Syrians' Misery Burdens the Precarious Environmental State of Lebanon

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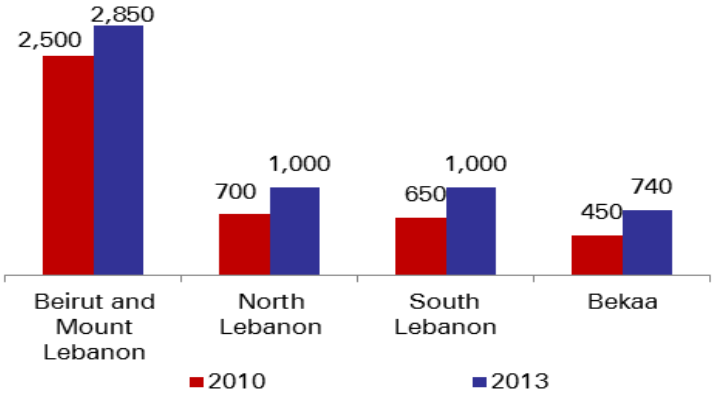
Municipal Solid Waste Generation by Mohafaza



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Distribution of Incremental Quantities of Municipal Solid Waste by end 2014

Mohafaza	Incremental Daily Quantity	Daily Capacity before crisis (t/d)	Increased Burdens (%)
BML	321	2950	10.9
North Lebanon	198	1100	18
Bekaa	253	670	37.7
South of Lebanon	117	940	12.4
Total	**889**	**5660**	**15.7**

Source: MoE

Shortly after the Syrian war began in 2011, thousands of refugees overwhelmed Syria's neighboring countries that were already struggling to look out for their own people. Lebanon was one of them, especially with its expected 20% unemployment rate[1] and 1% slackening economic growth[2], by the end of 2014. In fact, and even though the Syrian crisis started in March 2011, the tangible impact on Lebanon was felt starting the summer of 2012. The refugees' registries reveal a huge leap from 57,335 by September 2012 to 1.14M by the end of September 2014, currently accounting for 26% of Lebanon's population.

The Syrian conflict squeezed economic growth since 2012 and heavily impacted numerous facets of Lebanon's society and economy. In a previous World Bank report, a rapid "Economic and Social Impact Assessment of the Syrian conflict on Lebanon" was prepared for the purpose of quantifying the impact on the Lebanese economy. The report assessed the losses of Lebanon's economy prompted by spillovers from conflict in Syria at $7.5 billion, ($1.1 billion in 2012, $2.5 billion in 2013 and $3.9 billion in 2014). This is equivalent to a 2.9% cut in real GDP growth for each conflict year, and entails large losses in terms of wages, profits, taxes, private consumption and investment.

However, some impacts are still not entirely felt and could emerge long after refugees' problem is solved, of which the environmental impact. Inevitably, any arrival of a huge influx of refugees would intensify pressure on the environment of the hosting country. Some of the direct

1 According to the World Bank

2 According to the International Monetary Fund (IMF)

environmental impacts are deforestation, water contamination and depletion, land erosion, air pollution and poorer solid waste management.

The Ministry of Environment (MoE) recently undertook an environmental assessment of the Syrian conflict's impact on Lebanon to quantify the level of damage and the reforms needed to respond to the upcoming crisis. Under the title of "Lebanon Environmental Assessment of the Syrian Conflict & Priority Interventions", a measurement was conducted between May and July 2014 using 2010 or 2011 as baseline years to assess the environmental situation before the Syrian crisis. The report was prepared by the MoE and supported by the European Union (EU) and the United Nations Development Programme (UNDP) and only took into account the environmental impact of the Syrian turmoil in 2014[3]. The report further expects the influx of refugees to reach 1.84M by the end of 2014, based on current trends and considering the Palestinian refugees from Syria and the Lebanese returnees as well.

Besides environmental assessment, the report proposed several interventions complementing "Lebanon Roadmap of Priority Interventions for Stabilization from the Syrian Conflict"[4] report. Below is a summary of the report's main findings on 4 major scales: solid waste, water and wastewater, air pollution, and land-use and ecosystems.

The Increase of Solid Waste Hinders the "Reduce, Reuse and Recycle" Concept

Hosting around 37% of the region's Syrian refugees, Lebanon saw levels of its Municipal Solid Waste (MSW) hiking hand in hand with municipal spending, pollution of water and deteriorating health conditions.

