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Lebanese Water Resources:

A Potential to Alleviate Middle East Water Stress

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Spring 2010

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Preface:

This research stems from the already growing consensus of the importance of fresh water resources in our world today. Lebanon's mismanagement of the resource can be taken as world's neglect to this important resource. Ultimately, as it is a substance essential to life itself, it is the world's duty to ensure that every drop is utilized and to the maximum of its abilities. We must not forget that this very substance created and is still sustaining life on planet earth. This study highlights the need for cooperation as a solution to water scarcity, particularly the cooperation of the strong with the weak to reach mutual benefit.

Abstract:

Years of war have left the Lebanese water sector in a very bad shape. This has caused excessive water waste in practically all aspects of water consumption. As Lebanon wastes water, its neighbors are desperately seeking to secure their water needs. Consequently, this paper proposes investing sovereign wealth funds from the oil rich water poor Arab countries to assist in developing an efficient water network to maximize the efficiency of the Lebanese water sector. Such investments would be made for the purpose of creating a large enough water surplus in Lebanon that would eventually be exported to the gulf to help alleviate their water stress.

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Finally, I would also wish to acknowledge Lebanon and its people. It is their struggle for survival, freedom, independence, and a brighter future, an epic that has become the symbol of heroism, which has allowed me to become the person I am today.

I: Introduction

Freshwater resources are becoming ever more important in our world today. Despite the substance being a renewable and generally abundant resource, countries are finding increasingly challenging to meet current and future water demands. The Middle East, in general, is characterized as a water scarce region where governments must act swiftly and effectively to secure the water demands of their rapidly growing populations. Oil rich Arab states in the Gulf have already begun investing in desalination technology while other poorer nations in the region are searching for potential alternatives. This paper will discuss the current status of Lebanon's water resources emphasizing its potential and then attempt to show how regional cooperation in developing Lebanese water resources could help alleviate water stress and catalyze regional unity and cooperation.

II: The Fresh Water Situation of Middle East

Increasingly, experts on the Middle East have begun to fear that water scarcity, especially in the infamously volatile Levant region, which encompasses Syria, Lebanon, Jordan, and Israel, could exacerbate tensions causing them to escalate into conflicts. In 1985, when he was still Egypt's Foreign Minister, the former Secretary General of the United Nations, Dr. Boutros Boutros Ghali stated that "the wars in the Middle East will be fought over water, not politics".¹ This statement is reinforced by the fact that according to representatives of the Economic and Social Commission for West Asia (ESCWA), "ten of the thirteen ESCWA countries are among the poorest fifteen countries in the world in terms of water resources".² In 2003, the global water availability per capita was estimated at approximately 7,140 cubic meters, while the ESCWA

¹ BBC. "Talking Point: Ask Boutros Boutros Ghali ." BBC News. http://news.bbc.co.uk/2/hi/talking_point/2951028.stm (accessed February 17, 2010).

² Lebanon Wire. "Lebanon is no exception to global water shortages." Lebanonwire. <http://www.lebanonwire.com/0306/03060609DS.asp> (accessed April 21, 2010).p.1

regional figure is estimated at 1,066.³ Furthermore, some countries in the region have less than 200 cubic meters per capita.⁴ Today, with population increase and its effect on water demands, these figures are even lower.

In the Arab Gulf Countries, countries such as Saudi Arabia, Kuwait, Qatar, and Bahrain all use nonrenewable groundwater resources in large quantities, causing their depletion and deterioration of the quality as the water becomes more brackish. There, with the availability of financial resources, desalination has been used since the 1960s as an alternative to satisfying their water needs. This has proven not only to be costly but also to have detrimental environmental consequences.⁵ Furthermore, with eighty percent of the region's renewable water resources coming from outside the region, there is an increased chance of confrontational competition over the valuable resource.⁶ Thus to avoid conflicts over resources, regional cooperation is needed for the implementation of development projects of existing regional water resources aimed at maximizing water use efficiency, namely in Lebanon.

III: Assessment of Lebanon's water sources: water availability and general characteristics

Generally, Lebanon is considered as the most water rich of Arab states. Dating back to biblical times, "the country has been known as an oasis of lush greenery and abundant water resources."⁷ This however does not necessitate the fact that Lebanon does not suffer from water

³ Ibid;

⁴ Ibid;

⁵ "Managing water for peace in the Middle East." United Nations University.

<http://www.unu.edu/unupress/unupbooks/80858e/80858e09.htm> (accessed April 21, 2010).

⁶ Lebanon Wire. "Lebanon is no exception to global water shortages." Lebanonwire.

<http://www.lebanonwire.com/0306/03060609DS.asp> (accessed April 21, 2010).

⁷ Voice of America. "Lebanon Has Lots of Water, Chronic Shortages Persist." Voice of America.

