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GAZA WAR: **PRELIMINARY** **FINDINGS ON THE** **SOCIO-ECONOMIC** **AND ENVIRONMENTAL** **IMPACT ON** **LEBANON**

December 2023

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This report presents a snapshot of the impact of the war in Gaza on Lebanon and on the southern Lebanese border as of the report's cover date and based on the latest available data. Data presented in the report may change as the situation evolves.

Contents

Executive Summary	8
Methodological note	9
1. Country context	10
2. Main transmission channels for the impact of Gaza war¹¹	12
2.1 Impact on the tourism sector: signs of contraction	13
2.2 International trade: Potential disruption in imports and exports	14
2.3 Possible disruption in remittances and other financial flows	17
3. Impact of the conflict on south Lebanon	18
3.2 Damages in buildings, housings and other assets and infrastructure	19
3.3 Losses in the agriculture, livestock, animal production, aquafarming and forestry	20
3.3.1 Olive and Olive Oil	21
3.3.2 Carob	21
3.3.3 Grain and winter farming	21
3.3.4 Animal production	21
3.3.5 Dairy production	22
3.3.6 Forests and forestry	23
3.3.7 Aquafarming	23
3.3.8 Greenhouses.....	23
3.4 Environmental impacts	23
3.4.1 Protected areas, natural areas and nature reserves	24
3.4.2 Air pollution.....	25
3.4.3 Ground and surface water	25
3.4.4 Soil quality and land	26
3.4.5 Solid waste	27
4. Conclusions and way forward.....	29

List of Figures

Figure 1. Total visitor arrivals to Lebanon (excluding Lebanese, Syrians, and Palestinians) during January 2022-Sept 2023.....	12
Figure 2. Flow of passengers: higher departure and lower arrival in October 2023	13
Figure 3. Imports, Exports and Trade balance in USD Billion (2018-2023 until August).....	14
Figure 4. Tax on international Trade and VAT (%)	15
Figure 5. Attacks on the southern areas of Lebanon by type.....	18
Figure 6. Cumulative number of IDPs from conflict-affected villages in South Lebanon during October 14-December 14, 2023	19
Figure 7. Number of hectares affected by fires by type of vegetation cover	22

List of Acronyms

AFDC	Association for Forests, Development and Conservation
ATSDR	Agency for Toxic Substances and Disease Registry
AWRIS	Arab War Risk Insurance Syndicate
BDL	Banque du Liban/ The Central Bank
CARs	Current Account Receipts
CAS	Central Administration of statistics
CBNRM	Community Based Natural Resources Management
CDR	Council for Development and Reconstruction
CEO	Conflict and Environment Observatory
CNRS	National Center for Scientific Research
EPA	Environmental Protection Agency
ESCWA	Economic and Social Commission for Western Asia
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
IBA	Important Bird Area
IDAL	Investment Development Authority of Lebanon
IDP	Internally displaced people
IIF	Institute of International Finance
IMF	International Monetary Fund
IOM	International Organization for Migration
IPAs	Important Plant Areas
KBAs	Key Biodiversity Areas
Km	Kilometer
LAF	Lebanese Armed Forces
LEM	Lebanon Economic Monitor
MEA	Middle East Airlines
MENA	Middle East and North Africa
MoA	Ministry of Agriculture
MoE	Ministry of Environment
MOPH	Ministry of Public Health
MPO	Macro and Poverty Outlook
NA	National Accounts
NLR	North Litani Region
NNA	National News agency
OCHA	Office for the Coordination of Humanitarian Affairs
P4	white phosphorus
P4O10	Forming Phosphorus Pentoxide
P4O6	Phosphorus Trioxide
PA	Protected Areas
PBX	Plastic-Bonded Explosives
PFA	Polyfluoroalkyl Substances

PH3	Phosphine
PHCCs	Primary Health Care Centers
PMI	Purchasing Manager Index
RXD	Cyclonite
S&P	Standard & Poor's
SLA	Staff Level Agreement
SLR	South Litani Region
TNT	Trinitrotoluene-2,4,6
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
USD	United States dollar
UXO	Unexploded Ordnances
VAT	Value-added tax
WB	World Bank
WTTC	World Travel and Tourism Council



Gaza war: Preliminary findings on the socio-economic and environmental impact on Lebanon

Executive Summary

The current Gaza war has resulted in an additional layer of complexity to the already profound and multifaceted crisis that Lebanon has been struggling with for the past few years. The impact from the Gaza war has started to be felt across sectors, and through a variety of trans-mission channels. The ongoing conflict around the Southern Lebanese border that has been triggered by the Gaza war is expected to have significant impact on key economic sectors in Lebanon, particularly tourism and services. The economy of South Lebanon has been and will be affected, given the direct military attacks targeting a high number of southern villages and towns, the high displacement rates, and the reported shutdown of economic activity.

To better understand the magnitude of the conflict's implications, UNDP has assessed the actual and potential impact of the ongoing conflict on the economy and transmission channels, as well as on the environment. The assessment is based on a desk-based review of available data, complemented with informal interviews with key stakeholders, and with preliminary data gathered by the UNDP team. Given that no official damage assessment has been done so far, this analysis is based on available official data and the latest data released by a variety of sources as of the report's cover date.

The main findings of the assessment can be summarized as follows:

On the national level:

- Should the war continue, or expand beyond the borders' area to reach other locations in Lebanon, the domestic economy will resume its contractionary trend, although it was forecasted that the economy may start to slowly grow in 2023. The magnitude of contraction depends on different scenarios relating to the extent and duration of the conflict (status quo versus full expansion of the war to other parts in Lebanon).
- The tourism and hospitality sectors are heavily impacted by the conflict. This is evidenced by the reduced flow of travelers, low hotel occupancy rates, and the diminished clientele at restaurants.
- International trade was affected and may be subject to further repercussions should the conflict continue, mainly in terms of the widening trade

deficit and the disruption of supply chains. Imports and exports are both key to Lebanon's economy, and the ongoing disruption may jeopardize Lebanon's efforts to recover from the crisis: on one side, the country relies on imports to meet basic necessities, mainly food and convenient goods; on the other side, exports are considered a major source of foreign currency.

- The conflict will affect financial flows to the country, mainly remittances, which are critical to the survival of a wide segment of the population, amid the continuous dysfunctionality of the banking sector. Disruptions in flights to Lebanon will further impact the flow of remittances from the diaspora.

On the level of South Lebanon and Nabatiyeh Governorates

Since 7 October 2023, around 91 villages in the Governorates of Nabatiyeh and South Lebanon have been subject to 1,768 attacks, including shelling, airstrikes, flare and incendiary bombs, phosphorous shells, and other forms of assault. The fighting on the borders has resulted in a number of casualties, internally Displaced People (IDPs), the destruction of assets (such as cars, production tools, houses, shops, etc.) and infrastructure, and disruption to economic and social services:

- Since the start of the conflict (as of 14 December 2023), a massive displacement was recorded from villages and towns located on the border, reaching 64,053 individuals, of whom 52 percent are female and 37 percent are children.¹
- Tens of buildings and dwellings have been completely destroyed; hundreds of housing units were partially or totally damaged; hundreds of commercial entities were affected and/or shutdown; and assets were lost or damaged.
- The most significant losses are reported in the agriculture sector, a main source of livelihood and income in the area. The conflict is taking place during a critical period (harvesting and land preparation for the next season). Agricultural lands have suffered significant damage, including physical degradation, chemical pollution, and contamination from explosive remnants, resulting in a loss of soil fertility. The use of phosphorus shelling has led to the contamination of crops, surface and ground water, posing threats to livestock and human health. Additionally, fires

have impacted various agricultural areas, affecting olive groves, citrus farms, banana farms, and pasture lands.

- The main crops that are affected are: olives (and consequently olive oil production), carob, grains and other winter crops. In addition to the losses in production, thousands of trees were burned (for instance 47,000 olive trees were reported to have been burnt by phosphorus bombs). The conflict also causes major losses in the livestock, poultry and aquaculture sectors.
- Forest fires significantly impact natural ecosystems, hindering recovery due to disrupted ecological processes. White phosphorus is extremely poisonous to various organisms, leading to documented incidents of death among mammals, birds, and fish, with long-lasting environmental harm and a classification as very toxic to aquatic life. The use of white phosphorus extends beyond immediate destruction, posing ongoing and unpredictable hazards due to its prolonged and difficult-to-control burning, creating serious risks to human health, safety, and the environment.

- Water infrastructure has been damaged, risking the spread of water-borne diseases and environmental degradation, highlighting the critical need for access to clean water for public health and community wellbeing.

- Soil quality in the conflict area has been affected by physical destruction and pollution due to the spread of heavy metals and toxic compounds from explosive weapons, with white phosphorus usage further reducing fertility and increasing soil acidity. The conflict will impact solid waste, as waste management disruption leads to unsafe landfilling and burning, negatively impacting ecosystems.

In conclusion, irrespective of the war scenarios, the economy is likely to contract further. This contraction, along with the delay in implementing a comprehensive reform agenda, will inevitably impede the country's economic recovery. This analysis serves as an early effort to take stock of the initial actual and potential losses resulting from the conflict. The report concludes with potential ways forward for a swift response post-war and outlines the immediate steps to be taken:

- Regularly updating the impact of the conflict and preparing for further in-depth assessments to feed into the design of a response and recovery plan that enables the implementation of the triple nexus, combining humanitarian assistance and peacebuilding with longer-term development.
- Reprogramming activities to address the implications of the crisis and to safeguard livelihoods, should the conflict continue, prioritising community-based initiatives, establishment of linkages and value chains, and cash for work for IDPs.

- Laying the groundwork for well-informed and programmatic activities post-conflict, including job creation, business development, income support to farmers to restart their activities, access to finance and infrastructure investments to stimulate sustained economic recovery.
- Planning an in-depth environmental assessment as the preliminary UNDP environmental assessment underscores significant impacts on protected areas, forests, water bodies, air quality, and land.
- Prioritizing environmental considerations such as strategies for recovery including reforestation, advocating against prohibited phosphorus bombs
- Implementing measures for the protection of livestock, recognizing their significant role in the local economy and livelihoods.



¹The International Organization for Migration (IOM), the Lebanese Red Cross (LRC), the Disaster Risk Management (DRM) Unit, Displacement Tracking Matrix, Mobility Snapshot, Round 15, <https://dtm.iom.int/reports/mobility-snapshot-round-15-14-12-2023?close=true>.

