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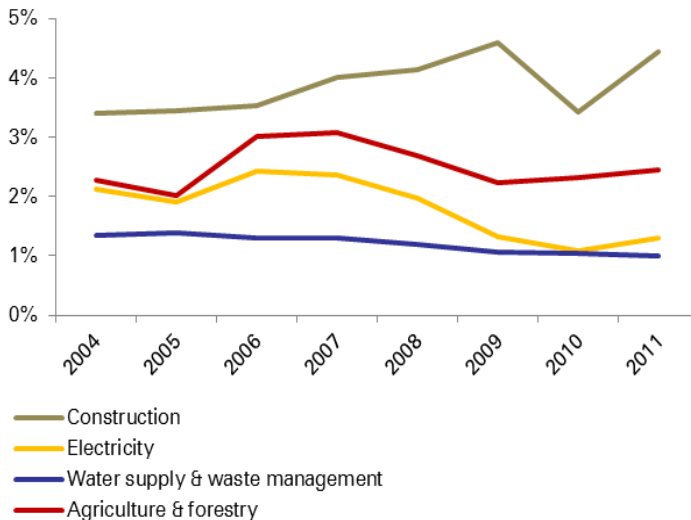
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Ratio of Value Added by Sector to GDP



Source: CAS National Accounts

Oil is no longer the world's most valuable commodity, water snatched the title. Numerous statements were recently published explaining that one bottle of water's price will soon match that of one bottle of oil. These declarations are primarily correct when spotting the trends of both commodities. While the S&P World Commodity Oil Index<sup>1</sup> edged up by 160% over 2003-2013, the World Water Total Return Index showed a 222% surge over the same period. Therefore, the water index is estimated to grow at a CAGR of 9.8%, while that of the oil will follow at a slower pace of 8.8%.

As every drop of water largely counts all over the globe, Lebanon is currently facing a critical standing in terms of water shortage. In 2014, a threatening water condition has been driven up by a changing climate with rising temperatures and unprecedented scarcity in rainfall. Lebanon had seen around 400 millimeters of rain in Beirut by mid-March this year<sup>2</sup>, compared to 825 millimeters over the same period in 2013. In addition, the 30-years average normal total precipitation for Lebanon over the previously mentioned period hovered around 685 millimeters.

The world's most precious natural resource is undergoing several challenges that will shortly deepen the Lebanese economy's burdens. In fact, the estimated direct contribution of water supply & waste management to the GDP<sup>3</sup> stood at 1.0% in 2011.

However, the water total contribution to the economy cannot be quantified in any meaningful way. First, water resources are heavily exploited in different sectors and industries of which, tourism and winter sports, agriculture, and manufacturing. Second, data limitation makes it difficult to assess water resources availability and hinder the evaluation and forecasts of the sector's performance.

<sup>1</sup> According to Bloomberg

<sup>2</sup> According to Rafic Hariri International Airport's meteorological department

<sup>3</sup> According to CAS national accounts for 2011

### Status of Demand and Supply in the Water Sector

The rising water demand will increase faster than expected in the coming years, placing further strains on Lebanon's water supply. On one side, Lebanon's population grows by an annual average of 2.5% enhancing water need for domestic usage. On the other side, the increasing Syrian influx over the past three years also weighed over the dwindling water supply. Estimates showed a jump in the Syrian refugees' number from 265,000 by the end of 2012 to 930,000 refugees<sup>4</sup> (22% of the country's population) in 2013 and expected to hit the one million mark by the end of March. Therefore, and with Syrian refugees accounting for about the quarter of the Lebanese population, water demand is definitely expected to surge by an average of 25%, assuming their water consumption is the same as the local population.

Despite its location at the edge of a dry zone, Lebanon enjoys a privileged hydrologic position in the Middle East. In 2011, the country collected an average of 661 mm of rain per year<sup>5</sup> as compared to 252 mm in Syria and only 111 mm in Jordan. Iraq and Egypt also revealed lower levels of precipitations in 2011 at 216 mm and 51 mm, respectively.

Regardless of the short rainfall season of 5 months, Lebanon is endowed with hydraulic resources which contributed to the country remaining moderately self-sufficient in terms of water needs. The rough topography, the great altitudes of mountains and the relatively high precipitation rates explain the seasonal overflow of numerous rivers and springs. Accordingly, Lebanon's estimated dependency ratio<sup>6</sup> in 2011 was estimated at 0.79% indicating that the country does not receive any water from neighboring countries but only depends on its internal resources. In this context, Lebanon fared better than several regional and developed countries. Bahrain and Egypt both revealed a dependency ratio of 97%, while France and Germany's ratios stood at 5% and 31%, respectively.

However, Lebanon posted in 2011 a deficit of 73.0M cubic meters (m<sup>3</sup>) in water supply. The latter is mainly brought by a yearly average of 8.6B m<sup>3</sup> of precipitations of which, 4.5B m<sup>3</sup> evaporates, 1.0B m<sup>3</sup> flows across boundaries and 0.4B m<sup>3</sup> of ground water that pours into the sea<sup>7</sup>. Accordingly, the remaining available water accounts for 2.7B m<sup>3</sup> and is brought by 40 streams and rivers (of which 17 perennial rivers) and more than 2,000 springs<sup>8</sup>.

