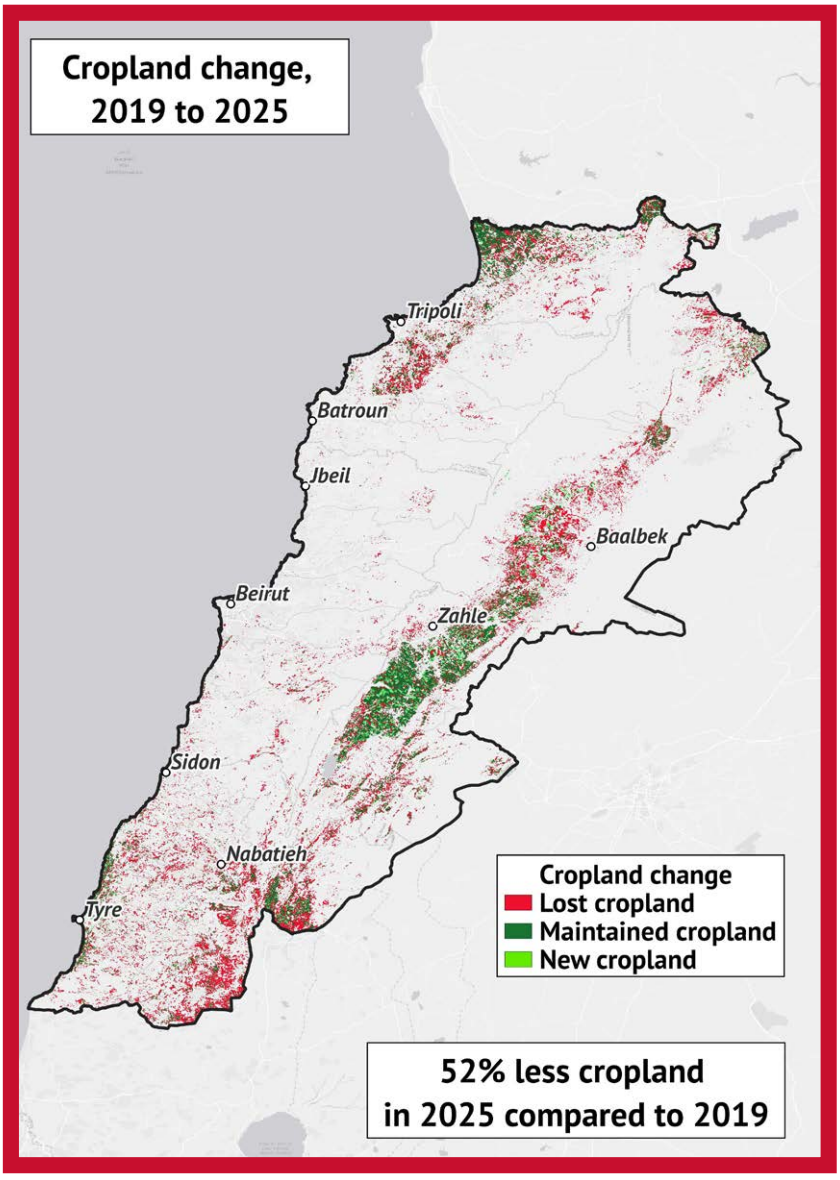

***Figure 3**: Cropland change in 2025 compared to 2019.*[38]
Source: LCAT analysis using Sentinel-2 satellite imagery.

[38] LCAT classified a given area as cropland if 75% of the cloud-free observations from the DynamicWorld land cover layer were categorized as cropland and the maximum NDVI was ≥0.3 (calculated using the Sentinel-2 satellite), between Feb. 15th to May 15th of each year. Cropland cover was identified in 2019, 2024, and 2025. Sentinel-2 was also used to calculate the Normalized Difference Water Index (NDWI) within the water body boundary obtained from Wikimapia. Only NDWI values ≥0.1 were considered water cover.
Earth Engine Data Catalogue, Dynamic World V1;
Earth Engine Data Catalogue, Harmonized Sentinel-2 MSI: MultiSpectral Instrument, Level-2A (SR);
Wikimapia, Water Body Boundary