<http://www1.voanews.com/english/news/middle-east/Lebanon-Has-Lots-of-Water-Chronic-Shortages-Persist-88837127.html> (accessed April 21, 2010).

shortages. “Lebanon has the most water of any Middle Eastern country, but is subject to persistent chronic water shortages due to mismanagement and poor infrastructure.”⁸

Lebanon is mostly a mountainous country characterized by two parallel mountain ranges that run from north to south, respectively the Mount Lebanon range, and the Anti-Lebanon. Between them lies the fertile Bekaa valley where most agriculture is concentrated. The geography leads to the existence of two principal hydrological regions, the Mediterranean (coastal) watershed, which gives rise to twelve perennial rivers from the slopes of the western mountain ranges, which flow from east (the mountain slopes) to west until they empty into the sea; and the interior watershed, which is the source of some of Lebanon’s largest rivers, the Litani, Assi (Orontes), and Hasbani. “The country may also be divided into some forty drainage basins of permanent or intermittent streams, whose flows depend on the topography of the watershed and the size of the mountain reservoirs that their sources feed.”⁹ “The tiny country bordering Syria and Israel has no fewer than forty major streams, two thousand springs and numerous waterfalls that form each year from the melting snow.”¹⁰ However, there is still a discrepancy as to the actual amount of water available in the country. A 1992 United Nations report estimated Lebanon’s total water availability at 3,375 million cubic meters per year. Other figures range from 2600 Mm³/year to 3,922 Mm³/year depending on the source.¹¹ This discrepancy in statistics can be seen as an aspect towards the poorly managed water resources in the country that lacks proper infrastructure and data.

⁸ Ibid

⁹ Amery, Hussien A.. " Assessing Lebanon’s Water Balance." International Development Research Center. http://www.idrc.ca/en/ev-33225-201-1-DO_TOPIC.html (accessed April 21, 2010).

¹⁰ Lebanon to run out of water by 2015 - expert

¹¹ Amery, Hussien A.. " Assessing Lebanon’s Water Balance." International Development Research Center. http://www.idrc.ca/en/ev-33225-201-1-DO_TOPIC.html (accessed April 21, 2010).

IV: Water Mismanagement

According to a study published by the International Development Research Center, crop production is mainly rain fed, however there are estimates that the “number of farms that have private water wells ... are increasing rapidly to satisfy the increasing need for irrigation water.”¹² This, usually uncontrolled, drilling severely affects the quality of ground water as withdrawals are both unmeasured and usually wasteful. Ultimately, due to the seasonal discrepancy between precipitation periods in winter and the period of maximum demand for irrigation water in the dry summer, there has been consistent and excessive withdrawal of ground water.¹³ This also leads to the seeping of pollutants that negatively affect water quality in terms of pollution and brackishness.¹⁴

The irrigation method most commonly used on Lebanese farms tends to be flood irrigation, which accounts for sixty four per cent of the total irrigated land.¹⁵ This method is characterized as extremely wasteful due to “low system efficiencies and high evaporation losses.”¹⁶ This also adds to long term soil degradation that will, in the long run, lead to lower crop yields. The Efficient Management of Wastewater, its Treatment and Reuse in the Mediterranean Countries (EMWATER) stated that crop production efficiency could be significantly improved using optimal water and crop management schemes”, but unfortunately the majority of Lebanese farmers lack basic agricultural training and environmental awareness.

Ultimately, much like any other country, the irrigation water demand is the largest user of water in Lebanon, and inefficient irrigation practices result in nearly fifty percent of water loss.

¹² "Water Demands and Uses in Lebanon." International Development Research Centre. http://www.idrc.ca/pan/ev-140247-201-1-DO_TOPIC.html (accessed April 21, 2010).

¹³ Ibid

¹⁴ Now Lebanon, Lebanon's Agriculture sector suffers with climate change

¹⁵ "Water Demands and Uses in Lebanon." International Development Research Centre. http://www.idrc.ca/pan/ev-140247-201-1-DO_TOPIC.html (accessed April 21, 2010).

¹⁶ Ibid

Surface (flood) irrigation is used in about seventy percent of irrigated schemes, while drip and sprinkler systems are used on seven percent and twenty three percent of irrigated land respectively. In most areas, farmers use far more water than is needed for efficient crop production with over irrigation reaching as high as three hundred per cent in some areas.¹⁷

V: Industrial Waste

There is extremely limited information concerning Lebanon's industrial water use. It is estimated that around seventy percent of all industrial water needs are satisfied from underground sources, mostly from illegal private wells.¹⁸ This is causing excessive pollution and leading to degradation of water quality. Most industrial waste waters are not recycled, as pumping new water from aquifers is considered much cheaper than water recycling which ultimately is causing a loss in water potential. "Hardly any water recycling facility exists in the industrial facility and this is mainly due to the low cost of water extraction as compared to recycling."¹⁹

VI: Domestic Water Waste

Most of Lebanon's roughly four million inhabitants reside in the major cities which lie on the narrow coastal stretch. "Many – if not most- residential buildings rely on private water wells to meet their demands for water."²⁰ This has many negative consequences. Much like the effects of private wells utilized for irrigation purposes outlined above, the uncontrolled digging of wells for domestic use also leads to excessive and wasteful practices. Illegal and uncontrolled well

¹⁷ "Water Demands and Uses in Lebanon." International Development Research Centre. http://www.idrc.ca/pan/ev-140247-201-1-DO_TOPIC.html (accessed April 21, 2010).

¹⁸ Amery, Hussien A.. "Assessing Lebanon's Water Balance." International Development Research Center. http://www.idrc.ca/en/ev-33225-201-1-DO_TOPIC.html (accessed April 21, 2010).

¹⁹ "Water Demands and Uses in Lebanon." International Development Research Centre. http://www.idrc.ca/pan/ev-140247-201-1-DO_TOPIC.html (accessed April 21, 2010).