The Gaza war: Preliminary findings on the socio-economic and environmental impact on Lebanon

In November 2023, UNDP and ESCWA carried out an early assessment of the then expected economic and human impact of the war on Palestine². In December 2023, UNDP developed a complementary brief to examine the likely effects of the Gaza war on Palestine's neighbouring countries, focusing primarily on Egypt, Jordan and Lebanon. This brief presents an additional analysis focusing on Lebanon, which has been seriously affected, as fighting on its southern border has progressively escalated and caused significant human and material losses. The ongoing conflict is expected to have a considerable social, economic and environmental impact on the country as whole, and on the southern Lebanese border area in particular.

Methodological note

The brief was prepared while the conflict is still ongoing, and thus it reflects the situation as of the cover date. The analysis is based on a desk-based review of available data, complemented with informal interviews with key stakeholders, and based on preliminary data gathered by a UNDP team in the South Lebanon area office.

The report is intended to give a snapshot on the impact of the Gaza war and the conflict on the southern borders on Lebanon, using available data and sources. The structure of the report is meant to analyze the impact at the broad national level through main transmission channels, and then it zooms in to highlight the impact on South Lebanon. The ultimate aim of the report is to take stock of losses and inflicted damages to: 1) provide evidence for the implementation of the triple nexus and thus complementing humanitarian assistance with developmental support, and 2) to provide an unbiased baseline to guide future programmatic responses of UNDP and partners for recovery, reconstruction and stabilization.

2-ESCWA and UNDP (2023). "Gaza war: Expected socioeconomic impacts on the State of Palestine. Preliminary estimations until 5 November 2023". <https://www.unescwa.org/publications/war-gaza-expected-socioeconomic-impact-palestine>.

3-World Bank, Lebanon Economic Monitor (LEM): Lebanon Sinking (To the Top 3), Spring 2021. The report classified Lebanon's financial and economic crisis as "likely to rank in the top 10, possibly top three, most severe crises episodes globally since the mid-nineteenth century".

4-UNHCR, Lebanon factsheet, August 2023 <https://reporting.unhcr.org/lebanon-factsheet-5735>

5-World Bank, Lebanon Economic Monitor (LEM), Spring 2023: The Normalization of Crisis is No Road for Stabilization, <https://documents1.worldbank.org/curated/en/099027005152320346/pdf/IDU0ea0213ae0ef804ba309c7a00638cf710a36.pdf>

6-Over the past few months, and following a long period of steep deterioration, the market exchange rate has been relatively stable, with very minor fluctuations, standing at an average rate of 89,700 USD/LBP (as of December 2023). The country still operates multiple exchange rate regime, however the gaps across the different regimes have been slightly bridged and most adopted rates are converging to the parallel market rate.

7-CAS and WB, measuring Poverty in Lebanon using 2011 HBS, December 2015. http://www.cas.gov.lb/images/Excel/Poverty/Measuring%20poverty%20in%20Lebanon%20using%202011%20HBS_technical%20report.pdf

8-ESCWA, Multidimensional Poverty in Lebanon (2019-2021), <https://www.unescwa.org/sites/default/files/pubs/pdf/multidimensional-poverty-lebanon-2019-2021-english.pdf>

1. Country context

For the past four years, Lebanon has been in the grip of an acute economic and financial crisis, classified as one of the worst in its modern history³. In addition to the economic and financial collapse since 2019, the country has been hit by multiple shocks, including the COVID-19 pandemic and the devastating Beirut Port explosions in August 2020. Furthermore, Lebanon continues to host more than 1.5 million Syrian refugees, making it the country with the highest number of refugees per capita in the world⁴.

The domestic economy contracted by around 40 percent between 2018 and 2022.⁵ The local currency has lost more than 98 percent of its value⁶. Inflation

has been recording triple digit figures for the past three years, cumulatively rising by more than 4,300 percent since the outbreak of the crisis in 2019, causing massive losses in the real value of income. The fiscal balance has been affected by the sharp decline in state revenues that drastically dropped from 13.1 percent of GDP in 2020 to 6 percent of GDP in 2022, one of the lowest rates globally. In parallel, public expenditures declined from 16.4 percent of GDP in 2020 to a critically low level of 5.7 percent of GDP in 2022, indicating the diminished role of the state in providing basic services and public goods. These economic challenges translated into intense deprivation, poverty, and unemployment across the country. They also led to a rise in inter and intra-communal tensions threatening social stability and cohesion. The most recent official poverty figures are based on 2011-2012 household survey, which estimate poverty headcount at 27.4 percent⁷. The recent multidimensional poverty index estimates that around 82 percent of Lebanon's households experience multidimensional poverty⁸. Also, unemployment hit a record of 29.6 percent in

January 2022⁹, with significant variations across regions. The Governorate of Baalbeck-Hermel reported the highest unemployment rate of 40.7 percent, followed by South Lebanon with 36.5 percent.

Adding to this, Lebanon has been experiencing a political stalemate since the parliamentary elections in May 2022. In October 2022, the President concluded his mandate and the Government has assumed a caretaking role, which has slowed further the policy and decision-making processes. The political stalemate is accompanied by a lack of political will and consensus for the much-needed economic reforms, pushing institutions to the edge of collapse, and further complicating the way out of

the economic and financial meltdown. The Government signed a Staff-Level Agreement (SLA) with the IMF in April 2022.

As part of this agreement, a set of prior actions were committed by the Lebanese Government and agreed as pre-requisites to reach a programme with the Fund¹⁰. To date, no significant progress has been made on these prior actions, apart from the adoption of a budget law for 2022, the banking secrecy law, and the special audit of the Central Bank (BDL).

The war in Gaza and its expansion into southern Lebanon has resulted in an additional layer of complexity to the already profound and multifaceted crisis. On October 8, and along the 'blue line' (demarcation line between Lebanon and Israel (Golan Heights), fighting was triggered by the Gaza war and has intensified since then. The impact is already felt across economic sectors and through a variety of transmission channels. And it is expected to have more impact on the key economic sectors in Lebanon if the conflict escalates.

Immediately following the outbreak of the conflict, the tourism and service sectors, particularly trade, which had shown slight signs of improvements during the past summer, have been the most affected at the national level. In South Lebanon especially, the livelihood and local economy have been particularly affected, given direct military attacks targeting agricultural land, infrastructure, houses and economic facilities across tens of villages and towns. Tens of thousands of people living along the border have been already displaced. Economic activity and local businesses are either disrupted or have had to shut down or relocate.

9-Central Administration of Statistics(CAS), Lebanon Follow-up Labor Force Survey, January 2022

10-The following prior actions were part of the IMF-SLA: 1) Cabinet approval of the appropriate bank restructuring strategy 2) Parliamentary adoption of the emergency bank resolution legislation; 3) Parliamentary adoption of the reform to the bank secrecy law in line with international standards; 4) Completion of the first phase of BdL special audit; 5) Initiation of bank-by-bank assessment; 6) Cabinet approval of the medium-term fiscal and debt sustainability strategy; 7) Parliament approval of the 2022 budget; 8) Unification of the exchange rates; 9) Parliamentary approval of the capital controls and deposit withdrawal limits law; and 10) Cabinet approval of the energy strategy.



LEBANON CONTINUES TO HOST MORE THAN 1.5 MILLION SYRIAN REFUGEES, MAKING IT THE COUNTRY WITH THE HIGHEST NUMBER OF REFUGEES PER CAPITA IN THE WORLD



THE LOCAL CURRENCY LOST MORE THAN 98 PERCENT OF ITS VALUE



INFLATION HAS BEEN RECORDING TRIPLE DIGIT FIGURES FOR THE PAST THREE YEAR



BALBECK-HERMEL REPORTED THE HIGHEST UNEMPLOYMENT RATE OF 40.7 PERCENT, AND SOUTH LEBANON CAME SECOND WITH 36.5 PERCENT



2. Main transmission channels for the impact of Gaza war

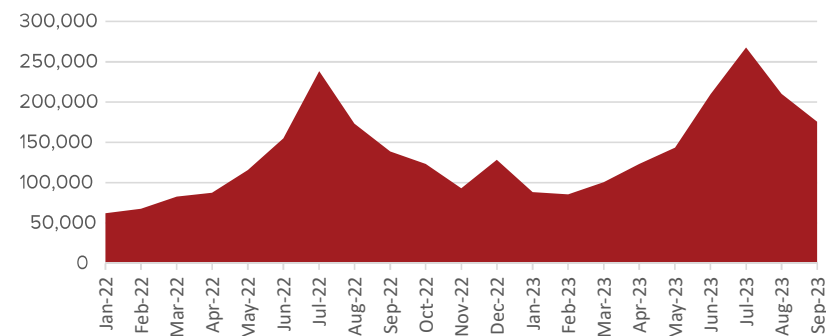
The impact of Gaza war on Lebanon is being felt across several sectors and transmission channels. The effects on the aggregate economy will most likely vary in the future depending on different war scenarios, including intensity of the war, its duration and possible geographic expansion. However, forecasting such an impact is beyond the scope of this report. Instead, the analysis focuses on the main transmission channels are being affected by the ongoing war, considering they are likely to be further disrupted should the conflict escalate or expand further in time and space. These channels include tourism, trade and financial inflows.

2.1 Impact on the tourism sector: signs of contraction

Tourism has been historically a major contributor to Lebanon's economy and essential for job creation. In figures, the tourism sector's contribution to GDP was estimated at 19.1 percent¹¹ and 18.9 percent in 2018 and 2019, respectively¹². Prior to the crisis, the sector's share in total employment reached 20.8 percent¹³ 2019¹⁴. Following the outbreak of COVID-19, tourism was impacted across the globe and, as a result, a sharp decline in the flow of tourists and in tourism receipts was reported world-wide. Lebanon was no exception. The impact on Lebanon was even more profound, given the multi-layered crises. As of 2022, the sector started to rebound and to partially regain its role in the economy, despite the persistence of the economic and financial crisis.

Since the beginning of 2023, and despite the ongoing economic and financial turmoil, tourism has demonstrated promising signs of improvement. During 2023, Lebanon witnessed an exceptional and long-awaited increase of touristic activities. As shown in Figure 2 below, there has been an increase in the number of visitors coming to Lebanon in 2023 compared to 2022, reaching a peak during the summer season. Between January and September 2023, Lebanon received around 1.3 million visitors (excluding Lebanese, Syrian and Palestinian visitors). This marks a 10 percent increase compared to the same period of the previous year.

Figure 1. Total visitor arrivals (excluding Lebanese, Syrians, and Palestinians) during January 2022-September 2023



Source: BRITE, BLOMInvest¹⁵.