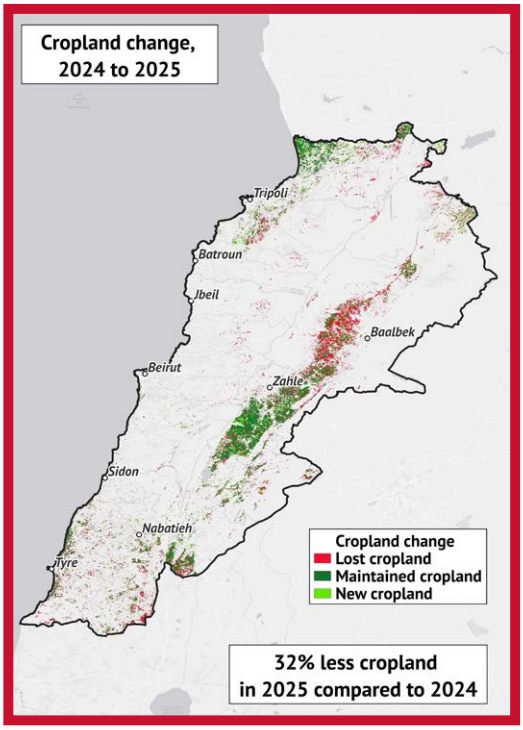

***Figure 4**: Cropland change in 2025 compared to 2024.*
Source: LCAT analysis using Sentinel-2 satellite imagery.

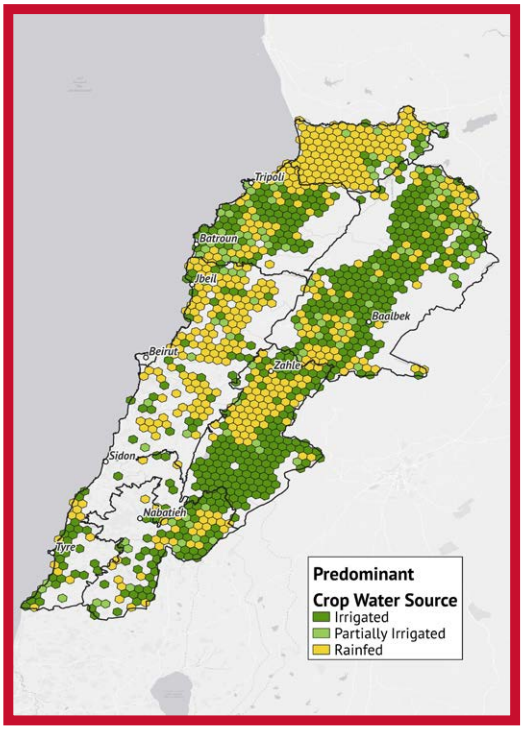

***Figure 5**: Predominant crop water sources in Lebanon.*

LCAT estimated the cropland water source by measuring the change in the average Normalized Difference Vegetation Index (NDVI)[39] of cropland during "low" and "normal" rainfall seasons, which were defined as the bottom 15th percentile and between the 30th and 80th percentile of total seasonal rainfall. Cropland was identified as partially irrigated or irrigated if NDVI values were 10% to 20% greater during "normal" rainfall seasons compared to "low" rainfall seasons.

Source: The Sentinel-2 satellite[40] was used to measure NDVI and rainfall data was obtained from WFP.[41]

[39] NDVI is a remote sensing indicator of plant health, vegetation cover, drought impacts, and crop conditions.
[40] Earth Engine Data Catalogue, Harmonized Sentinel-2 MSI: MultiSpectral Instrument, Level-2A (SR)
[41] World Food Programme, Lebanon: Rainfall Indicators at Subnational Level June 23, 2025

In February 2025, the president of the Federation of Farmers' Unions in the Bekaa warned that "weather conditions lead to lower production, which means less market supply and, consequently, a price hike."[42] Similarly, the president of the Farmers' Association also warned earlier this year that wheat crops could decline by more than 50% compared to last year due to drought.[43] Additional costs incurred by farmers to obtain water and pesticides will likely translate into higher food prices while increasing the risk of contamination.[44] Local farmers will also compete with imported or smuggled food items, but it is unclear how regional drought levels will affect the prices of foreign products, particularly Syrian goods.[45]

Beyond immediate economic losses, prolonged droughts have lasting impacts on land fertility. Water scarcity reduces soil moisture, depletes organic matter, and disrupts nutrient cycling, gradually degrading soil health.[46] This increases risks of salinization, erosion, and desertification, especially where groundwater is overexploited.[47] Drought also reduces vegetation cover, leaving soils exposed to wind and water erosion, and diminishing their long-term productivity.[48] Without sustainable land management, repeated droughts can cause irreversible declines in soil fertility, undermining agricultural resilience and food security.