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<sup>4</sup> According to the United Nations High Commissioner for Refugees

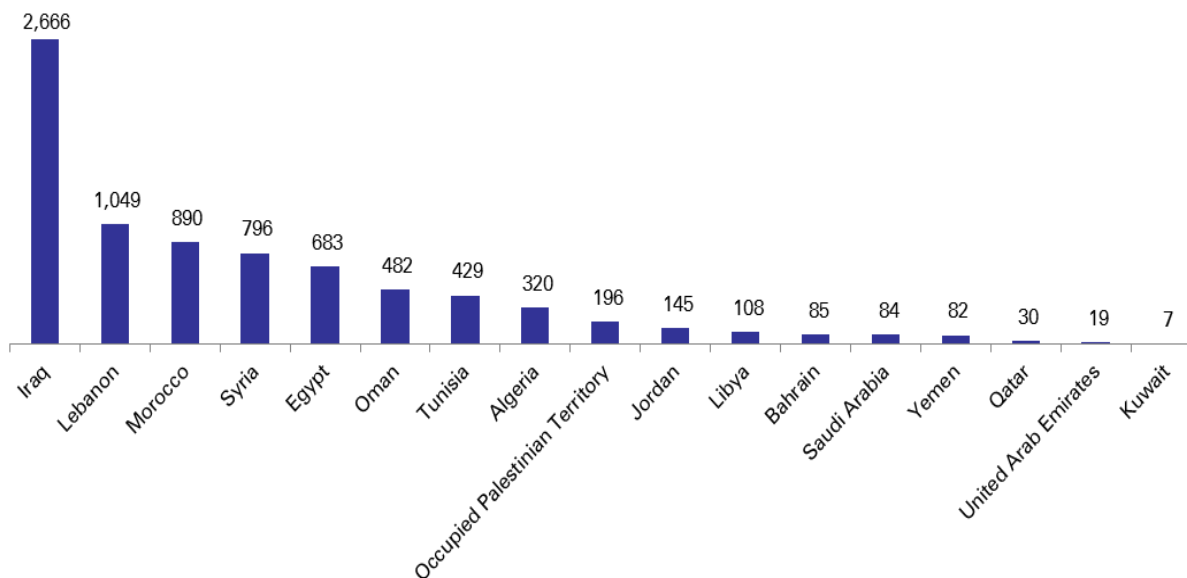
<sup>5</sup> According to the World Bank

<sup>6</sup> According to Aqastat, the dependency ratio is the percent of total renewable water resources originating outside the country. This indicator does not consider the possible allocation of water to downstream countries.

<sup>7</sup> According to the Ministry of Energy and Water

<sup>8</sup> According to the Ministry of Environment

Selected Countries by Total Renewable Water Resources per Capita (m<sup>3</sup>/inhab/y)



Source: Aquastat

2011's water deficit alluded to the total renewable water resources per Capita<sup>9</sup>. Each inhabitant in Lebanon almost profited from 1,049 m<sup>3</sup> of renewable water resources, noting that the water scarcity threshold is 1,000 m<sup>3</sup>/capita/ year. This level is expected to go down by 2015 to reach 839 m<sup>3</sup>/capita/year if no action is undertaken. However, Lebanon still has a better standing than many regional countries such as Morocco (890 m<sup>3</sup>/capita/year) and Egypt (683 m<sup>3</sup>/capita/year).

## The Economic Importance of Water

The three main drivers of water's demand are agriculture and industrial sectors as well as domestic usage, which approximately use 55%, 10% and 35% of water consumed, respectively. Hence, the upcoming challenges will certainly hit the mentioned sectors' sustainability as well as the potentially expanding economy in the near future.

Agricultural activity is expected to be the first sector to show, as early as this summer, substantial downfall signs. Water deficiency that was clearly seen in 2014 alludes to the heavy loads that Lebanese farmers will have to carry in the summer season. The sector's sustainability and expansion are extremely threatened by the actual situation of this basic commodity as any intensification in the agricultural industry will lead to an increasing demand for irrigation. As an additional source of pressure, the lack of efforts to raise awareness among farmers increases the volume of wasted water. In addition, excessive use of fertilizers and unregulated application of pesticides leads to the contamination of both surface and ground waters.

Hydropower in Lebanon is mostly disregarded as a vital source of energy. Despite its economic cost effectiveness, hydropower only represents 8.7% (around 282 MW) of total nationally produced power in Lebanon<sup>10</sup>. However, the majority of current hydropower plants require rehabilitation and renovation to be able to produce their full nominal capacity. In addition, new plants should be implemented to boost the share of renewable energy in the country amid a changing climate and an inadequate water management.