As the growth in MSW is being managed with the current infrastructure facilities, Lebanon's municipalities almost increased their spending, from national treasury[5], by 11% during 2011-2012 and 40% during 2012-2013. Worth mentioning that the additional cost to manage the generated MSW is estimated to reach $24.0M per year (M/y) in 2014. This is explained by the Syrian refugees' incremental daily quantity of MSW that is expected to touch the 324,568 tons per year (t/y) by the end of 2014, almost constituting 15.7% of total MSW generated by the Lebanese citizens prior to the crisis.

However, only 48% of MSW is treated by municipalities, while the remaining 52% of solid waste is left in existing open dumps. This enhances possibilities of land and soil contamination with Mount Lebanon standing as the region to suffer the most from MSW's negligence, followed by Zahleh, Baalbeck and Akkar.

Furthermore, the mismanagement of incremental levels of MSW threatens Lebanon's surface and ground water as well as land and soil. Risk of polluting the water is constantly rising along with the mounting amounts of solid waste being left in dumps. Srar in the North, Machghara in the Bekaa, Qana in the South are selected sites threatened by surface water pollution. Groundwater contamination is highly expected to be present in Berkayel (North of Lebanon), Taalbaya (Bekaa) and Kfartibnit (South).

MSW's actual condition severely jeopardizes the surrounding environment's quality which is a critical condition for human's persistence and healthy existence. In fact, the quantity of infectious waste, generated from health care waste, is estimated to show a 420 t/y increase by the end of 2014, noting that 18% of the total is deposited without any treatment. Moreover, mismanaged dumpsites enhance risks of breeding insects carrying vector-borne diseases such as eye irritation, tuberculosis, diarrhea etc…

The assessment suggested several interventions to reduce the negative environmental impact of the increasing quantities of solid waste. Those suggestions amounted for $131.1M with Operation and Maintenance costs touching $57.6M per year (M/y). Some of the short term actions included the reduction of food items' packaging, the collection and treatment of health care waste and the implementation of recycling activities in areas where refugees are present. On the medium term, the open and uncontrollable MSW dumps should be closed and new landfilling

3 The assessment does not account for the cumulative impacts since the start of the conflict

4 Report prepared by the Lebanese Government with the support of the World Bank and the United Nations

5 The municipalities have a weak local revenue base leading them to depend on treasuries' transfers to cover their financial needs

facilities need to be established. According to the report, an appropriate infrastructure should be built in order to properly manage solid waste generation.

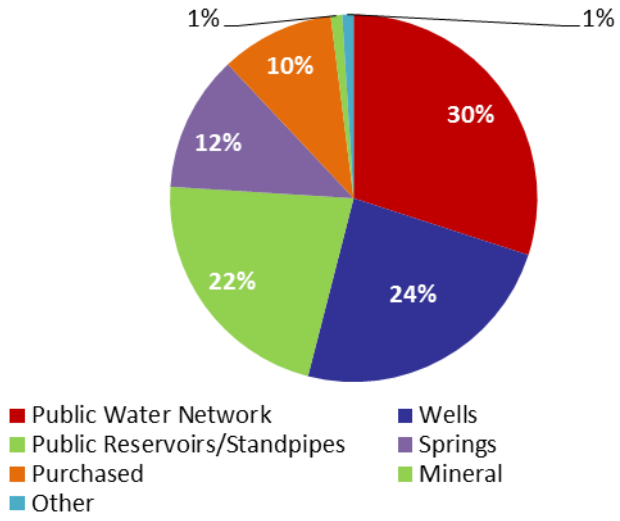
Water and Waste Water Management Reach a Critical Standing in 2014

The increasing Syrian influx over the past three years is placing further strains on Lebanon's water resources. Water demand is expected to surge around 43-70 Million Cubic Meter (MCM) by the end of 2014, an average of 8-12% increase. Different regions started to show drops between 1 and 20 meters in groundwater levels of several wells. Bekaa is the most overstressed region on the increase of national water demand along with other governorates (the North, Beirut, Mount Lebanon and the South). Also, poor hygiene and sanitation conditions deteriorated water quality as revealed by the increase of diarrheal and communicable diseases.

Waste Water (WW) management is another issue to address as levels of WW are getting higher along with the increasing number of displaced Syrians. The report measured the rise in WW between 34 MCM and 56 MCM with Bekaa topping the list of regions in terms of highest additional WW.

A worsening pollution is, once again, the main repercussion of refugees discharging their WW. It is expected that incremental pollution will hover around 40,000 tons of BOD5[6] per year (or 34% national increase in BOD5 level) mainly concentrated in Baalbeck, Akkar, Zahleh and Baabda. Likewise, the untreated WW that causes oxygen depletion will contaminate agricultural crops, fish and wildlife populations.