Public Health:

The 2025 drought poses several health-related risks, particularly for populations with limited access to safe water sources.[49] Some areas in Beirut receive most of their clean water supply through state facilities,[50] while refugees camps and informally constructed buildings outside Beirut often rely on private wells or natural water sources like lakes and rivers. These sources are frequently contaminated by untreated sewage, industrial waste, and agricultural runoff, and can have high salinization levels.[51] Reduced water supply and quality in reservoirs, particularly in informal private wells, limit access to clean water, increasing the risk of pathogen spread,[52] including cholera, dysentery, typhoid, and other diarrheal diseases.[53]

The most recent disease outbreak in Lebanon directly linked to water scarcity and contamination occurred in October 2022, when a cholera outbreak was largely attributed to "poor water and sanitation infrastructure, the current economic crisis and limited availability of energy supplies."[54] The outbreak lasted nearly three months, leading to 8,000 suspected cases and 23 deaths.[55] On October 16, 2024, the Ministry of Public Health (MoPH) documented the first cholera case in Northern Lebanon following the 2022-2023 outbreak. The World Health Organization (WHO) has cited water scarcity and poor sanitation as one of the leading causes of cholera in Lebanon since 2022.[56]

[42] L'Orient Today, Vegetable and grain prices to increase due to lack of rainfall, low temperature February 28, 2025
[43] ibid.
[44] Food and Agriculture Organization, Water scarcity means less water for agriculture production which in turn means less food available, threatening food security and nutrition March 21, 2023
[45] World Bank, Droughts and Agriculture in Lebanon: Causes, Consequences, and Risk Management October 1, 2018
[46] Food and Agriculture Organization, The State of the World's Land and Water Resources for Food and Agriculture – Systems at Breaking Point 2021
[47] United Nations Convention to Combat Desertification, Global Land Outlook 2nd Edition – Land Restoration for Recovery and Resilience 2022
[48] Intergovernmental Panel on Climate Change, Special Report on Climate Change and Land 2019
[49] United Nations Children's Fund, Joint Monitoring Programme Lebanon Water Quality Survey June 2016
[50] Surveys of households in 2022 revealed that Verdun and Aisha Bakkar, two areas in Municipal Beirut, receive around 77% of their water supply through formal means.
Institute of Development Studies, Water Sustainability in Lebanon October 31, 2024
[51] ANERA, A Climate Change Wake-Up Call January 31, 2025
[52] World Health Organization, Fact Sheets, Drinking Water September 13, 2023
[53] United Nations Children's Fund, Joint Monitoring Programme Lebanon Water Quality Survey June 2016
[54] World Health Organization, Impact in 2022: Lebanon
[55] Nature Communications, An unusual two-strain cholera outbreak in Lebanon, 2022-2023: a genomic epidemiology study August 13, 2024
[56] World Health Organization, WHO in Lebanon working to stop cholera spread amid conflict October 17, 2024

The MoPH has in recent years successfully contained waterborne diseases outbreaks, though its ability to prevent outbreaks is constrained both by financial and operational limitations. The MoPH, supported by WHO, launched a vaccination campaign to combat the 2022-2023 cholera outbreak[57] and in April 2024, the ministry also documented 40 cases of Hepatitis A in Kamed al-Lawz, West Bekaa and continued to test the water supply in the affected region.[58] While the ministry was able to identify and mitigate these health threats, its ability to limit the spread of waterborne pathogens in summer 2025 is subject to budgetary and personnel constraints, as well as dependence on other government ministries. Both the MoPH and the Ministry of Energy and Water (MoEW) share responsibility for ensuring the safety of the water supply.[59] Since the 2019 economic crisis, the MoPH has been forced to operate on a smaller budget and contend with an exodus of medical and skilled staff, particularly those who worked in public healthcare centers, while the MoEW is faced with similar budget and operational constraints.[60]