²⁰ "Water Demands and Uses in Lebanon." International Development Research Centre. http://www.idrc.ca/pan/ev-140247-201-1-DO_TOPIC.html (accessed April 21, 2010).

digging has reached fifty percent and the Ministry of Environment and Water has estimated losses reaching as high as thirty percent.²¹ A major effect that differs from illegal digging in the Bekaa is that since these domestic wells are usually pumping from coastal aquifers there is a major consequence caused from seawater intrusion. Beirut for example, the country's capital and largest city that holds around half the country's population, is estimated to require 250 Mm³/year of water extracted primarily from two major aquifers, but its freshwater and wastewater infrastructure is inadequate and outdated.²² This leads to many leaks and wastes since most of the waste water is dumped into the Mediterranean and not recycled. This is recurrent throughout the Lebanese water network where not only is the inadequate water supply infrastructure causing wasteful leaks, but also prone to water borne diseases and degraded water quality. According to Mohammed Bendrissi Alami, WESH Senior Programme Officer at UNICEF's Beirut office, "People are building houses too close to springs, or they are digging septic tanks close to water holes, both which lead to feces contaminating drinking water and subsequent diseases such as hepatitis and diarrhea."²³ Ultimately, seventy per cent of Lebanon's water system lacks proper sewage treatment. Consequently, most waste water simply ends up in rivers and acts to further compound pollution of otherwise fresh water.²⁴

The mismanagement of water resources by the central government, which only recently reformed the administration of water from twenty two institutions to four, has forced households to connect themselves unilaterally and illegally to the mains water supply causing decreased pressure and a worsening of the situation. This is further exacerbated by the absence of water

²¹ Ibid

²² Amery, Hussien A.. " Assessing Lebanon's Water Balance." International Development Research Center. http://www.idrc.ca/en/ev-33225-201-1-DO_TOPIC.html (accessed April 21, 2010).

²³ IRIN news. "Lebanon: Water supply is priority issue for the south." IRIN humanitarian news. <http://www.irinnews.org/Report.aspx?ReportId=70642> (accessed April 21, 2010).

²⁴ Ibid

meters to detect such illegal tapping and the fixed annual water bill of US \$120 perpetuates disparities of water access for rich and poor. Lebanon also has huge disparities in the distribution of its water resources across southern areas of the country. In Sidon, a southern port city and the country's second largest city, the water supply is currently at about three times the requirement of its residents and will remain so until 2025. This is primarily due to an abundance of natural wells. By comparison, the poorly supplied mains water system for the district of Nabatiyeh, further south, the mains supplies water at an average of only three times a week.²⁵

Despite Lebanon's adequate water supply, many skeptics and experts fear that a major water crisis will hit Lebanon soon. This however is not going to be primarily due to climate change lowering water tables, but rather due to the excessive mismanagement. According to Nadim Farajalla, associate professor of hydrology and water resources at the American University of Beirut, "If we (Lebanese) keep managing our water resources the way we are doing right now, by 2020 or even 2025 at the latest, available water will not be sufficient for us."²⁶ The imminent water crisis according to experts such as Dr. Farajalla is primarily caused by wasteful water use, illegal pumping of the countries rivers, uncontrolled drilling of wells, and even pollution. "What's happening is water quality always affects quantity ... we are polluting some of the water resources that we have, and what's happening in return is people are unable to use the water."²⁷

VII: Israel as a Hindrance to Development of Lebanon's South

What was not destroyed in terms of water infrastructure during the fifteen year Lebanese civil war was further damaged during the devastating Israeli aggression of the July War in 2006.

²⁵ Ibid

²⁶ Now Lebanon. "Lebanon's water threatened by climate change." Now Lebanon. <http://www.nowlebanon.com/NewsArchiveDetails.aspx?ID=128665> (accessed April 21, 2010).

²⁷ Ibid

The air strikes which were aimed primarily at damaging the Lebanese infrastructure greatly affected the already distraught water network primarily in the south of Lebanon. “The Israeli bombardment included the destruction of water tanks, springs, and pipelines, leaving most of southern Lebanon totally cut off from the mains water supply in the immediate aftermath of the war.”²⁸ Ironically, the south of Lebanon is also the location of some of Lebanon’s mightiest rivers, including the Litani, Wazzani, and Hasbani which Lebanon also shares with Israel. Ironically, despite the water wealth in the region, households connected to the mains only get water a few days per week. According to a resident of Al-Khiam, the village that housed the infamous Israeli prison, “water is pumped maximum twice a week.”²⁹ The desperate status of Lebanon’s water supply in the south has prompted humanitarian organizations to intervene to alleviate the water crisis.

Immediately after the secession of hostilities, UNICEF was “not only directly engaged in the engineering process, but has provided funding for the reconstruction of destroyed water tanks for entire towns and surrounding villages” in the region.³⁰ WESH is also helping rebuild twelve other water tanks as well as pipelines and has provided twelve generators to southern towns to keep water pumps working during the daily electricity cuts. Even Lebanese organizations have stepped in, Jihad al Bina, Hezbollah’s construction company, has repaired the damaged network of pipes in Khiyam, but locals say water shortages will persist and blame the central government for years of neglect. According to a Khiyami community leader, “we have shortages now and in the summer the population of the town will double. We’ve had nothing from Beirut. We are used

²⁸ IRIN news. "Lebanon: Water supply is priority issue for the south." IRIN humanitarian news. <http://www.irinnews.org/Report.aspx?ReportId=70642> (accessed April 21, 2010).