The outbreak of the conflict in October in the south severely impacted Lebanon's tourism industry, resulting in a considerable decline in tourism-related activities, including hotels and restaurants. Local and rural tourism activities, including art festivals, hiking events, and others have been affected and were either cancelled or deferred to later dates.

Despite the scarcity of official figures, the declining trend in tourism activities following the war in Gaza can be captured through unofficial statistics, by anecdotal evidence, and by qualitative insights provided by relevant business associations. Given the lack of official figures and the uncertainty on how the conflict will eventually evolve, these trends are subject to continuous change. However, they reflect, to a certain extent, the situation in the period that immediately followed the outbreak of the war.

11- IDAL, Tourism Sector in Lebanon, 2019 Factbook, IDAL-Tourism_factbook_2019.pdf (opendatalebanon.org)

12- World Travel and Tourism Council, Lebanon Annual Research: Key Highlights

13- World Travel and Tourism Council, Lebanon Annual Research: Key Highlights.

14- World Travel and Tourism Council, Lebanon Annual Research: Key Highlights.

15- <https://brite.blominvestbank.com/series/Total-Visitor-Arrivals-to-Lebanon-4401/>

- i. **Passenger flow (including all nationalities)¹⁶:** In October 2023, following the outbreak of the war, the influx of travellers to Lebanon has seen a 15 percent decline, with a recorded count of 208,706 passengers in October 2023, compared to 245,977 passengers in October 2022. Conversely, the number of departing passengers increased by 15.5 percent, reaching 307,879 passengers, as opposed to 266,680 passengers in the same period of 2022. The trend continued during the first week of November, compared to the same period of last year, mainly for arrivals, which continued a declining trend. The number of arrivals decreased by 41.75 percent, recording 34,163 passengers. Meanwhile, the number of departures dropped by 35.46 percent to reach 41,627 passengers, indicating that most of the departure took place during October, immediately after the outbreak of the conflict. In parallel, several airlines suspended their services to Lebanon, such as Lufthansa¹⁷. Also, the Middle East Airlines halved flights amid the fears of war expansion to other parts of the country beyond the south. During November and early December, however, an improvement in the passenger inflow is expected, given that the conflict did not escalate beyond the border areas. As an indicator for this potential improvement, the Middle East Airline announced that it will schedule additional 151 flights during the festive season, i.e., between 14 December 2023 and 10 January, 2024¹⁸.

Figure 2. Flow of passengers: higher departure and lower arrival in October 2023



Source: National News Agency (NNA)

- ii. **Hotel Occupancy:** Hotel occupancy rates in Lebanon plummeted to below 10 percent in October 2023 due to premature departures of visitors and trip cancellations¹⁹. Some hotels became completely vacant. Most European tourists, that usually visit Lebanon in groups in the fall, have cancelled their travel to Lebanon due to travel warnings issued by most European countries.
- iii. **Restaurants:** Since the conflict began, restaurant activity in Lebanon has seen a significant decline, with a 70-80 percent reduction in business during the weekdays and a 30-50 percent decrease on weekends, compared to the first week of October. These figures were reported by the President of the Syndicate of Restaurant, Nightclub, and Café Owners in Lebanon. They came after a significant improvement in restaurant activity during earlier months, with expectations of the potential opening of tens of new restaurants by December. These expectations have now faded. These expectations have now faded, even though the upcoming holiday season may give an indication on whether a positive trend can re-emerge despite the security situation

The slowdown in tourism is likely to have a multiplier effect on other economic activities, notably on agriculture and manufacturing, given the intersectoral linkages between tourism and these sectors. For instance, rural and eco-tourism depends on local agriculture as essential input. Also, the decline in restaurant and hotel activities is likely to affect the agriculture sector, as they heavily rely on local produce.

2.2 International trade: Potential disruption in imports and exports

International trade is central to Lebanon's economy. In 2022, exports of goods accounted for 21.4 percent of GDP, while imports of goods constituted 79.2 percent of GDP²⁰. The country relies on imports to meet its basic necessities, mainly for food and convenient goods. At the same time, export of goods is a major source of foreign currency income, which is critical as the country struggles to build up its foreign currency reserves. Any disruption in trade will jeopardize Lebanon's efforts to recover from its long-lasting economic crisis and will impose a real threat on the country's food security.

The trade deficit, and consequently in the current account balance, was a key trigger of the financial and economic crisis. In 2018, the trade deficit reached around USD 17 billion, equivalent to around 31 percent of GDP. During the peak years of the crisis, notably in 2020, the trade deficit of goods was significantly reduced to USD 7.7 billion (24 percent of GDP). This reduction was driven by the sharp decline in imports, which was almost halved compared to the level of 2018. Imports declined from USD 20 billion in 2018 to USD 11.3 billion in 2020.

16- These figures were published by the National news agency on November 8, 2023 (<https://rb.gy/ybco4z>)

17- Lufthansa extended its flight suspension to Lebanon until December 14, 2023 (inclusive). <https://www.lufthansa.com/ke/en/flight-information>

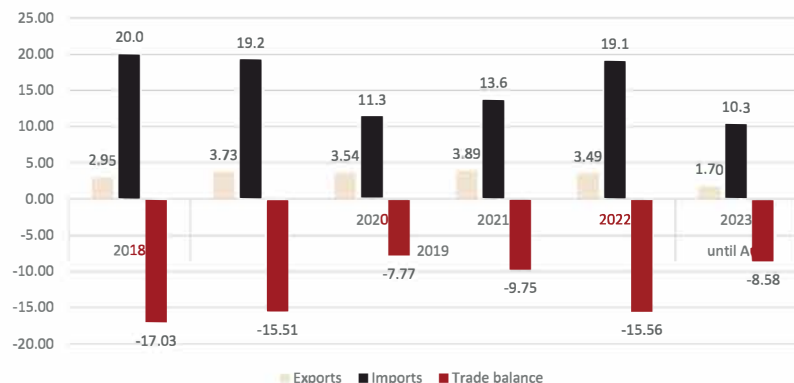
18- <https://www.mea.com.lb/english/about-mea/news-and-press-releases/news-and-press-releases/mea-flight-schedule-for-the-holidays>

19- Lebanon 'abyss' warning as fears of wider conflict grow | Arab News

20- World Bank, Lebanon Economic Monitor, The Normalization of Crisis Is No Road for Stabilization Spring 2023, World Bank Document

However, the control of the trade deficit did not last for long, as it showed an increasing trend as of 2021, to almost resume its pre-crisis level of USD 15 billion, which is very close to 2019 levels.

Figure 3 . Imports, Exports and Trade balance in USD Billion (2018-2023 until August)



Source: Customs Administration, Lebanon

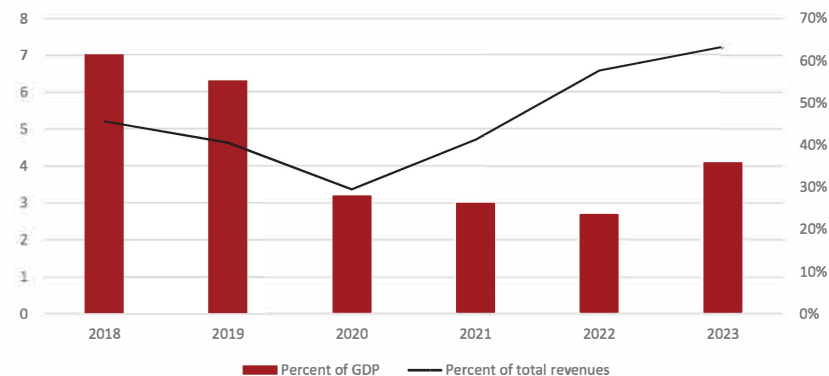
The growing trade deficit between 2021 and 2022 is owed to the increase in imports, coupled with a relative decline in exports. The latter were expected to demonstrate a different behaviour, capitalizing on the depreciation of the local currency, which should, in theory give a competitive edge for exports. However practically, exports remain lower than expected at aggregate level- with some exceptions, mainly in agricultural and agro-food products whose exports significantly grew compared to pre-crisis level.

The ongoing war on Gaza has a direct impact on Lebanon's trade activity, and the possible widening of the trade deficit. It is likely that imports will increase to overstock essential goods such as wheat, medicines, and other essential food. For instance, in anticipation of any escalation, and in order to ensure that the country has an optimal stock of wheat, the Ministry of Economy and Trade ordered 30,000-ton shipment of wheat^{21 22}. Exports on the other hand, will tend to drop mainly for agricultural products. While specific quantitative data on the exact extent of this impact is not available yet, the disruption in the agriculture sector, mainly in southern region, is likely to have direct implications on the level of exports, specifically on the export of olive oil, animal productions, vegetables, and fruits.

Immediately after the outbreak of the war, the maritime transport sector through the Port of Beirut witnessed a decrease in bookings for new non-oil import goods, and some export contracts were suspended due to importers' security concerns. These concerns are primarily driven by war risk insurance policies, premiums, and risk classifications. For instance, as a result of the growing instability, the Arab War Risk Insurance Syndicate (AWRIS) placed Lebanon under "Hold Over" since October 13²³. Under this measure, "AWRIS will continue to act as a reinsurer for contracts underwritten before 13 October. As of that date, the fund will apply a selection of risks covered for marine insurance policies covering ships heading for Lebanon."

The disruption in international trade, especially imports, is likely to affect Government revenues, as levies on trade, including customs and Value-Added Tax, which currently constitute the major source of Government revenues. Tax on international trade (including taxes and excises) and VAT are expected to reach 4.1 percent of GDP in 2023²⁴, which represents 63 percent of total tax revenues. These taxes represented 33 percent of total tax revenues in 2018, prior to the outbreak of the economic crisis. Potential decline in Government revenues will jeopardize the Government's efforts to restore fiscal balance and delay the economic recovery of Lebanon.

Figure 4 Tax on international Trade and VAT (%)



21- Lebanon expects 30,000-ton wheat shipment in two weeks -minister | Reuters

22-<https://rb.gy/j0urcf>

23-Atlas magazines: Insurance News Around the World, <https://www.atlas-mag.net/en/category/pays/liban/arab-war-risks-insurance-syndicate-lebanon-hold-cover>, October 30, 2023

24- IMF, Article IV mission report, June 2023



2.3 Possible disruption in remittances and other financial flows

Amidst the ongoing economic and financial crisis, Lebanon has managed to sustain a consistent and substantial inflow of remittances, ranging from \$6 to \$7 billion per year²⁵. According to a comprehensive study released by UNDP in 2023, these funds, once primarily dedicated to investing in building the human capital such as health and education, have now evolved into a crucial social safety net for a considerable number of Lebanese families. This safety net plays a pivotal role in shielding them from the adverse effects of currency depreciation and inflation on their purchasing power and overall income. Lebanon recorded the highest remittances-to-GDP ratio in the MENA region, reaching 37.8 percent in 2022.