Electricity Generation:

Drought will significantly degrade electricity coverage for approximately 500,000 residents of southern and eastern Lebanon, as well as national infrastructure.[61] The LRA operates four hydroelectric power plants that use water from Lake Qaraoun,[62] which has significantly receded in volume in 2025 due to lack of precipitation. On March 17, 2025, the LRA announced that Lake Qaraoun had receded to 25% of its normal water level, prompting a six-week shutdown of one plant and the partial shutdown of two others.[63] On April 17, 2025, the head of the LRA warned that the drought could lead to all its power plants halting operations.[64] In 2024, the LRA generated 641 gigawatt hours (GWh) of electricity for Lebanon's electrical grid, or 15.5% of the state electricity generation that year.[65] From January to April 2025, the LRA has generated 65.854 GWh of electricity, a 77% drop from its production in the same months the previous year.[66]

[57] World Health Organization, Impact in 2022: Lebanon
The MoPH monitored the scale of cholera infections, engaged in awareness campaigns targeting citizens and refugees, and monitored imports and standards of cholera vaccines and treatments in medical centers.
Ministry of Public Health, Laws & Regulations
Ministry of Public Health, Cholera in Lebanon
Ministry of Public Health, Health Awareness & Prevention
[58] Ministry of Public Health, MoPH Announces 40 Cases of Viral Hepatitis A in Kamed al-Lawz April 30, 2024
[59] The MoEW is responsible for "monitoring the quality of surface and groundwater and setting the relevant quality standards" and "protect[ing] water resources from pollution."
Meanwhile, the MoPH is responsible for "monitoring and controlling drinking water quality and ensuring water quality standards are met." The ministry also should be "monitoring the incidence of waterborne diseases and publishing related epidemiological data." The ministry in practice should therefore be presenting "recommendations to prevent the pollution of water sources, water sampling and analysis, technical assistance to water authorities on installation, maintenance, and operation of water quality equipment, and review of sewerage and drainage schemes."
Water Reform, Lebanese Water Sector Legislation Summary Analytical Report March 31, 2022
Lebanese Center of Policy Studies, Review of National Water Sector Governance in Lebanon January 2025
[60] Inter Press Service, Lebanon Healthcare Crisis Exposed through Communicable Diseases July 8, 2024
[61] World Bank, Environmental and Social Audit: Rehabilitation of Litani River Authority Hydropower Plants, Lebanon October 1, 2024
[62] National Authority for the Litani River, The electrical production for the hydroelectric power plants of the Litani River Authority June 23, 2025;
World Bank, Environmental and Social Audit: Rehabilitation of Litani River Authority Hydropower Plants, Lebanon October 1, 2024
[63] National New Agency, الجفاف الحاد يجبر "مصلحة الليطاني" على توقيف معامل كهرومائية جزئيًا وكليا March 17, 2025
[64] Nida al-Watan, الجفاف يهدد بحيرة القرعون ولإعلان حالة طوارئ مائية April 17, 2025
[65] The LRA announced that it produced 641 GWh of electricity in 2024. According to Banque du Liban data, sourced from Lebanon's state Electricite du Liban utility, there were 4,135 GWh hours of state electricity production countrywide in 2024. LCAT's review of historical EdL statistics on electricity, cross-matched with statistics on the BdL website, shows that EdL counts LRA electricity in its statistics as purchased electricity.
Litani River Authority, انتاج الطاقة الكهرومائية في معامل المصلحة: في عيد العال، ارقش والحلو خلال عام 2024 January 6, 2025;
Banque du Liban, Statistics and Research – Electricity Production June 24, 2025;
Central Administration of Statistics, Electricté du Liban (EDL) 1995-2021 June 24, 2025
[66] National Authority for the Litani River, The electrical production for the hydroelectric power plants of the Litani River Authority June 23, 2025