²⁹ Assir, Serene. " Lebanon - Rehabilitating water systems and raising hygiene awareness in south Lebanon." UNICEF. http://www.unicef.org/infobycountry/lebanon_38335.html (accessed April 21, 2010).

³⁰ Ibid

to that. We need new pumps and new wells, but there is no search for them going on. For that we would need an efficient government.”³¹

VIII: The Wasteful State of the Management:

It is not intentional neglect that the central government has exhibited on the rural community of the south. The Lebanese central government, which is based on a consociational representation model in which Muslims and Christians are equally represented, has had many challenges and limited resources to tackle them with. As such the administration has had far more pressing and important issues to handle – namely the reconstruction of infrastructure and buildings that paved way to economic success. By no means can a war torn ravaged country’s government be expected to handle and create efficient systems in just less than two decades. The neglect can also be blamed on the fact that the south and Bekaa regions are controlled by Hezbollah – and not the central government. It was only in late 2006 that the Lebanese army was even able to enter and establish itself in the military zones of south Lebanon. Furthermore, most of the population derives sustenance from agriculture. Investments in such volatile areas could lead to unnecessary risk of being placed in danger given the situation with Israel. Furthermore, investment in agriculture needs would require tapping into resources that are shared with Israel, namely the Wazzani and Hasbani, to which Israel might oppose. It is no secret that the prime minister of Israel, Ariel Sharon, had stated in 2002 that any water diversion projects in Lebanon “constitutes a *causus belli*.”³²

³¹ IRIN news. "Lebanon: Water supply is priority issue for the south." IRIN humanitarian news. <http://www.irinnews.org/Report.aspx?ReportId=70642> (accessed April 21, 2010).

³² BBC. "Israel hardens stance on water." BBC News. http://news.bbc.co.uk/2/hi/middle_east/2265139.stm (accessed February 17, 2010).

IX: Neighborly Greed

Despite the fact that most of Lebanon's water resources are confined to its borders, there are some larger rivers that either act as tributaries to other international rivers, such as the Hasbani for the Jordan River, or themselves traverse political boundaries, such as the Assi (Orontes) crossing over to Syria. One of the main impediments to the development of Lebanese sources, especially in the south of Lebanon is ultimately Israel. Apart from the wars and the risks that make investments in that volatile area unattractive, Israel itself desires access and control over the mighty rivers of the Hasbani and Litani.

The Hasbani River is a major tributary of the Jordan River which ultimately flows down to Israel and acts as its main source of surface water. Any Lebanese development plans for the Hasbani would mean less water flowing downstream towards Israel. Ariel Sharon was referring to that river particularly in his statement concerning the *causus belli*. Till today there is still no treaty to share this transboundary river between both Lebanon and Israel. This makes development projects difficult and eventually avoided. Ultimately, it is in Israeli interests to minimize any development projects along Lebanon's southern rivers. This would give Israel the excuse to say that Lebanon is not exploiting its share of the waters and hence Israel, who is in more need and has proven water management efficiency, will have the right to a greater share of river's water. According to Nadim Farajalla, "if we (Lebanon) don't do anything there will come a point where the international community will tell us that we have lost our rights to exploit this water."³³ It is exactly such a policy that Israel would be in favor of pursuing, especially granted the lack of an established water sharing treaty.

³³ Al Arabiya. "Lebanon to run out of water by 2015: expert." Al Arabiya. <http://www.alarabiya.net/articles/2010/03/22/103719.html> (accessed April 21, 2010).

The Litani River has both similar and slightly different aspects. Unlike the Hasbani which acts as the tributary of the Jordan River, the Litani flows fully inside sovereign Lebanese territory. The river rises in the northern Bekaa valley and runs southward to Beaufort Castle, where it turns westward to empty in the Mediterranean Sea. It was this river that then defined the northern borders of the Israeli occupied southern Lebanon. Israeli interests in the waters of the Litani date back to pre-statehood. In his letters to various British officials, Chaim Weizmann, head of the World Zionist Organization (WZO), argued that Lebanon was well watered and that the Litani River was “valueless to the territory north of the proposed frontiers, they can be used beneficially in the country much further south.”³⁴ Weizmann concluded that the WZO considered the Litani valley for a distance of twenty five miles above the bend of the river essential to the future of the Jewish national home. In 1941, Ben-Gurion suggested that the Litani be included in the borders of the future Jewish state. Even the 1967 war was said to have hydrological motivations. “In fact, in the war of 1967, water resources were perhaps the prominent factor in Israeli strategic calculations.”³⁵ The water supplies from the territories acquired in the west bank constitute as much as forty percent of the water consumed in Israel.³⁶ It is ultimately at the statement made by Moshe Dayan in the conclusion of that war that proves Israeli interests in the Litani, “Israel had achieved provisionally satisfying frontiers, with the exception of those with Lebanon.”³⁷

The Litani River is characterized with an average annual flow estimated at 920 million cubic meters, of which Lebanon utilizes inefficiently 125 million cubic meters for irrigation

³⁴ Amery, Hussein A.. *The Litani River of Lebanon.: An article from: The Geographical Review*. New York: American Geographical Society, 1993. p.3

³⁵ Moss, Angela J.. "ICE Cases: Litani River Dispute." American University.
<http://www1.american.edu/TED/ice/litani.htm> (accessed April 21, 2010).