The high cost of transferring remittances and the lack of trust in the banking system pushed a large segment of migrant Lebanese to send money home through informal channels, shifting away from using commercial banks. In 2021, it is estimated that around 70 percent of remitters use such channels- sending money with individuals traveling back to Lebanon²⁶. The situation remains unchanged till now, as no resolution was put in place to reform the financial sector in Lebanon, an essential step to restore confidence. It is worth underscoring that financial sector reform is a core component of the IMF SLA reached in April 2022. Proposed reforms included the adoption of a bank restructuring strategy and bank resolution framework, reform to the bank secrecy law, special audit of the Central Bank and audit of the 14 largest banks. However, most of these reforms are still pending, which delays restoring confidence in the banking sector. As such, disruption in incoming flights to Lebanon, and consequently in the flow of Lebanese expats coming from abroad, is expected to affect the flow of remittances.

In conclusion, disruption to tourism, trade and financial inflows will have repercussions on the already fragile economy, and is likely to affect growth. Prior to the outbreak of the war, Lebanon was expected to report a mild growth of 0.2 percent in 2023, following four consecutive years of contraction, as per the latest World Bank forecasts²⁷. At this level of modest growth, the likelihood of resuming a contractionary trend is high, given the significant reliance of the economy on sectors that are susceptible to security shocks, namely tourism, trade and financial inflows. At the onset of Gaza war, several international agencies attempted to simulate its impact on Lebanon and other countries of the region, using several scenarios concerning the intensity and duration of the ongoing conflict (BOX 1). These scenarios give an indication of the potential impact of the ongoing conflict in view of the uncertainty regarding its evolution and likely impact on neighbouring economies.

25-UNDP, the Increasing Role and Importance of Remittances in Lebanon. The Increasing Role and Importance of Remittances in Lebanon, MAY 24, 2023.

26-UNDP, 2023

27-World Bank, Lebanon Macro and Poverty Outlook, October 2023

Box 1. Potential Impact of Gaza war on Lebanon Economy based on simulations by selected international financial institutions

International Institute of Finance (IIF): Two scenarios are assumed by IIF. scenario 1 assumes that the fighting remains confined to Gaza, while scenario 2 assumes a higher likelihood of regional conflict dragging Lebanon into the war. Under scenario 1, the economy will resume the downward path that started in 2019, and contract by 0.5 percent in 2023 and 1 percent in 2024, according to IIF. Meanwhile, scenarios 2, which is more pessimistic, considers Lebanon being fully dragged into the ongoing conflict, which will have more severe implications on the economy and would result in a contraction of 15 percent during the last quarter of 2023 (averaging to a contraction of 4 percent for the whole year 2023). Under this scenario, Lebanon would continue to suffer a staggering 26.2 percent contraction in 2024.

Standard & Poor's: Given the vital role that tourism plays in the economy, notably as a source of foreign currency, any deterioration in this sector is likely to have a significant impact on Lebanon's economic performance. To better understand the extent of this impact, Standard and Poor's (S&P) ran several scenarios to estimate the impact of the war on tourism in Lebanon and other countries in the region, and consequently on the national output and on foreign currency reserves. The study assumed, as a baseline, that tourism receipts contribution to the Current Account Receipts (CARs) is 25.8 percent in 2022. To calculate the impact on the economy, S&P ran three scenarios assuming a drop in the tourism receipt of 10 percent, 30 percent, and 70 percent respectively.

Fitch Solutions: To estimate the impact of the conflict on Lebanon, Fitch Solution has two assumptions regarding the war scenarios. The baseline scenario considers that the conflict is largely contained in Gaza and there is no escalation beyond the South of Lebanon. Under this scenario, Fitch Solutions expected a limited economic growth in 2023 of 0.7 percent, down from its earlier estimate of 1.7 percent. In a more pessimistic scenario assuming a larger scale war on the Lebanese border, a more profound impact on the economy is expected. Under this scenario, it is expected, by Fitch, that airline activities will be suspended, the currency will depreciate to LPB 150,000/USD, import cost will increase, and the country will suffer shortages in basic goods.

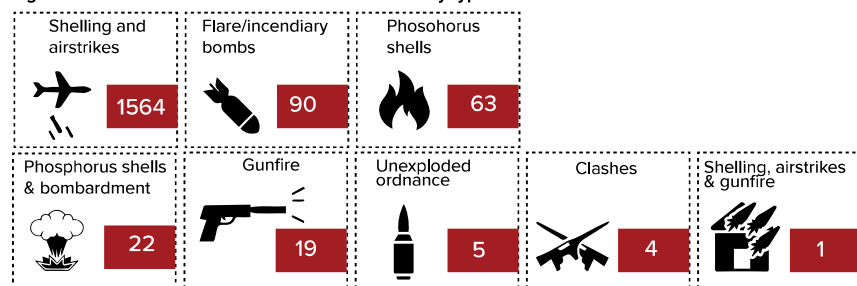
3. Impact of the conflict on south Lebanon

The repercussions of the conflict on the broader economy are starkly obvious, in terms of economic contraction and further economic and fiscal uncertainties. Yet, the impact on the conflict-affected area in South Lebanon and Nabatiyeh Governorates, in terms of exact losses, is yet to be comprehensively assessed. Given that the conflict is still ongoing, it is hard to provide a definitive assessment. This report provides a snapshot of the situation as of mid-December based on available data. Given the dynamic context, this is a start that attempts to quantify losses and set a baseline for recovery and response planning.

Available figures reveal that the ongoing conflict has already resulted in a number of casualties, Internally Displaced People (IDPs), destruction of assets and infrastructure, and disruption in economic and social services. The economy of South Lebanon and Nabatiyeh, notably the South Litany Region (SLR), relies heavily on agriculture, services and (eco-) tourism, all of which are volatile and highly susceptible to security shocks.

Since 7 October, around 91 villages in the Governorate of Nabatiyeh and South Lebanon have been attacked during the conflict. Until 6 December, around 1768 attacks were documented by the National Centre for Scientific Research (CNRS) including shelling and airstrikes, flare and incendiary bombs, phosphorous shells, in addition to other types of attacks, as presented in Figure 4 below²⁸.

Figure 5. Attacks on the southern areas of Lebanon by type



Source: CNRS, December 2023

Despite being relatively confined to the border region (within 15 to 20 Km from the borders)²⁹, the conflict has already taken a toll on the local economy of villages and towns beyond the direct conflict zones.

3.1 Human losses and displacement

The conflict has caused massive displacement from the border towns and villages. On December 14, 2023, the number of Internally Displaced Persons (IDPs) reached 64,053 persons, of whom 52 percent are female and 37 percent are children³⁰. These IDPs are distributed across 10 districts (around 305 cadastres) of Lebanon notably in Tyre, Saida, Southern Suburbs of Beirut, Iqlim al-Kharoub, Sawfar, Bhamdoun and Jbeil. Of these, around 48 percent are still in the districts of Tyre and Nabatiyeh, and 1,023 are living in collective shelters (such as schools). It is estimated that around 12 collective shelters are currently providing accommodation for IDPs, with four located in Tyre, seven in Hasbayya and one in Bekaa³¹. It is also estimated that almost 90 percent of residents in the villages that are directly located on the border line (one km from the border) left to safer places. Meanwhile, villages located within a 2 to 5 km perimeter from the 'Blue Line' report a displacement rate of 50-60 percent. The directly affected areas by bombing and displacement are all the border villages from Naqoura toward Shebaa farms (100 Km wide and 5 Km depth). More than 50 villages were directly affected across four districts (Tyre, Bint Jbeil, Marjeyoun and Hasbaya districts).

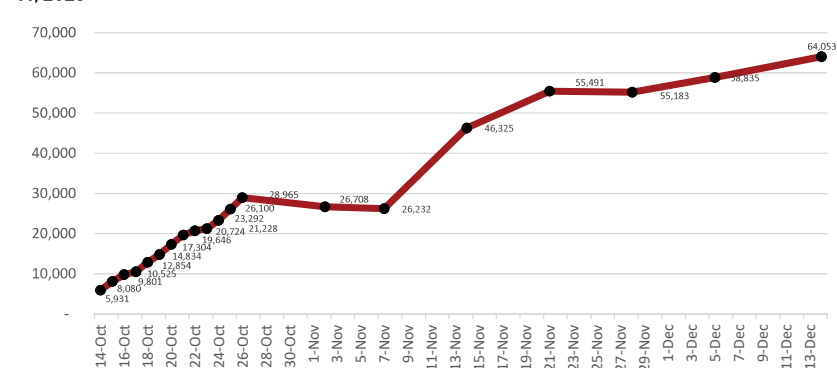
28-National Center for Scientific Research (CNRS), December 6, 2023

29-This was previously within 5 km and has recently expanded to 15-20 Km

30-The International Organization for Migration (IOM), the Lebanese Red Cross (LRC), the Disaster Risk Management (DRM) Unit, Displacement Tracking Matrix, Mobility Snapshot, Round 15, <https://dtm.iom.int/reports/mobility-snapshot-round-15-14-12-2023?close=true>

31-OCHA: Lebanon: Flash Update #2: Escalation of hostilities in South Lebanon, 25 November 2023

Figure 6. Cumulative number of IDPs from conflict-affected villages in South Lebanon during October 14-December 14, 2023



Source: The International Organization for Migration (IOM), the Lebanese Red Cross (LRC), the Disaster Risk Management (DRM) Unit

3.2 Damage to buildings, housings, other assets and infrastructure

The armed conflict resulted in considerable physical losses, mainly on buildings, houses, commercial entities, infrastructure, services, and utilities, in villages situated on the borders, and that were subject to daily direct attacks. The Council of the South³² is currently in the process of finalising an extensive assessment to account for damages and human losses including deaths, injuries, properties, fixed assets, displacement, and other losses. The assessment is being closely coordinated with the municipalities located in the South Litany River (SLR) area and is being updated on a daily basis.

Box 2 provides a snapshot of the main damages reported in the attacked villages and towns located in the SLR.³³

Box 2. Economic and social facilities affected by the war (destroyed, damaged or closed)

Several economic facilities were reported to be partially or completely destroyed.