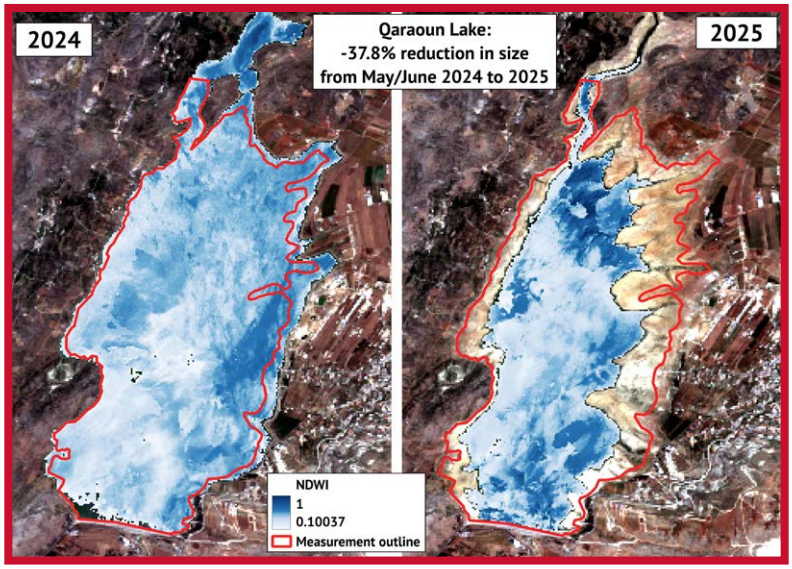

Figure 6: *FLake Qaraoun water extent year-on-year comparison*
Source: LCAT analysis using Sentinel-2 satellite imagery

This precipitous drop off in electricity production will impact the livelihoods of residents of southeastern Lebanon, where the LRA directly provides power for 109 municipalities in the districts of West Bekaa, Rashaya, Hasbaya, Jezzine, Chouf, Nabatieh, and Saida. The LRA indirectly powers another 220 municipalities in the South, Nabatieh, and Bekaa governorates while also providing electricity for infrastructure in the region such as water pumping stations and wastewater treatment facilities.[67]

The LRA normally provides approximately 20 hours of power to the municipalities it directly services – more coverage than provided by the national utility Electricté du Liban (EdL) elsewhere in the country.[68] Now that the LRA is unable to power these 109 municipalities, EdL has stepped in to provide rationed electricity equal to other regions in the country,[69] prompting anger among residents. On March 23, 2025, residents of West Bekaa and Rashaya district towns protested near Lake Qaraoun against EdL's rationed electricity provision, with a local politician saying the residents do not have sufficient access to back-up electricity generators that are prevalent elsewhere in Lebanon.[70] Social tensions could rise in the area due to power cuts, with residents likely to hold further protests in the hot summer months. Also, power cuts will likely negatively impact infrastructure and farms in southeastern Lebanon, including reducing power to irrigation pumps, which will compound the impacts of the drought. Beyond southeastern Lebanon, the LRA has provided power for Beirut's Rafik Hariri International Airport, Roumieh Prison, and stations for pumping public water into Lebanon's capital, the Bekaa, and southeastern Lebanon when Lebanon's state-run power grid is not servicing these facilities.[71] EdL's thermal power plants are chronically short of fuel and likely to temporarily halt operations this summer, as they have in past years since the economic crisis began. Without LRA electricity as a backstop, this could lead to short-term stoppages of critical national infrastructure.

[67] National News Agency, مصلحة الليطاني: إنتاج حوالى 500 مليون كيلو واط ساعة July 5, 2020;
World Bank, Environmental and Social Audit: Rehabilitation of Litani River Authority Hydropower Plants, Lebanon October 1, 2024
[68] National News Agency, كهرباء لبنان : ملتزمون العدالة في التغذية بالتيار بين كافة المناطق اللبنانية March 21, 2025;
National News Agency, مصلحة الليطاني: إنتاج حوالى 500 مليون كيلو واط ساعة July 5, 2020
[69] National News Agency, كهرباء لبنان : ملتزمون العدالة في التغذية بالتيار بين كافة المناطق اللبنانية March 21, 2025
[70] GrandLB, أهالي البقاع يصعّدون: سنفصل الكهرباء عن المناطق ونقطع الطرقات March 23, 2025
[71] Al-Modon, مصلحة الليطاني تؤمن الكهرباء لمطار بيروت August 27, 2022;
National News Agency, مصلحة الليطاني: بالتنسيق مع كهرباء لبنان أمنا التغذية لمحطات ضخ مياه الشفة التابعة لمؤسستي مياه لبنان الجنوبي والبقاع May 26, 2022;
Janoubia, معامل الليطاني الكهرومائية September 15, 2022