³⁶ Amery, Hussein A.. *The Litani River of Lebanon.: An article from: The Geographical Review*. New York: American Geographical Society, 1993. p.2

³⁷ Ibid p.3

purposes in the Kasmieh irrigation project, and around 236 million cubic meters are diverted through the Markaba tunnel to fuel hydroelectricity and augment the wasteful water supply network of Beirut.³⁸ It is projected that if the relatively easy link is constructed from the Litani to the Hasbani, then Israel could potentially augment its water supply by a staunch 800 million cubic meters annually, or around forty percent of its aggregate annual consumption.³⁹ As such, much like Israel has occupied south Lebanon before, it is highly probable that it might do so again if the water situation in the country becomes worse. “The desire to obtain additional water sources has been a primary influence on geostrategic interaction of Israel and its Arab neighbors.”

It is not technically difficult to divert the waters of the Litani into the Hasbani. At one geographic location, the distance between these two rivers is five kilometers.⁴⁰ At another point, the river is only four kilometers from the Israeli border itself. It is such reasons combined with the fact that Israel witnesses on average a water deficit of around six hundred million cubic meters that lead many analysts to consider the hydrological imperative of Israel to occupy south Lebanon, which it did for slightly less than two decades.⁴¹ Ultimately, “water is a sensitive political issue and it’s true that any attempt by the state to exploit its rivers in the south would meet with a reaction from Israel.”⁴²

X: Other wastes:

Apart from the wastes that are caused from inefficiencies within the current infrastructure, Lebanon also wastes water due to the lack of infrastructure. Most of Lebanon’s

³⁸ Ibid p.4

³⁹ Ibid

⁴⁰ Ibid

⁴¹ Ibid p.3

⁴² Al Arabiya. "Lebanon to run out of water by 2015: expert." Al Arabiya. <http://www.alarabiya.net/articles/2010/03/22/103719.html> (accessed April 21, 2010).

rivers are fed through rainwater or melting snow, however with the lack of proper rain water catchment facilities such as dams and reservoirs, most of this water gets wasted in the Mediterranean sea. Only a few dams exist and even those are not adequate or properly maintained for efficient storage. According to Energy Minister, Gebran Bassil, despite the fact that Lebanon had not witnessed a water shortage in 2010, over “1.5 billion square meters of rain water got wasted in the sea.”⁴³

XI: The Arab Gulf States’ Role

Thus as outlined above, despite Lebanon’s abundant supply of water resources, most of it gets wasted due to lack of proper management. This second part of the paper will outline how Arab investment in Lebanon’s water sector, primarily from oil rich Gulf States could prove to allow for an export worthy surplus of water to be transported to Arab states and aid them with their water needs.

All other Arab states can be considered as water starved. Syria and Iraq, despite relative water supply are also estimated to need more water than is generally available. Syria and Iraq will respectively require one billion and two billion cubic meters of water to satisfy immediate water needs to meet minimum requirements of their populations and economies.⁴⁴ Further south, the gulf states are relying on primarily desalination since the over pumped ground water is by no means able to satisfy current population and economic demands.

Nabih Berry, the Lebanese speaker of parliament, has recently called for Lebanon to begin exporting water resources to the Gulf States. That was reiterated by Gebran Bassil, the Lebanese Minister of Energy, who stated that he will “set up a strategic plan that will include

⁴³ Now Lebanon. "Bassil: No water scarcity in Lebanon this year ." Now Lebanon. <http://www.nowlebanon.com/NewsArchiveDetails.aspx?ID=155249> (accessed April 21, 2010).

⁴⁴ The Litani river of Lebanon p.2

repairing and expanding water networks, erecting dams, and exporting water to other countries.”⁴⁵ However, to commence such a project will require great investments in terms of developing the deplorable state of the Lebanese water infrastructure - resources that Lebanon does not currently have.

In its present state, Lebanon cannot begin investing in exporting substantial amounts of water into neighboring countries simply because there are no substantial amounts to be exported. In order to have a lucrative amount ready, Lebanon must first implement efficient water management systems in virtually all aspects and install proper mechanisms to deal with water to allow for a large enough surplus to be deemed export worthy. The current export of negligible amounts of bottled water is not enough to alleviate regional water stress, nor will it bring any tangible gains to the Lebanese economy. Ultimately, in order to properly realize the goal of water export, Lebanon needs to maximize the efficiency of its water management.

Gulf States have already begun to invest heavily in Lebanon. The successes of reviving the Lebanese economy have been partly caused by Gulf investments in the country, primarily in the construction industry. This has fueled the reconstruction boom that has left relatively no trace of previous wars and conflicts that have devastated the country. Gulf States have in their possession a vast amount of liquid money that they are seeking to invest. These sovereign wealth funds, driven by the boom in oil prices, have been a controversial point as Gulf States have been investing in many key industries worldwide.

Today, sovereign wealth funds have become quite common. As of March 2007, the United Arab Emirates and Saudi Arabia had, respectively, the first and third largest SWFs internationally, and Kuwait ranked sixth. Because of burgeoning oil prices, Persian Gulf sovereign wealth funds have become the preferred investment vehicles of

⁴⁵ Now Lebanon. "Bassil: No water scarcity in Lebanon this year ." Now Lebanon. <http://www.nowlebanon.com/NewsArchiveDetails.aspx?ID=155249> (accessed April 21, 2010).