- An aluminum factory in Kfour (Nabatieh district) was completely destroyed
- A renewable energy system used for water pumping (well) in Tayer Harfa (Tyre district) was completely destroyed
- Electricity public network were partially or completely damaged in several villages and towns: Yaroun and Rmeish (Bint Jbeil district), Marwahin, Dhayra and Alma Shaab (Tyre district)
- Around 52 schools were closed leaving more than 6,000 children without proper access to education. One public school was partially damaged
- Five Primary Health Care Centers (PHCCs) in Bent Jbeil and Marjayoun districts were closed because of security threats
- Three water Reservoirs (in Alma Shaab, Tayr Harfa and Yarine) were damaged.

32- The Council of the South is a public institution operating under the direct authority of the Prime Minister. The Council is assigned to handle developmental projects in the southern areas of Lebanon.

33- Collected from different sources mainly from UNDP's team.

3.3 Losses in the agriculture, livestock, animal production, aquafarming, and forestry

Agriculture is a crucial component of Lebanon's economy. The sector has gained more importance in the aftermath of the crisis, as its contribution to the economy significantly increased from 3 percent in 2019 to 9 percent in 2020³⁴. This increase was one of the positive externalities of the economic crisis and COVID19 spread, as the economy slightly shifted towards import-replacement of some strategic commodities, to compensate for the disruption in supply chains (COVID 19 and Ukraine war) and for the shortage in foreign currency reserves. Particularly in impoverished regions such as Akkar, Dinniyeh, Northern Bekaa, and the South Lebanon, agriculture significantly contributes to the local economy and makes up 80 percent of the local GDP³⁵.

The sector is also a major contributor to job creation. Approximately 20-25 percent of Lebanon's workforce contributes to the agricultural sector: 12 percent on a full-time basis and 13 percent on a part-time or seasonal basis³⁶.

Despite its importance in the economy, the sector continues to face structural challenges that are further exacerbated by the economic crisis. These include high production costs, land tenure problems,³⁷ limited access to credit, inadequate investment in research, insufficient food quality and safety standards, market operation issues,³⁸ and poor infrastructure, particularly concerning storage capacity and packaging.

South Lebanon and Nabatiyeh are considered as important agricultural hubs in the country and account for 21.5 percent of Lebanon's cultivated areas³⁹. Agriculture and farming are dominant activities in this region, and they are the main sources of livelihood and income for many households. There are also several innovative and sustainable agricultural practices emerging in this region such as permaculture and worm farming to improve soil productivity⁴⁰.

The conflict started during a critical agricultural season has caused already substantial losses, potentially impacting the annual income of resident households. This period (September-November) is crucial for various agricultural activities, including the harvest, ploughing and planting of crops such as olives, carob and grains. The timing of the conflict is particularly detrimental as it coincides with these key agricultural processes. Furthermore, the conflict has had a widespread impact on several important agricultural supply chains. These include animal and dairy production, honeybee cultivation, forestry, and aquaculture. The disruption in these value chains not only affects the immediate income and livelihoods of the farmers and households involved but also has broader implications for food security and the local economy in these conflict-affected regions. The loss of these supply chains is a significant concern, as it affects not just the production of food and agricultural products, but also the ecological balance and sustainability of these areas.

According to the Ministry of Agriculture, the agriculture areas that have been affected by the fires are 97,800 m² of olive groves, 66,000 m² of citrus farms and 98,800 m² of banana farms. Moreover, the fires have ignited in 20,800 m² of pasture lands⁴¹. MoA also reported the destruction of a 600 m² fodder warehouse in addition to the complete destruction of around 60 agricultural green houses. Farm animals that were reported killed are 200,000 birds and chicken and 700 heads of livestock. In Tyre, fisherman have found it difficult to access fishing grounds due to the ensuing conflict⁴².

3.3.1 Olive and Olive Oil

According to the Ministry of Agriculture (MoA)⁴⁴, the total area covered by olive orchards in 2010 is approximately 62,000 hectares. This area represents about 23 percent of the total Utilized Agriculture Area of Lebanon and 45 percent of the total area cultivated with permanent crops. This crop provides income for around 110,000 households. The generated income from olive plantation is estimated at around 7 percent of total agriculture output in Lebanon. Olive plantation is particularly important for South Lebanon and Nabatiyeh as it is one of the main value chains in this area. Also, given the high-quality olive oil produced; Lebanese producers have started to increasingly penetrate international markets. The olive harvest season usually starts at the end of September and lasts until the beginning of November (depending on the altitude of each village). The ongoing conflict has limited the ability of farmers and households to harvest olives, on the border as well as in villages situated further away from the border, fearing any sudden expansion of shelling. The attack More importantly, the ongoing war caused the loss of a massive number of olive trees as they were directly destroyed by internationally banned white phosphorous bombs and other explosives that burned them down. The Ministry of Agriculture reports the loss of around 47,000 olive trees in the conflict area which represents about 0.44 percent of the total number of olive trees in the country (considering a moderate average of 200 trees per hectare). Accordingly, the production of olive oil was severely impacted, and it is reported by some oil press factories that their production declined by 75-80 percent, as compared to last year⁴⁵. The drop in production is also attributed to the lower olive yield this year, due to the alternate bearing phenomenon of olive trees. As a result, prices of olive oil started to increase in the local market, amid declining likelihood of exporting to international markets. It is worth noting that this important economic sector was struggling, even before the war. Full production happens every other year, and farmers lack adequate investment and technical capacity to improve the produce, in quantity and quality.

3.3.2 Carob

Available data indicates that Lebanon produced approximately 4.400 Tons of carob in 2021, placing Lebanon as the third-highest producer of carob globally, following Morocco and Turkey.⁴⁶ This crop is one of the promising and emerging value chains within the border areas. Carob cultivation is known for being relatively low-cost and requiring minimal irrigation, making it a suitable crop for areas like southern Leb-




anon, where water scarcity is a concern. The process of harvesting carob and producing carob molasses typically occurs around November each year. These activities were affected, and in some areas completely halted, as a result of the ongoing conflict.

3.3.3 Grain and winter farming

During the October and November season, farmers typically begin preparing their lands for winter agricultural activities, focusing primarily on planting grains and various vegetables. In November, the sowing of grain seeds, including wheat, barley, and beans, commences. These grains are cultivated for multiple purposes, such as producing fodder and Frikeh, and are harvested in the spring and summer. However, most farmers were unable to plough their lands in November, with only a few managing to do so during the brief period of truce (October 27-November 4). The shift to grain farming is noteworthy, especially among former tobacco farmers, as these crops demand lower inputs and can yield higher incomes. This transition is particularly significant in agricultural practices and economic strategies for these farmers.

3.3.4 Animal production

Animal production is a vital source of livelihood and income for households and farmers in the border area. However, the ongoing conflict has severely impacted this sector. Farmers living at border, who are directly affected by the bombings, have struggled to maintain their animal production businesses. This has led many to sell their livestock. Since the conflict began, it has been reported that nearly 300,000 farm animals have been lost, underscoring the significant toll that the conflict has taken on agricultural livelihoods in these areas.

Type of farm animals	Number of lost animals
Birds and chicken 	200,000
Livestock 	700
Beehives 	250

Source: Ministry of Agriculture, November 2023

44- Ministry of Agriculture (MoA), »Evaluation of the Ministry of Agriculture Support to the Olive Sector in Lebanon»: <https://docslib.org/doc/12073846/evaluation-of-the-ministry-of-agriculture-support-to-the-olive-sector-in-lebanon>.

45- Figures reported by interviews with 2 major olive oil press factories in South Lebanon.

46- <https://www.tridge.com/intelligences/carob-bean/production>

34- CAS, the National Accounts (NA) for 2020, published in 2022.

35- Food and Agriculture Organization (FAO).

Lebanon at a glance, <https://www.fao.org/lebanon/fao-in-lebanon/lebanon-at-a-glance/fr/>

36- Food and Agriculture Organization (FAO).

37- Most of these problems are related to land ownership over non-surveyed areas, high fragmentation of ownership due to inheritance issues, and the illegal control of private or state land. These problems are mostly relevant in Ballback and Hermel districts and to a lesser extent in other regions of Lebanon.

38- These include poor quality standards and safety issues, in addition to limited availability of wholesale markets, storage facilities and infrastructure especially for small farmers and the influence of middlemen, disconnections in the supply chain and lack of market information. All these challenges lead to market operation problems.

39- Ministry of Agriculture (MoA), The Agriculture Census, 2010

40- L'Orient le Jour, Lebanon border fighting dashes hopes for independent sustainable farmers, 11/12/2023

41- CNRS/SUNAR. (2023). Platform for the Israeli attacks on Lebanon. Available at <https://www.arcgis.com/apps/dashboards/ef0d63781c984b82b6add616c6b13de2> Accessed on 29/11/2023

42- MoA. (2023). Media News. In an interview with the Kuwaiti newspaper Al-Rai: The Minister of Agriculture talks about the fires and the emergency plan... This is why Israel is burning the green and dry land of southern Lebanon. Available at <https://rb.gy/3darlo>

43- reliefweb, 2023. <https://reliefweb.int/report/lebanon/southern-lebanons-unofficial-war-and-escalating-crisis>

To adapt to the challenging circumstances caused by the ongoing conflict, some animal farms have been relocated to safer areas, predominantly towards Tyre and Zahrani. However, these farmers continue to face significant challenges, notably the high cost of fodder. The increased prices are partly due to the difficulty suppliers face in accessing these areas, a direct consequence of the precarious security situation. Additionally, the use of alternative natural pastures presents its own set of risks, as these areas could potentially expose both farmers and their animals to direct bombing, further complicating the situation for agricultural livelihoods in these conflict-affected regions.⁴⁷

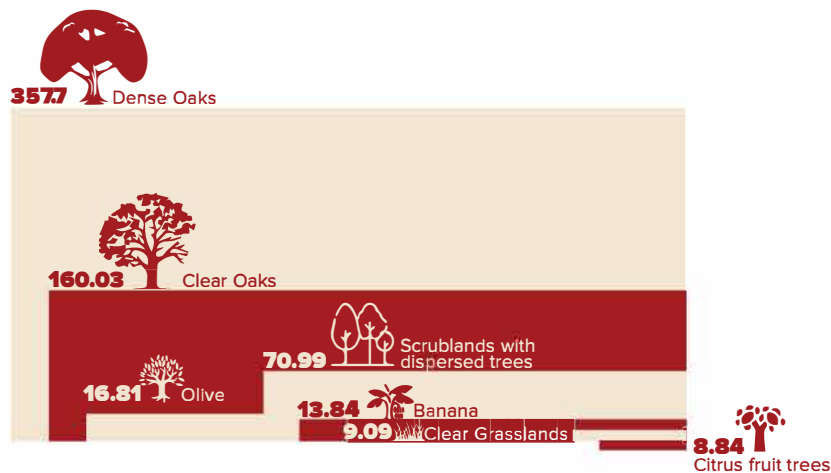
3.3.5 Dairy production

Dairy production is closely tied to the livestock sector, where livestock farmers are involved either in producing dairy products themselves or in supplying raw materials to local dairy factories. In the South Litani Region, there are four dairy production factories, which are located in the village of Aitaroun and the town of Khiam, (in the districts of Bint-Jbeil and Marjeyoun respectively). However, this sector has been severely affected by the ongoing conflict. The existing dairy factories in these areas are struggling, with their production capabilities that has been significantly reduced. This downturn in dairy production reflects the broader challenges faced by the agricultural sector in conflict-affected areas, impacting not only the livelihoods of farmers but also the local food supply and economy.