Credit: Adnan Tarabulsi

State Measures to Address Drought Induced Water Shortages

The Lebanese government has developed and implemented several initiatives to address water shortages and quality across the country, with mixed results.[72] While these plans and projects aim to improve water capture, wastewater treatment, and early warning systems, their implementation has been hindered by the 2019 economic crisis and political interests. Moreover, several ministries and official bodies are responsible for maintaining Lebanon's public water capture and distribution systems, complicating national-level planning and coordination.[73]

The MoEW first proposed its National Water Sector Strategy (NWSS) in 2012, prior to the 2014 water shortage.[74] In 2014, Lebanon faced a drought due to a dry winter season, exposing major gaps in the country's water management policies and infrastructure. In response, the parliamentary Public Works Committee called for emergency action, and government officials proposed measures such as importing water, reducing consumption, and constructing surge dams.[75] For over a decade, public funds were directed toward dam construction that proved to be technically flawed and financially unfeasible.[76]

[72] Lebanese Center of Policy Studies, Review of National Water Sector Governance in Lebanon March 6, 2025
[73] The MoEW is the primary governmental body for water management and sanitation works alongside Regional Water Establishments (RWEs) and the LRA. The Ministry of Environment, MoPH, and MoA contribute to pollution monitoring, water quality, and irrigation policies, though coordination with the MoEW is limited. Municipalities and the Council for Development and Reconstruction play a direct role in infrastructure maintenance, especially for sewage and drainage. The MoEW is the primary authority responsible for formulating national water policies and supervising major hydraulic and energy projects through its three directorates.
United Nations, Water sector in Lebanon March 9, 2007
RWEs manage potable water, wastewater, and irrigation systems within their regions, operating with autonomy under Law 221/2000, though their coordination with local committees and agencies remains inconsistent.
International Water Association, Challenges of post-war policy reforms in Lebanon's water sector – lessons learned November 1, 2021
The LRA oversees the Litani River Basin, managing irrigation, hydroelectricity, and water monitoring, particularly in South Lebanon, often taking over roles from RWEs under MoEW mandates.
United Nations, Water sector in Lebanon March 9, 2007
Lebanese Center of Policy Studies, Review of National Water Sector Governance in Lebanon March 6, 2025
[74] Programme Solidarité Eau, National Water Sector Strategy 2012 March 3, 2012
[75] Lebanese Center of Policy Studies, Beyond Rehashed Policies: Lebanon Must Tackle its Water Crisis Head-On October 1, 2014
[76] International Water Management Institute, Water policies and politics in Lebanon, where is groundwater December 2016

Two examples of this – the Brissa dam constructed in 2013 and Mseilha dam built in 2019 – cost USD 74 million and USD 27 million, respectively. Both failed to retain the projected amounts of water due to leakages in their foundations due to country's geological features.[77]

The Water Code (Law 77/2018, amended by Law 192/2020) provides the legal framework for water resource management in Lebanon.[78] It promotes an Integrated Water Resources Management approach at the river basin level, requiring the development of basin management and master plans. The law aims to improve the management of both surface and groundwater, protect resources from overexploitation and pollution, and ensure more sustainable and equitable water use. It reinforces the role of the MoEW and the Regional Water Establishments and acknowledges the role of municipalities without clearly defining their responsibilities in water governance, leaving room for coordination gaps.