Kuwait, Qatar, and the United Arab Emirates. As SWFs blur the line between public and private investment, however, western nations worry about the security implications of foreign countries, including Persian Gulf states, acquiring important positions in key industries and companies.⁴⁶

With such vast amounts of resources, Gulf States could find it greatly rewarding if they invest in the development of Lebanese water resources. Much like they are investing in the development of the real estate sector and construction in Lebanon, there could be an emphasis on investment in Lebanese water resources meant for export to neighboring countries, including, potentially, themselves. “The Persian gulf countries have invested US \$140 billion overseas between 2004 and 2007 alone, an investment blitz that has transformed some of the Persian Gulf emirates into key actors on the international financial stage.”⁴⁷ Furthermore, there has already been a great shift from traditional investments to the nontraditional.

Many SWFs have shifted toward a 2005 recommendation, made by an international consulting firm to the Kuwaiti Investment Authority, that it ‘decrease the fund’s allocations to the traditional asset classes (such as publicly listed equities and bonds) and increase the allocation into nontraditional and uncorrelated asset classes (such as alternative investments, private equities and real estate).’ In practice this has led the Kuwaitis and others to shift investment targets from slow-growth economies like the United States, Great Britain, and Germany to rapidly growing economies – namely China, India, South Korea, and Turkey. As the chief of the Kuwait Investment Authority asked, ‘why invest in two percent growth economies when you can invest in eight percent growth economies?’⁴⁸

Ironically, Lebanon witnesses an average real GDP growth rate of eight percent as well. According to a Lebanese financier, investment in Lebanon is lucrative and would yield returns in the long run – especially in Lebanon’s richest natural resource, water.⁴⁹

European banks have already begun investing in water development projects in Lebanon.

⁴⁶ Winer, Stephanie. "Sovereign Wealth Funds: Investment Vehicles for the Persian Gulf Countries." Middle East Forum. <http://www.meforum.org/1863/sovereign-wealth-funds-investment-vehicles-for> (accessed April 21, 2010).

⁴⁷ Ibid

⁴⁸ Ibid

⁴⁹ Anonymous, Personal Interview, Zurich - Switzerland

In 2009, and during the inauguration of the Tripoli wastewater treatment plant which benefited from a European Investment Bank loan, the bank approved a further loan of 70 million Euros to support new water treatment facilities in the Kesrwan region.⁵⁰ This investment comes from a series started since 1993, whereby the European Investment Bank has approved loans of nearly 600 million Euros for Lebanon, mostly in support of infrastructure development and rehabilitation in projects including electricity distribution rehabilitation and water and wastewater development in several Lebanese cities.⁵¹

The European Investment Bank has less interest than potential Arab investors who have much more to gain from such investments. Ultimately, investing in Lebanon's water sector is not only financially beneficial, but could also lead to transporting water via pipeline to the Gulf countries themselves. Much like oil and gas are transported through pipes, water, a more important resource, could also be transported in a similar manner. In the 1950s, Saudi Arabia created the Trans-Arabian pipeline that transported oil across the Middle East reaching Lebanon, where the oil was then refined and loaded onto tankers bound for the west. This was done at a time that oil was much cheaper than it is today. There is no reason that water can't substitute water in such a case.

Potential Gulf investments in Lebanon's water sector should include fully developmental aspects. If they invest in installing efficient wastewater treatment and recycling plants, then not only can Lebanon reuse waste water for irrigation or other purposes and increase real supply of water, but also decrease pollution in its rivers yielding more water potential and decrease pollution all together. Second, updating the water

⁵⁰ AME Info. "EIB supports water and road infrastructure in Lebanon | European Investment Bank (EIB) | AMEInfo.com." AME Info. <http://www.ameinfo.com/191260.html> (accessed April 22, 2010).

⁵¹ Barragan, Alberto . "Intervention of the European Investment Bank." Speech, Visit of Mr. Alberto Barragan to Lebanon from Lebanese Government, Beirut, July 27, 2000.

infrastructure in cities would ultimately yield to less water leaks and allow for more water availability bound for export. That would also help in decreasing soil pollution and pollutants leaking from pipes and contaminating other ground water sources. Third, investments in the heaviest waster of water, agriculture, could yield to a tremendous increase in water availability. Installing drip irrigation systems to replace traditional flood methods would not only yield to saving a huge percentage, but also increase crop yield. Fourth, water catchment and reservoirs must be installed to be able to effectively store rainwater and river water that otherwise would be dumped in the sea. Dams and reservoirs will allow the water to be used in summer and also create the storage capacity necessary if an exporting project is implemented. Furthermore, since hydropower is considered one of the cheaper ways of generating electricity, installing hydropower dams will allow for enough electricity to be generated, satisfying Lebanese power needs, and potentially even allowing for a potential of export of electricity to Syria.

On the other hand, it is up to the Lebanese government to decrease water demand in the country to be able to achieve a greater surplus. Proper tariffs should be placed for abusers of water, and meters should be installed to measure properly the amount of water a household consumes and in return must pay for. This will encourage water conservation among citizens and also give the government necessary funds to maintain this renewed system. If all such measures are implemented, then Lebanon could be able to satisfy its water needs, update its water network, and maximize the efficiency of its agriculture sector.