3.3.6 Forests and forestry

Since the onset of the conflict, the Ministry of Agriculture (MoA) has recorded a significant number of forest fires along the border. Specifically, around 351 fire incidents have been reported, as indicated on the map provided in annex 1. These incidents are a result of white phosphorus bombing and have affected 53 villages along the border, with 41 of these in the Nabatiyeh Governorate and 12 in the South Lebanon Governorate. The National Council for Scientific Research has assessed that the total area impacted by these fires is approximately 637 Hectares, predominantly in villages located within one kilometre of the border. Notably, the most substantial fires were in Naqoura (112 hectares), Alma al-Shaab (315 hectares), and Marwahin (111 Hectares), among other villages along the border. A large portion of the areas affected by these fires, around 90 percent, consists of forests, including oak forests. The remaining areas include olive groves, banana groves, citrus fruit orchards, and other types of fruit trees.⁴⁸ The extensive damage to these forestry areas not only has ecological implications but also affects the livelihoods of the local communities reliant on these resources. Figure 7 illustrates the burned areas by type of vegetation cover.

Figure 7. Number of hectares affected by fires by type of vegetation cover



47- Two farmers were directly targeted and killed by an Israeli attack while they were grazing their sheep and goats in the Wazzani area.

48- These estimates are based on official statement by the Minister of Agriculture on November 20, 2023. <https://rb.gy/53nn2z>

3.3.7 Aquafarming

The Governorates of South Lebanon and Nabatiyeh used to host 17 aquafarms. In the aftermath of 2019 economic crisis, three farms were closed, while the rest remained operational. The ongoing armed conflict in the South affected the work of these farms. Most of them are not currently functioning, as farmers had to leave their villages to safer places and because of the inability of these farmers to secure feed and to sell produce to the local restaurants⁴⁹. Only those located in the North Litani River (NLR) are operational.

3.3.8 Greenhouses

Approximately 60 greenhouses, which were used for vegetable cultivation, have been reported as destroyed⁵⁰. The destruction of greenhouses represents a significant setback for local agriculture, particularly for the cultivation of vegetables, as greenhouses play a crucial role in protecting plants from adverse weather and extend growing seasons.

3.4 Environmental impact

The magnitude of the environmental impact is hard to quantify while the conflict is ongoing. A comprehensive assessment should include extensive surveys of flora and fauna, an assessment of cultural heritage sites, and a determination of the extent of damage to agricultural lands, rangelands and forests. Such an assessment would provide a clearer picture of the environmental degradation and help in formulating targeted strategies for restoration.

In the meantime, the sections below provide a general overview on the impact of the shelling and the use of phosphorus bombs, explosives and chemical materials based on experiences of other conflicts and the available scientific evidence on the effects of explosives and chemicals used in the fighting.

The impact of white phosphorus on wildlife encompasses various environmental and ecological aspects. It is known for its toxicity, causing severe health issues in animals, including burns and organ failure, as noted by the Agency for Toxic Substances and Disease Registry (ATSDR). Environmental contamination is another significant concern, with white phosphorus contaminating soil and water bodies, leading to long-term detrimental effects on

49- As reported by UNDP area office team in South Lebanon.

50- Minister of Agriculture's statement.

51- ATSDR, 1997. <https://www.cdc.gov/TSP/PHS/PHS.aspx?phsId=286&toxId=52>

52- Zwiwnenburg, w. & Nikolaieva, I., (2023). Attacks on Agro-Industrial Sites in Ukraine Environment and Conflict Alert Ukraine. Available at https://paxforpeace.nl/wp-content/uploads/import/2023-04/PAX_Ukraine_agro.pdf

53- Columbia Climate School. (2012). State of the Planet. Agriculture, Earth Sciences, General Earth Institute. Why Soil Matters. By Renee Cho. Available at <https://news.climate.columbia.edu/2012/04/12/why-soil-matters/#:~:text=t%20can%20take%20500%20to%2C%20topography%2C%20and%20living%20organisms>. Accessed on 6/12/2023.

54- TIMEP. (2023). Israel's Environmental and Economic Warfare on Lebanon. By Michelle Eid. The Tahrir Institute for Middle East Policy. Available at <https://timep.org/2023/11/28/israels-environmental-and-economic-warfare-on-lebanon/> Accessed on 4/12/2023

55- Angurets, O., Khazan, P., Kolesnikova, K., Kusch, M., Chernochova, M., & Havranek, M. (2023). Environmental Consequences of Russian War in Ukraine." <https://cleanair.org.ua/wp-content/uploads/2023/03/cleanair.org.ua-environmental-consequences-of-russian-war-in-ukraine-wardamages-en-version.pdf>

ecosystems. This contamination can result in bio-accumulation in aquatic animals, as mentioned by the ATSDR, potentially increasing toxicity up the food chain. Habitat destruction due to fires caused by white phosphorus is another critical issue, displacing wildlife and reducing biodiversity, a concern highlighted in reports such as those by Amnesty International regarding its use in conflict zones like southern Lebanon. Furthermore, the long-term ecological impact of white phosphorus is substantial, especially in areas where its presence persists in the environment, affecting ecosystems and wildlife over extended periods. These combined effects underscore the need for careful consideration and management of white phosphorus in natural environments to protect wildlife and maintain ecological balance⁵¹.

Agricultural land suffered significant damage, including physical degradation, chemical pollution, and contamination from explosive remnants, resulting in a loss of soil fertility⁵². The process to reclaim agricultural land fertility and its normal properties could take many years, as one inch of topsoil that includes organic materials and microorganisms can take up to 500 to 1,000 years to form⁵³.

The existing crops in the southern agricultural lands could be contaminated by toxic agents and heavy metals even though they were not directly struck by phosphorus shelling and bombardment. This also applies to surface and ground water that could be contaminated, hence, affecting animal and human health by consuming water or consuming fruits and vegetables already grown on the plants that were irrigated using this water. Livestock could be affected by these toxic substances after grazing in the nearby contaminated rangelands.

In the south of Lebanon, farmers have reported that they felt unwell after consuming some cabbages which they thought to be unharmed near the phosphorus bombing locations⁵⁴. It has been recommended not to consume any agricultural produce grown near combat activities as heavy metals could poison the soil, and hence, could be easily absorbed by plants⁵⁵.

The use of white phosphorus shells in natural areas carries several environmental risks beyond the immediate and devastating fires they cause. One significant long-term impact is the potential conversion of land use, particularly in forested areas. This conversion often involves changing from

natural landscapes to artificialized surfaces, such as construction. Such transformations are considered a type of irreversible degradation, as they permanently alter the ecological and functional characteristics of the land.

Moreover, fires in sloped areas or regions where the vegetation cover is already weakened can lead to increased soil erosion or even landslides. The lack of vegetation leaves the soil exposed and more susceptible to being washed away by rain. This not only leads to the loss of fertile topsoil but can also trigger dangerous landslides, particularly in hilly or mountainous regions.

In addition, areas downstream of these affected zones are at risk of flooding. When vegetation cover that normally absorbs rainfall is reduced or completely destroyed, water runoff increases significantly, potentially leading to floods in lower areas. This change in the hydrological dynamics of the region can have serious consequences for both the environment and human settlements.

3.4.1 Protected areas, natural areas and nature reserves

The South Litani River area in Lebanon is well-known for its wealth of natural reserves and protected areas, indicating the region's ecological significance. In the South Lebanon Governorate, the Tyre Coast Nature Reserve and Abbassiyeh Coast Nature Reserve are the most prominent. Meanwhile the Nabatiyeh Governorate boasts five reserves: Wadi Al Houjeir, Kafra, Ramia, Debel, and Beit Lif. Additionally, the Ministry of Agriculture (MoA) oversees the protected Kherbet Selem Forest. The region also features four community-managed Himas⁵⁶, namely Mansouri, Qoleileh, Ebel es-Saqi, and Arnoun, declared by their respective municipalities as protected areas. While there are currently no new nature sites declared by the Ministry of Environment (MoE), Yaroun is in the pipeline. Plans are also in place to establish additional reserves such as Jabal Rihan, Zibquine, and Naqoura in South Lebanon, along with Sarada in Marjaayoun/Nabatiyeh.⁵⁷ These Protected areas are crucial for the preservation of Lebanon's natural heritage, biodiversity, and for maintaining ecological balance in the region. (Annex 2 provides detailed definitions for each type of protected areas, Annex 3 provides a map of these areas in the SLR).

56-Fifth National Report of Lebanon to the Convention of Biodiversity (Aug 2015) Hima which is defined as a Community Based Natural Resources Management (CBNRM) System that promotes Sustainable Livelihood, Resources Conservation, and Environmental Protection for the human wellbeing (UNU-INWEH). A Hima is under the supervision of the municipality, the union of municipalities or the Qaimaqam

57- UNDP/UNICEF/UNHCR/MoE (2021). Lebanon State of the Environment and Future Outlook: Turning the Crises into Opportunities. SOER 2020.

58-An Important Plant Area (IPA) is a natural or semi-natural site exhibiting exceptional botanical richness and/or supporting an outstanding assemblage of rare, threatened and/or endemic plant species and/or vegetation of high botanic value, Convention on Biodiversity.

59- Key Biodiversity Areas (KBA) are 'sites contributing significantly to the global persistence of biodiversity', in terrestrial, freshwater and marine ecosystems (International Union for the Conservation of Nature, 2016)

60- Ibid.