Sources of water used by Syrian refugees



Source: MoE

Later on, the report discussed the potential measures to mitigate the Syrian turmoil negative impacts on water and WW management in Lebanon. Yet, it did not provide an exact figure concerning total costs but a preliminary one ($1,287.3M) as costs of the majority of projects are to be determined. For one, groundwater usage should be controlled and an emergency action plan should be developed to hamper scarcity and poor management. Second, raising awareness on water management and conservation besides improving infrastructure storage, transmission and distribution systems are also schemes to be considered. Water quality and sludge disposal, implementing wastewater collection and conducting infrastructure projects remain vital.

Poor Air Quality Worsen Health Conditions

Similarly, air pollution is one of the environmental repercussions of the Syrian exodus to Lebanon. Several sectors reside behind the worsening of air quality such as residential heating, open

6 Biochemical Oxygen Demand in Water Bodies: it measures the amount of oxygen required or consumed for the microbiological decomposition (oxidation) of organic material in water

burning of solid waste, electricity production. On-road transport is also another source of air pollution following the 5% increase in traffic on the main national axes especially in Beirut where chronic air pollution already exists.

Incremental Quantities of Air Pollutants Emissions in 2014 Compared to 2010

	CO	NOx	SO2	PM10	PM2.5
Incremental Quantities of Air Polluants in 2014 compared to 2010 (in tons)	100,346	15,317	2,222	1,221	1,077
Percent Increase in 2014 compared to 2010 (in %)	18	20	4	11	13

Source: MoE

The report considered that the Syrian conflict will enhance the emission of air pollutants up to 20% in 2014 and several actions could be undertook (worth $1,986.8M with Operation and Maintenance costs costs around $139M/y). Solutions to improve the transportation system were proposed to be initiated over the short and medium term such as the implementation of a Bus Rapid Transit (BRT) and organized mass transport systems in cities. The worsening air quality also implies using bio-energy for residential heating, decreasing the emissions of energy production (private generators), increasing access to sustainable energy, strengthening the electricity network etc...

Land Use and Ecosystems

Lastly, the report discusses the impact of the Syrian conflict on urban densification, rental and construction sectors as well as the outcome of Informal Tented Settlement (ITS) on land use and agriculture.

Lebanon has seen a quick urban densification since the Syrian crisis forced citizens to relocate. As a result, population density in Lebanon widened 37% to 520 persons/km^2. The country is now standing at the 16th rank in terms of world highest population density, up from the 20th rank before the war in Syria. However, such urban densification implies higher quantities of solid waste, further water problems, proliferating noise pollution etc…

The influx of Syrian refugees boosted both rental and construction sectors. The report estimated the total amount of rental transactions made by Syrian refugees to hit the $34.0M per month. As lodging activity boosted up, Lebanese residents hurried to initiate new construction projects or finalize unfinished ones randomly.

Despite being an asylum for Syrian refugees, ITS accommodations are behind considerable problems on both the economic and environmental fronts. Only 15% of refugees are benefiting from ITSs but their number is expected to increase especially with more evictions due to unpaid rent. Bekaa is the region with the highest concentration of ITSs (712 ITS) followed by Akkar with 300 ITS. Since the majority of ITSs are located near agricultural lands, any growth in those settlements would threaten agricultural production.

The negative impact of Syrian refugees outspreads to forest resources, yet to a lesser extent. In border areas, the displaced Syrians saw their demand for fuel and firewood rising as they were trying to look for alternative energy sources. Accordingly, illegal chopping of forest trees witnessed a considerable rise mainly in the North of Lebanon.

To reduce the repercussions caused by refugees on land use and ecosystems in Lebanon, the report presented a series of potential measures costing around $16.0M with Operation and Maintenance costs hitting the $78.5M/y. These approaches include improving environmental planning at local level, supporting municipalities in urban planning and preventing ITSs encroachment on environmentally sensitive areas, agricultural and flood prone areas. Enforcing forest laws and regulations (Law 85/1991, Law 558/1996) is also considered a backbone in the protection of forest resources. Specific attention should also be given to ensure alternative sources of energy before each winter season.

To sum up, refugee crisis is not going to disappear as the environment will remain at risk as long as no robust measures are implemented. Refugees' concentrated demand for natural and land resources will only aggravate the situation as their number goes up. Even though it is difficult to scale the problem of environmental degradation caused by refugees, the MoE managed to offer an assessment providing remedies to the frail environment situation via intervention strategies and actions. However, and besides enduring shelters to refugees in time of need, the most important role that the Lebanese government should play is to act as mediator between addressing human needs and the welfare of the environment.

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