There is water availability in Lebanon, and with proper investment, there would be a great enough surplus in the country that it would be export worthy. The vast amounts of water saved and stored could be potentially transported through pipeline to quench the

thirst of neighboring countries and could potentially reach the Gulf States themselves if found economically feasible. The Lebanese Central Bank governor, Riad Salameh, stated “that if the water sector is well organized, its value could reach \$ 5 billion to \$ 6 billion to be added to the national wealth.”⁵²

XII: Peace Water Pipelines – A Proposal

The late Turkish president, Turgut Ozal, in 1986 proposed the creation of the “Peace Water Pipeline”, a US \$21 billion project to bring water from the Seyhan and Ceyhan rivers via pipelines to cities in Syria, Jordan, and Arab Gulf States.⁵³ It was proposed that this project transfer around 10 million cubic meters of water every day and is sufficient to meet the daily needs of around fifteen million persons.⁵⁴ This was however rejected by most states due to economic and political reasons. Gulf Arab states said that the cost of one gallon of water from that project will cost 1.36 US cents, whereas one gallon of desalinated water costs only 0.27 cents.⁵⁵ This is primarily due to the fact that the pipes will cost too much to traverse the desert and ultimately make the per unit cost too much. The political dimension included well founded fears on behalf of the recipients that such a project would give Turkey a big leverage over the Arabs. The fact that Turkey retains control over the headwaters of something so vital spurred concerns among Arabs, especially in calculating the geopolitical aspects of it. Furthermore, Turkey also has had a

⁵² The Daily Star, Ali Akbar. "\$6 billion potential if water sector better managed - Salameh." The Daily Star. http://www.dailystar.com.lb/printable.asp?art_ID=112532&cat_ID=3 (accessed April 22, 2010).

⁵³ Gruen, George. "Turkish Water Exports: A Model For Regional Cooperation in the development of Water Resources." IPCRI. www.ipcri.org/watconf/papers/george.pdf (accessed April 22, 2010).

⁵⁴ Gruen, George. "Turkish Water Exports: A Model For Regional Cooperation in the development of Water Resources." IPCRI. www.ipcri.org/watconf/papers/george.pdf (accessed April 22, 2010).

⁵⁵ Feuillherade, Peter. "Water pressure." Find Articles.com. http://findarticles.com/p/articles/mi_m2742/is_n229/ai_n25022190/ (accessed April 22, 2010).

bad past incidents with water resources between itself and the other Arab co-riparians of the Tigris and Euphrates.

The Turks then amended their proposal into a shorter pipeline that would reach only Syria and Jordan. This one would cost a fraction of its predecessor with an estimated cost of US \$5 billion. This smaller pipeline was planned to pump six million cubic meters of water daily.⁵⁶ However the same reaction has been met by Syria which did not want to rely on Turkey as it already does for the Euphrates, the flow of which was cut at one point in time to fill the massive Ataturk dam. The pipeline could also be extended to supply the water parched Palestinians. However, that would require that Syria and Israel normalize relations – something not foreseeable in the near future.

In light of these proposals, the Lebanese government actually proposed a counter offer. It would be able to supply almost the same amounts of water through a similar pipeline to the Gulf States at a total of US \$6 billion, itself a fraction of the US\$21 billion of the initial Turkish proposal.⁵⁷ The Lebanese proposal itself was subject to the skepticism that it would not be able to deliver the quantities required. However, as outlined above in this paper, there is available water quality, if Lebanon is assisted financially and technically in managing its water resources. Ultimately even if the long 1500 km pipeline that would run to the gulf is proven financially unfeasible, A much shorter pipeline could be transmitted to Syria and Jordan, crossing a distance of only a bus ride from Beirut.

⁵⁶ Feuilherade, Peter. "Water pressure." Find Articles.com. http://findarticles.com/p/articles/mi_m2742/is_n229/ai_n25022190/ (accessed April 22, 2010).

⁵⁷ Feuilherade, Peter. "Water pressure." Find Articles.com. http://findarticles.com/p/articles/mi_m2742/is_n229/ai_n25022190/ (accessed April 22, 2010).

Another alternative would be investment in the agriculture sector of Lebanon. Due to the country's vast plains, predominantly in the north, the Bekaa, and South valleys, and generally good and fertile soil, Lebanon is estimated to have a total cultivated land area of 328,000 ha.⁵⁸ Unfortunately, only about one third of that, about 190,000 ha is currently under cultivation.⁵⁹ According to Dr. Nidal Salim of the Global Institute of Water, Environment and Health, water security is an offshoot of food security.⁶⁰ Most water demand tends to go towards irrigation ultimately aimed at satisfying local food security. Syria's major concern for water security is irrigation. Furthermore, Saudi Arabia has also begun investing in creating artificial irrigation farms to produce crops locally, at an inefficient cost of both money and water. If Gulf States decide to invest in Lebanon's food sector to allow it to reach its full potential, Lebanon could then export the ready crops to neighboring countries as a form of water exchange. Ultimately, Lebanon is able to produce crops at less demand for water in its fertile land than, for example, Saudi Arabia in the desert. This is also a form of cooperation that will not only benefit Lebanon, but the importing countries as well.