In June 2024, the MoEW introduced the NWSS 2024–2035[79] – a condensed and updated version of the 2020 and 2022 strategies[81] – which aims to enhance water infrastructure, expand access to services, and improve sustainability in the sector.[82] However, in May 2024, the initial implementation budget was reduced from USD 8 billion to USD 2.5 billion under donor pressure for reform.[83]

The MoA issued the National Agriculture Strategy (NAS) in 2016 (updated it in 2020) to promote sustainable water resource management within the agricultural sector. This strategy emphasizes the reuse of treated wastewater for irrigation, adoption of water-saving techniques like drip irrigation, and the development of monitoring and evaluation systems.[84] While such practices could prove beneficial to the sector, water access in Lebanon has been severely constrained by the Hezbollah-Israel conflict, during which the Israeli military targeted irrigation infrastructure, especially in southern Lebanon. Some 4,500 irrigation systems have been damaged as a result of the conflict, at a cost of USD 16 million.[85]

The Lebanese government also maintains the National Early Warning System Platform (NEWSP), established in 2015, to monitor and predict both natural and man-made hazards. Closely linked to the national-level Disaster Risk Management Unit and regional operation rooms, the NEWSP uses satellite imagery and digital modeling to project droughts, floods, landslides, and pollution. NEWSP plays a critical role in informing government policies aimed at preventing and managing crises, however, data and projections for 2025 have yet to be released.[86]

[77] Nida Alwatan, الإصرار على السدود... متاهة بلا حدود؟ March 19, 2022
[78] Parliament of Lebanon, Law No. 192 of 2020 March 16, 2020
[79] Ministry of Energy and Water, الاستراتيجية الوطنية لقطاع المياه ٢٠٢٤-٢٠٣٥ June 2024
[80] United Nations Environment Programme, Updated National Water Sector Strategy (NWSS) 2020 - Volume IV May 1, 2020
[81] Programme Solidarité Eau, Updated National Water Sector Strategy 2020-2035 December 2022
[82] Resilient Water Solutions Against Climate Change, Towards a Sustainable Water Sector: Lebanon's National Water Strategy 2024 – 2035 June 21, 2024
[83] Nida Al-Watan, الاستراتيجية الوطنية للمياه 2024-2035 - فتات عيّاد تهريبة January 31, 2025
[84] Ministry of Agriculture, Lebanon National Agriculture Strategy (NAS) 2020 - 2025 July 2020
[85] World Bank, Lebanon - Rapid Damage and Needs Assessment (RDNA) March 6, 2024
[86] National Early Warning System Platform, National Early Warning System Platform June 18, 2025

Recommendations:

Government:

- The MoEW and MoA should determine how best to enforce water use restrictions, backed by real-time aquifer monitoring. The government should also work to decentralize water storage measures and support for irrigation systems, while ensuring the timely release of data from the MoA's early warning system.

- The government should develop guidelines that clearly delineate the roles and responsibilities of the MoEW, MoA, National Council for Scientific Research (CNRS), Regional Water Establishments, and municipalities regarding water retention and provisioning.

- The government should establish a clear legal and operational framework that empowers municipalities to play an active role in local water management, especially drought preparedness and response planning. This includes defining their mandates, offering technical guidance, and providing access to real-time water and drought data that allows municipalities to plan and implement sustainable water management solutions in coordination with national institutions.

- Ministries should launch coordinated public advocacy campaigns to discourage harmful coping mechanisms such as overreliance on water tankers, and the security forces should enforce regulations on unregulated well drilling.

NGOs, Donors, International Community:

To address the challenges facing Lebanon's water sector, municipal authorities, NGOs, donor agencies, and the international community should provide long-term support while engaging in structural reform. The following highlight how external actors can contribute:

- Support water sector-focused legislation through workshops that examine draft laws to ensure they are feasible, cost-effective, and align with international standards.

- Build institutional capacity through training forums that advance the capabilities and knowledge of public servants working in the water sector.

- Build upon existing Early Warning Systems by providing support to CNRS and the MoA to limit negative impacts on the agricultural sector.

- Support private-public partnerships and cooperation by offering co-financing options and technical assistance mechanisms that foster cooperation and reduce dependency on private water providers.

- Develop integrated programs that encourage collaboration between water management agencies and agricultural and environmental sectors, ensuring dynamic and coherent planning at the national, governorate, and municipal level.

- Monitor intra- and inter-communal tensions arising from water access constraints.