61- Mitri, G. and El Hajj, R., 2008. State of Lebanon's forests 2007. AFDC/WWF/UNDP/IUCN, Beirut, pp. 128

62- Hamadeh, S. (2023). Can Sustainable Pasture Management Improve the Ecosystem Services for Small Ruminant Farmers and Rural Communities? A Case Study from West Bekaa, Lebanon (Doctoral dissertation).

63- Van Voris P, Cataldo DA, Ligothe MW, et al. 1987. Evaluate and characterize mechanisms controlling transport, fate and effects

The southern region of Lebanon is home to several forests and nature reserves that are internationally recognized for their ecological significance. Notably, Rihane and the Tyre/Naqoura areas are classified as Important Plant Areas (IPAs), which confirms their significance in⁵⁸ terms of plant conservation. Additionally, these regions, along with Sarada, are designated as Key Biodiversity Areas (KBAs)⁵⁹, highlighting their critical role in maintaining global biodiversity. These designations for Jabal Rihane, Tyre-Naqqoura Coast, and Sarada reflect the high value of these areas for conservation efforts, particularly in preserving unique plant species and supporting diverse ecosystems. These areas are essential not only for their natural beauty but also for the vital ecological functions they perform⁶⁰. Forest fires significantly impact the structures and functions of natural ecosystems⁶¹. The direct and indirect effects of armed conflict exacerbate this issue by increasing the vulnerability of vegetation cover to fire. This heightened risk often results from the accumulation of thick biomass coupled with a lack of regular maintenance, especially in rangelands⁶². Additionally, the regeneration rate and recovery process of areas affected by these fires tend to be considerably slow, posing long-term challenges for the restoration of these ecosystems. The recovery is often hindered not only by the immediate damage caused by the fires but also by the disrupted ecological processes and altered habitat conditions resulting from the conflict.

Plant exposure to white phosphorus in nature, specifically in the Protected areas results in a variety of deleterious effects depending on the species of plant, smoke concentration, duration of exposure, relative humidity, and wind speed. These effects can include leaf tip burn, leaf curl, leaf abscission and drop, floral abortion, chlorosis, necrotic spotting, wilting, desiccation, and dieback⁶³.

A consequence of direct shelling on any natural area, ecosystems are disrupted, and faunal and floral habitats are destroyed leading to species deaths. In addition, migration of wild animals from these territories to safer places will occur⁶⁴.

White phosphorus can cause severe and long-lasting environmental harm. When deployed, it can ignite and burn at extremely high temperatures, often leading to uncontrolled fires in the areas where it is used. The persistence of these fires and the difficulty in extinguishing them can lead to widespread destruction of vegetation, including in rangelands and forested areas. This destruction can alter the ecological balance, affecting soil quality, increasing the risk of erosion, and damaging habitats for a range of species.

White phosphorus is extremely poisonous to many organisms and when ingested, incidents of death among mammals, birds and fish have been documented⁶⁵. In fact, after many investigations, white phosphorus was identified to be the cause of the annual die-off of thousands of waterfowl at an Alaskan salt marsh, who were found to be poisoned by the substance⁶⁶. Forests and nature reserves in the South are habitats to various faunal species such as the golden jackal, mainly in the Rmeish region, rock hyraxes, small rodents and badgers. In addition, migratory birds are threatened during this period when their migration is at its peak. The Hima Ebel Es-Saqi is an Important Bird Area (IBA) for globally and regionally threatened soaring birds⁶⁷ and white phosphorus poses a threat to these birds⁶⁸. White phosphorus has been classified as hazardous to the aquatic environment with an acute hazard over a short term (Category 1). The Hazard Statement is H400 which is very toxic to aquatic life⁶⁹. In moderate levels, white phosphorus concentrates in aquatic organisms. However, bioconcentration factors are much lower than those for other toxic organic chemicals⁷⁰, which means that phosphorus will not be absorbed and accumulated in aquatic organism in as high concentration as other substances.

3.4.2 Air pollution

The main sources that could affect air quality and lead to air pollution are mainly from the ongoing shelling and the use of ammunition including white phosphorus, fires as a result of phosphorus bombs, rise in the number of vehicles due to the resettlement of the people living in conflict areas, possible emissions of harmful substances into the air if any chemical or food facilities were shelled and burnt⁷¹.

The use of white phosphorus (P4) in armed conflicts poses significant hazards beyond the immediate physical destruction from shelling. White phosphorus is notorious for its ability to cause fires that are unpredictable and difficult to control. One of the critical characteristics of white phosphorus is that it can continue to burn when exposed to air, potentially for several days following its initial dispersal. This prolonged burning makes white phosphorus particularly dangerous, posing ongoing threats of injury not only to civilians but also to clearance personnel working in the affected areas. The persistent nature of these fires can lead to extensive damage to the environment and property, as well as posing serious risks to human health and safety⁷².

3.4.3 Ground and surface water

The southern region of Lebanon is rich in water resources, featuring an array of rivers, springs, and groundwater reserves. A significant part of the Litani River, the most abundant river in Lebanon with the largest catchment area in the country, covering 2,180 km², flows through this region. This area is also home to numerous springs, including Aalman, Ain al Tine, Ain Rkeiz, Ghalle, Hasbani, Qbay, Rachidiye, Ras al Ain, and Tasseh springs. The South Lebanon Water Establishment, serving as the primary water provider in the region, relies heavily on groundwater sources. In fact, their annual groundwater extraction accounts for 45 percent of the total annual national groundwater volume, indicating the crucial role of these underground reserves in the region's water supply. Additionally, there are three operational wastewater treatment plants in the South, located in Nabatiyeh Sharqiyeh, Sidon, and Tyre Shabriha. These facilities

of Army smokes in the aerosol wind tunnel. Pacific Northwest Laboratories, Richland, Washington.

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play a vital role in managing wastewater and maintaining the water quality in the region, ensuring that both environmental standards and the water needs of the population are met⁷³. Many hydraulic, agriculture, and electric projects in the South have been developed on the banks of the Litani River to provide potable water for Marjayoun and Bint Jbeil districts⁷⁴.

The ongoing conflict in the South could lead to toxic contamination of the surface and underground water resources. War remnants containing metals and toxic energetic materials can pollute surface water sources and groundwater. If these remnants are near the shore, they can pollute the marine environment as well⁷⁵. In addition, coastal waters in conflict areas are subject to pollution if the region witnesses attacks on ports, fuel storage sites, warehouses and the present ships on the seaside carrying fuel and chemicals⁷⁶. Polluted coastlines and oil spills could affect sea birds, sea turtles and egg laying regimes. Tyre Coast Nature Reserve is home to two endangered species of sea turtles⁷⁷.

The bombardment in Lebanon has reportedly caused substantial damage to water infrastructure, including water supply systems and wastewater management facilities. This destruction poses significant environmental health risks. One major concern is the increased potential for the spread of water-borne diseases, stemming from reduced access to clean water. Furthermore, the contamination of water sources due to broken sewage pipelines exacerbates these health risks. The compromised state of water infrastructure can have far-reaching impacts, affecting not only immediate public health but also long-term environmental sustainability and the wellbeing of the affected communities. Access to clean water is crucial for maintaining public health, and any disruption to this can lead to a cascade of health and environmental issues⁷⁸.

White phosphorus use could contaminate both surface and underground water (water sources and streams). White phosphorus (P₄) does not dissolve

readily and solid P₄ persists indefinitely in water⁷⁹. Most phosphorous compounds released in the air will be deposited as phosphoric acid or phosphate on land and water⁸⁰. However, the presence of high phosphorus concentrations in aquatic ecosystems can cause increased growth of algae and large aquatic plants, which can result in decreased levels of dissolved oxygen. High levels of phosphorus can also lead to algae blooms that produce algal toxins which can be harmful to human and animal health⁸¹. Furthermore, phosphoric acid formed in water could leach into the ground and contaminate water supplies and underground water and its effects could remain for many years⁸². One of the most susceptible aquifers in Lebanon to conflict-related pollution is the Middle Cretaceous Western basin in South Lebanon, which is the largest aquifer in the country⁸³. As South Lebanon is the Lebanese region that most heavily relies on groundwater, contamination of these resources will pose a serious problem to public health, animal health and agriculture.

As mentioned above, the Ministry of Agriculture has reported the death of birds, chicken and livestock in the South. Animal waste contains toxic and pathogenic substances such as nitrates, nitrites, ammonium and pathogenic microorganisms that could also contaminate the soil, surface and groundwater⁸⁴.

3.4.4 Soil quality and land

The impact of the conflict on soil quality and land includes a physical destruction of the upper fertile layer of the soil by explosions and loss of agricultural lands, woodlands and wetlands, and soil pollution by toxic compounds including heavy metals from explosive weapons, unexploded ordnances (UXO) and explosive remnants of war. Heavy metals include chromium, cobalt, nickel, copper, zinc, cadmium, mercury, lead etc. Toxic munitions constituents such as per- and polyfluoroalkyl substances (PFAS), RXD, PBX, TNT and missile propellant and rockets are ejected into the soil⁸⁵.

White phosphorus usage can have a detrimental effect on soil quality as its incendiary nature severely burns the land and affects its fertility, hence, reducing its use for agricultural purposes⁸⁶. Phosphorus aerosols, once in contact with the soil, affect its pH rendering it more acidic. In addition, the metals present in the soil could react with the phosphorus compounds, increasing leachability and possible trace metal migration from the soil⁸⁷. At low temperatures, solid white phosphorus will persist indefinitely in water-saturated sediment⁸⁸.

3.4.5 Solid waste

Each shelling activity causes the generation of waste on land; this includes building rubble and equipment debris, components or parts of goods and their packaging, spillage of liquid components, in addition to the shell itself⁸⁹. Rubble and debris generated from destructive shelling are likely to be contaminated by asbestos.

In conflict periods, solid waste management will be disrupted, therefore, solid waste will undergo unsafe landfilling and open air burning. Ecosystems will be negatively affected and lost due to contaminated areas with UXO⁹⁰.

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4. Conclusions and way forward

It is evident that the conflict will likely have an impact on Lebanon's economy, given the ongoing protracted and multifaceted crisis. The conflict presents a direct and serious threat to the sectors that have lately showed signs of improvement - namely tourism, trade and financial flows. Most forecasts converge on the conclusion that the economy is likely to further contract - regardless of which conflict scenario materialises - which will almost certainly delay the country's economic recovery. The direct losses in livelihood opportunities are likely to increase vulnerabilities and to push more people into unemployment and poverty, given the absence of appropriate social protection schemes, notably social assistance and social safety nets.