A multilateral agreement might be reached whereby Lebanon would be granted the financial means to update its water sector to reach its maximum potential in return that Lebanon supply all surplus water after satisfying its needs to the other states. In its current state, Lebanon is able to satisfy most of its water needs in most areas, more or less. Eighty percent of the population has access to safe drinking water and the agriculture sector is able to satisfy local food demand and even export surpluses abroad. Upon speaking to a

⁵⁸ "Water Demands and Uses in Lebanon." International Development Research Centre. http://www.idrc.ca/pan/ev-140247-201-1-DO_TOPIC.html (accessed April 21, 2010).

⁵⁹ Amery, Hussien A.. "Assessing Lebanon's Water Balance." International Development Research Center. http://www.idrc.ca/en/ev-33225-201-1-DO_TOPIC.html (accessed April 21, 2010).

⁶⁰ Salim, Nidal. Interview by author. Personal interview. GIWEH office , April 13, 2010.

Lebanese lawyer, he pointed out to me that under international law, “water within one catchment area should not be diverted outside that area - regardless of political boundaries - until all needs of those within the catchment area are satisfied”.⁶¹⁶² Hence, if such a multilateral agreement is to be installed for the export of water, then Lebanon’s water rights are guaranteed by international water law.

One must also put into account the fact that droughts might hit water rich countries too. Relying on one external source for water security might be too risky, which is why Gulf States seem to be reluctant in advancing in such water pipeline projects. Proper regional cooperation would have both Lebanese and Turkish proposals combined. A dual sourced pipeline could provide water to the gulf, as such diversifying sources which would act as a form of guarantee against political leverage and potential droughts. If needed, Lebanon could augment its flow if Turkey’s is faltering and vice versa. The combined supply of water could actually lead it to becoming cheaper than desalination in terms of per gallon cost. With the combined supply, the amount of water reaching the Gulf States could be triple if not more considering the agriculture export proposal mentioned above. Dr. Salim even indicated the possibility of linking Europe into the pipelines through Turkey as a supplementary way of diversifying sources. The Georgian representative to the meeting of the seventh legal board to the water convention, even mentioned that Georgia is relatively water rich, and as such could also be included in such a water linking scheme!⁶³ Ultimately, all these are feasible options that require proper financial studies. Again, much like oil and natural gas is transported through pipelines, fresh water, which is in itself a

⁶¹ [http://faculty.chass.ncsu.edu/soroos/PS336/Outlines/Week15\(05f\).html](http://faculty.chass.ncsu.edu/soroos/PS336/Outlines/Week15(05f).html)

⁶² Interview, Lebanese Lawyer – Zurich, Switzerland

⁶³ Interview, Mr. Ivane Shvelidze, April 17 2010 in the United Nations Office in Geneva.

more important resource, should prove economically feasible to transport and export. Much like India has embarked on an ambitious multibillion dollar project to link all its rivers together through canals, so too can the SWF rich Middle East achieve a water linking mechanism.

XIII: Benefits to Lebanon

Apart from the economic and developmental benefits that Lebanon would enjoy, such a project could have positive socio-political effects. Lebanon will benefit greatly from increased revenues, and the investments would stimulate further growth and development as secondary and tertiary sectors of the economy develop simultaneously. Furthermore, due to the fact that such development will primarily affect the agriculture sector, which is primarily made up of the Shiite sect inhabiting the south and the Bekaa, then that would revoke the resentment they feel towards the years of neglect by the central government. The development will strengthen Lebanese national unity, and reinforce the sense of faith in the central government. This will ultimately weaken radical groups which feed on such resentment and call for either the Islamization or the Cantonization of the small republic.

Such a project will also enhance Lebanon's position regionally. With the increased importance that Lebanon would play for the oil rich Gulf States and its stronger neighbors, it would be imperative for these states to keep Lebanon strong against both internal and external threats. The increased regional support will give Lebanon deterrence against any form of subversive acts be it on the part of Syria, which will benefit also from water exports, or Israel which will now face greater costs for any potential conflict. This will also allow Lebanon to justify its claim over its resources and ultimately revoke a hydrological imperative for Israel or Syria to occupy it. Ultimately, the project will also act as a major

stepping stone for further cooperation in the region with lucrative economic gains. Finally, extending the water pipeline to the water starved Israelis and Palestinians could prove an imperative for Israel to begin negotiating more seriously a peace settlement to the long stretched out Arab Israeli Conflict.

Importing countries will be able to satisfy their water demands at economically feasible costs. There are also lucrative financial gains from investing, be it in forms of holding shares in a successful project, or by giving developmental aid loans for Lebanon at low interest. In the long run, the money invested will return compounded in addition to the benefits of securing water resources.

Conclusion

In conclusion, fresh water resources are becoming ever scarcer in the world. As population growth and climate change takes its toll on available supplies, the world must look on to ways of effectively curbing these effects and securing their water resources. This is particularly the case with the Middle East, where the scarcity of the resource is becoming ever more problematic and where the forecasts seem grim. To avert a conflict over such an important resource, regional cooperation must entail the development of all available water resources and insure that they are not wasted. Such a potential that is being wasted is namely Lebanese water resources. The mismanagement of the resource by the government caused by a lack of financial and technical means is leading to an extremely valuable waste in water that could be easily transported and utilized elsewhere. Ultimately, water must be viewed for its worth, as a resource that creates and sustains life and as such must be managed properly to ensure that every bit of it is nourishing and sustaining life in the region, and more extensively on planet earth.

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