Tap water demand is following a declining trend in favor of bottled water. Lebanese water ranked 60<sup>th</sup> out of 122 in terms of quality with the water quality indicator<sup>11</sup> standing at a negative 0.11 mark. Finland topped the

<sup>9</sup> According to Aquastat

<sup>10</sup> According to CEDRO, UNDP report "Hydropower in Lebanon; History and Prospects"

<sup>11</sup> According to 2003's United Nations World Water Development Report

list at a positive 1.85, followed by both Canada and New Zealand with positive 1.45 and 1.53, respectively. In this context, health concerns boosted the bottled water industry. Lebanon ranked 8<sup>th</sup> amongst the top 20 countries in terms of Per-Capita bottled Water Consumption<sup>12</sup>. 121 liters of bottled water were consumed per person per year in Lebanon in 2010 alluding to the poor quality of tap water that highly impacted the public behavior.

Although exports of bottled water remained subdued, there is an opportunity to expand the trading activity as the region suffers from water deficiency. In fact, total exports of bottled water almost doubled between 2010 and 2013 with water exports constituting a marginal 1.7% of total exports in 2013 compared to a 0.9% share in 2010. This means that external trading within the water sector is present and is showing signs of improvement, which could be supported and reinforced.

### Shortcomings of the Lebanese Water Sector

Despite its ample endowment of resources, only 1.4B m<sup>3</sup>, out of the 2.7B m<sup>3</sup> available water is effectively used (almost 16.3% of the total). The lack of awareness and the obsolete technical, financial, and managerial performances of the sector considerably hindered the effective use of its resources. This is mainly due to the very low water storage capacity leading to high amount of water lost to the sea, and the deficiency of the existing water network.

Irresponsible behavior also spreads in the absence of a metering system. Water crisis is furthered by consumers' lack of control over their water bill as the annual fixed fee that averages LBP 200,000 is considered cheap and affordable. Accordingly, consumption levels do not dictate water tariffs amid a weak water network that needs a complete restoration.

### Reforms of the Water Sector

Under the vision of "Water: a right for every citizen, a resource for the whole country", the Ministry of Energy and Water (MEW) had several strategic goals for Lebanon's water sector. MEW set numerous objectives to improve water's infrastructure and implement an efficient management. The ministry's main mission is to "ensure water supply, irrigation and sanitation services over all the Lebanese territory on continuous basis and at optimal service levels, with a commitment to environmental, economic and social sustainability". However, the implementation of law 221<sup>13</sup> that aims the restructuring of the water sector is still incomplete.

Governmental intervention to meet the water necessities of residents continued through 2013. After two years of delay, one of the large-scale projects was implemented in Batroun – North Lebanon: the Ministry of Energy, and in cooperation with Iran, set a dam project that is expected to procure the needs of more than 40,000 residents thanks to a reservoir of around 1.2M m<sup>3</sup>.

Several projects and strategies were also set in motion by foreign entities. By the end of 2013, the European Union, in partnership with the UNDP, signed a 3M Euros grant, as part of the CEDRO IV project<sup>14</sup>. The latter is in line with the national objectives of 12% share of energy mix from renewable energy sources and 5% increase in energy efficiency by 2020. Separately, the United Nations Development Program (UNDP) signed on for a \$1.5M project with the Ministry of Water and Energy to develop decentralized renewable energy systems. The agreement entitled "Decentralized Renewable Energy Power Generation" was assigned by the Global Environment Facility (GEF) and will be implemented within a 4-years period.

On the private investment front, initiatives are still restrained. The Blue Gold project was newly created in 2013 by the Civic Influence Hub hoping to reform the Lebanese water network. The 5-Year project will cost

<sup>12</sup> According to 2010's Beverage Marketing Corporation (BMC) data

<sup>13</sup> Law 221 defines the roles and responsibilities of the MEW as well as the role of Water Establishments

<sup>14</sup> The program targets the implementation of renewable energy projects utilizing solar water heater and photovoltaic systems and efficient energy systems aiming the reduction of power demand in the country

\$5.0B and will install several short and long term strategies to efficiently manage water and targets to reverse 2011's water deficit of 73.0M m<sup>3</sup> into a 500M m<sup>3</sup> by 2020. The Blue Gold book expects that the deficit will reach 876M m<sup>3</sup> in the absence of credible actions.

Finally, the current situation is certainly critical, but not hopeless. The actual challenges hindering the sector's progression still can be attenuated and removed. Incentivizing the private sector's participation to upgrade the water network is a must. Yet, it should be coupled with a better coordination between supply and demand by changing the pricing system through the introduction of a region-wide metering system that could include a fixed charge at which is added a progressive volumetric tariff. In addition, the government could improve bill collection which would also increase fiscal revenues. .

Another issue to be addressed relates to the need of making use of available water like the Wazzani and Assi Rivers, which flow entirely to Israel and Syria. Also, the local and regional political pressures as well as the lack of long-term vision should be eradicated to enable the emergence of a vicious perspective for the water industry.

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