This analysis is an early attempt to take account of the initial actual and potential losses caused by the conflict and is meant to guide post-conflict efforts for a speedy recovery, and to set the stage for the immediate way forward. Till now, there is no official comprehensive assessment of the physical damages inflicted by the armed conflict, except for the assessment being done and regularly updated by the Council of the South. That assessment primarily guides the government-approved compensation plan to support physical damages and war casualties.

Although the fighting on the southern borders is ongoing on, it is essential to be proactive and to stand ready for the period that will follow the end of the conflict, as well as to explore opportunities to extend immediate support while the conflict continues.

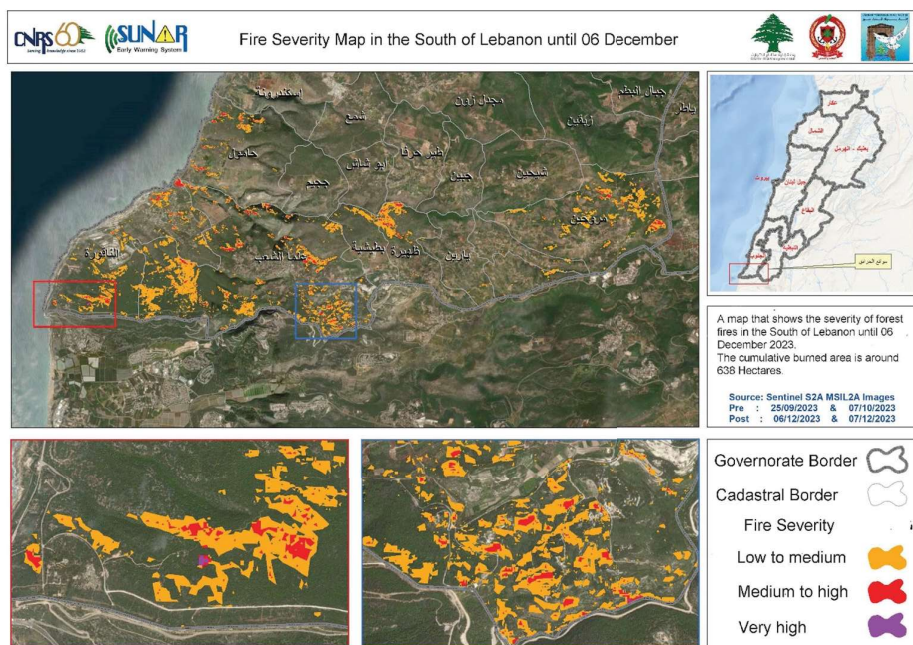
Key actions that should be taken include:

1. The analysis presented in this report is a snapshot of the situation in Lebanon and in the conflict-affected region as of mid-December 2023. The situation will keep evolving as long as the conflict extends in time and increases in magnitude. It is essential to consider this a living document and to regularly update it to reflect the latest developments. Further assessments are needed, during and after the end of the conflict. These assessments should be geared to better understand the long-term socio-economic implications of the war, and to feed into the design of a response plan that enables the implementation of the triple nexus, combining humanitarian assistance and peacebuilding with longer-term development.
2. In the immediate term and should the conflict persist, it is important to reprogramme activities to address the implications of the crisis and to safeguard livelihoods. This should include extending support to communities to coordinate crisis response and to proactively monitor losses and plan for recovery. It should also include fostering market connections for local producers through the establishment of linkages and value

chains. Cash for work programmes should be designed to support the IDPs in coordination with host communities.

3. By delving into the current situation, this report lays the groundwork for well-informed programmatic activities post-conflict. This includes targeted programmes for job creation, business development, income support to farmers to restart their activities, access to finance and infrastructure investments to stimulate sustained economic recovery.
4. The preliminary results of the environmental assessment conducted by UNDP, underscore the significant impacts of the conflict on protected areas, forests, rangelands, water bodies, air quality, and land. To expand on these preliminary results, a comprehensive post-conflict environmental assessment is crucial. This detailed assessment should include extensive surveys of flora and fauna, an assessment of the cultural heritage sites, and a determination of the extent of damage to agricultural lands, rangelands and forests. Such an assessment would provide a clear picture of the environmental degradation and help in formulating targeted strategies for restoration.
5. Lebanon's post-conflict recovery should focus on comprehensive environmental assessments. This includes restoring degraded rangelands, reforesting destroyed forests, and replanting crops for both environmental and livelihood, income-generation and economic recovery. Key elements include tailored management plans, monitoring for biodiversity, water clean-up, and integrated waste management. This multi-dimensional approach is crucial for sustainable recovery and long-term resilience.
6. It is imperative that environmental considerations remain a priority throughout the recovery process. This involves ensuring that the restoration efforts not only return the environment to its former state but, where possible, improve it. Sustainable practices and technologies should be employed to ensure that the recovery process contributes to long-term ecological resilience and sustainability.
7. Recognizing the significant role of livestock in the local economy and livelihoods, it's essential to implement measures for their protection. This includes providing shelters, vaccinations, and emergency veterinary services to prevent disease outbreaks, along with introducing livestock insurance programs to compensate farmers for conflict-related losses.

Annex 1. Fire map caused by conflict on forests and tree groves along Lebanon's southern borders



Annex 2 Definitions of Protected Areas (PA) in Lebanon

Based on the **protected areas framework law number 130 dated 30/4/2019** which defines the criteria for the establishment of each category in addition to their management objectives and modality, PAs in Lebanon are divided into the following four categories with unique management objectives:

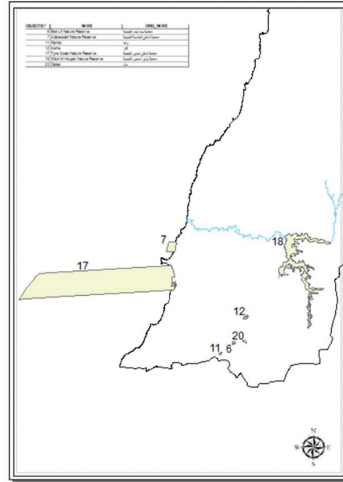
1. Nature Reserve, which is defined as a terrestrial or marine zone in which ecosystems, habitats and species of specific importance must be protected because they are either endemic, or rare or endangered. The conservation of those species and ecosystems may require maintenance or rehabilitation activities if needed, in a way that suits with the protection objectives, and that are described in a management plan in order to ensure the conservation of those habitats and the species that they harbour.
2. Natural Park, which is defined as a vast rural territory, partially inhabited, with exceptional natural and cultural heritage, recognized nationally and deserving protection on the long term. A Natural Park can include one or more PAs or areas that might eventually become protected.
3. Natural Site and Monument, which corresponds to an area containing one or more natural features of exceptional importance which deserve protection because of their rarity representativeness or beauty.
4. Hima, which is defined as a Community Based Natural Resources Management (CBNRM) system that promotes sustainable livelihood, resources conservation, and environmental protection for human wellbeing (Saleh, 2011). A Hima is under the supervision of the municipality, the union of municipalities or the Qaimaqam in the case of villages where there are no municipalities. Himas are known to be the oldest form of nature conservation and management. This practice appeared almost 5,000 years ago, during the time when the ancient Egyptians understood their environment and its requirements. The Hima practice became an existing management tool in the Arab region almost 1,500 years ago. Since 2004, SPNL worked relentlessly to revive this trend of traditional landscape management in collaboration with local authorities in many parts of the country such as Kfarzabad IBA; the goal is to combine traditional practices with latest conservation strategies in order to attain sustainable resource use, as well as conservation of biodiversity and avifauna, with education, research, recreation and expansion of economic opportunities (AFDC, 2018; AFDC et al., 2019).

In addition, Protected **forests established by MoA** decision before 1996 based on the Law of Protection of Forests Wealth (Law 85 dated 1991) and after 1996, protected directly by the Law of Protection of Forests (Law 558, dated 24/07/1996) and through MoA ministerial decisions issued based on this Law.

Annex 3. Protected areas under Litani river⁹¹

A-Nature Reserve: 7 Sites

ID	NAME
6	Beit Lif Nature Reserve محمية بيت ليف الطبيعية
7	Abbassiyeh Coast Nature Reserve محمية شاطئ العباسية الطبيعية
11	Ramia Nature Reserve محمية رميا الطبيعية
12	Kafra Nature Reserve محمية كفرناطية الطبيعية
17	Tyre Coast Nature Reserve محمية شاطئ صور الطبيعية
18	Wadi al-Houjeir Nature Rserve محمية وادي الحجر الطبيعية
20	Debel Nature Reserve محمية دبل الطبيعية



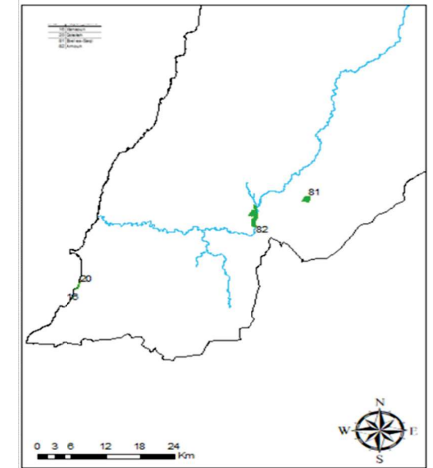
B-Protected Forest: 1 site

ID	NAME
6	Kherbet Selem Forest



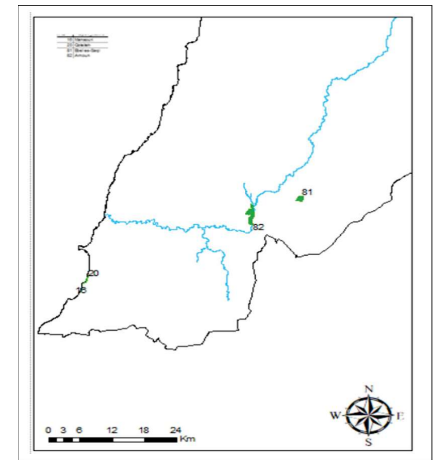
C-Himas: 4 sites

ID	NAME
16	Mansouri
20	Qoleileh
81	Ebel es-Saqi
82	Arnoun



D-Nature Site in pipeline: 1 site

ID	NAME
10	Yaroun



⁹¹- UNDP, 2023. "STEPping up Nature Reserves Capacity" Project, United Nations Development Programme, funded by the Ministry of Foreign Affairs and International Cooperation of the Italian Republic through the Italian Agency for Development Cooperation (AICS), Beirut, Lebanon.



UNDP is the leading United Nations organization fighting to end the injustice of poverty, inequality, and climate change. Working with our broad network of experts and partners in 170 countries, we help nations to build integrated, lasting solutions for people and planet.