- Adopt water-smart approaches across all interventions, whether for immediate access to drinking water, WASH, or longer-term livelihoods and agricultural support. This includes ensuring that solutions – such as solar-pumped wells or expanded irrigation – do not inadvertently contribute to the over-extraction of groundwater or the further depletion of already fragile water resources.

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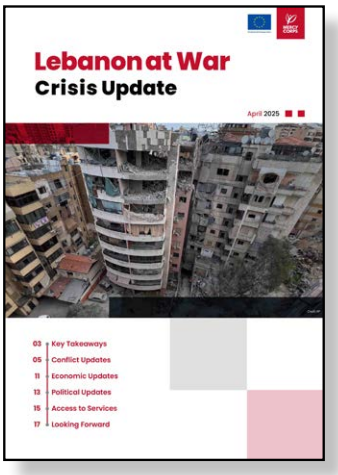

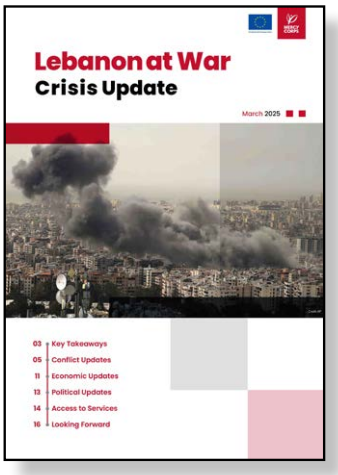

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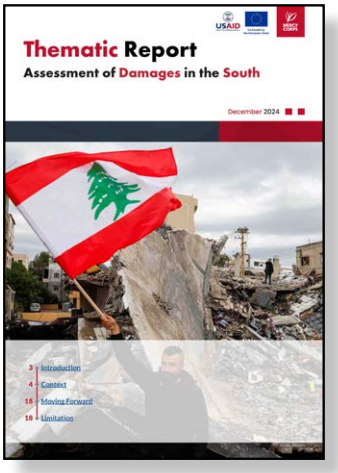

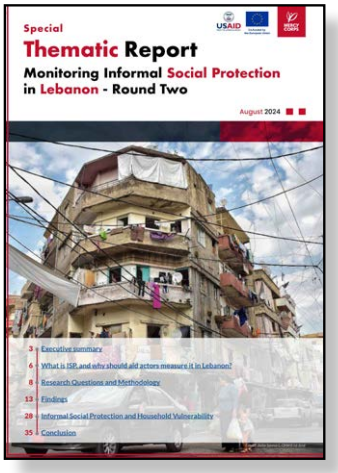

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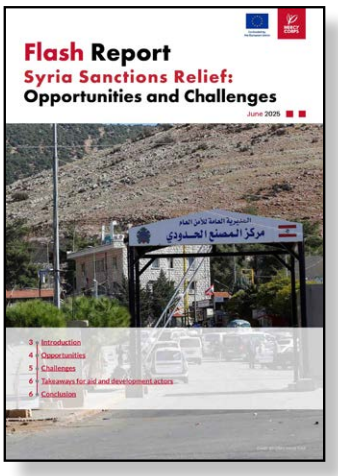

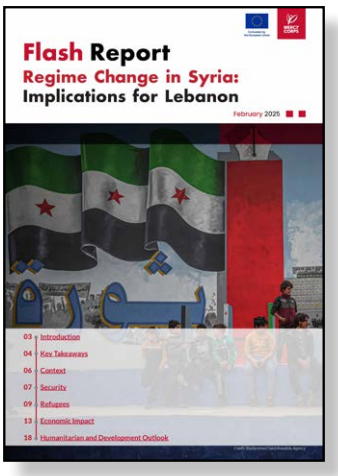

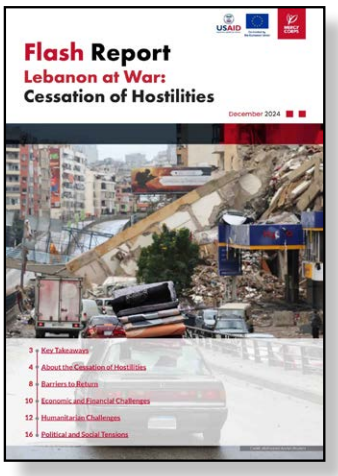

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