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## **Increasing Food Security in Lebanon by Decreasing Water Scarcity through Social and Political Avenues**

In an effort to inspire developmental efforts that universally address basic human needs and rights, the Millennium Declaration aims to free the world's people from extreme poverty, introduce global education, and prepare the world for a competitive future (The Millennium Development Report). The declaration, when applied specifically to Lebanon, looks to eradicate extreme poverty, reduce the discrepancy between genders, ensure environmental sustainability, and help Lebanon develop a global partnership with the Middle East and the rest of the world. On one hand Lebanon is a rising nation under its democratic political system, and multicultural values unmatched by the rest of the world. Yet, its present situation has arisen from an era of strife, death and destruction. This situation is still marked in the eyes of the world today. This Middle Eastern nation is ranked 83<sup>rd</sup> on the United Nations Development Programme's Human Development Index in 2009, a nation that was once marked with land disputes, religious conflicts, and improper social discourse caused by ruthless dictators and a rebellious underclass, and the repercussions of these ideas are still felt today. About 28.5% of Lebanese people live under the poverty line, with an uneven poverty distribution though the nation. Yet, the intrinsic reason behind this disparity is not fully understood. News agencies of the west only display the top layer of the issue at hand and fail to understand the true reason behind this phenomenon. Paired with a variable climate and an obsolete summer era, this nation faces about four months without rainfall and a large portion of the viable rainfall occurs in the Lebanon and Anti-Lebanon ranges (Fish). Though this situation can be found in other parts of the world, a conglomeration of factors specific to Lebanon makes it rather specific to this nation. Its interrelatedness to other countries around it adds to the web of complexity. Water scarcity, with its repercussions to food security, is a natural outcome of Lebanon's past and its current geopolitical landscape. This must be fixed through the investment in rural infrastructure which transcends traditional economic thought and also by assuaging the geopolitical problems that arise for Lebanon pertaining to its conservation process.

### *The Current Situation of Rural Lebanese Farmers*

The typical rural Lebanese family consists of Sireen, the female model and Imad, the dominant male figure. They will have a small family of one or two children in a rural community. This family may have lived on a variety of agricultural lands, from the interior plateau of the Beqaa Valley to the narrow valleys leading downward to the sea (Larwood and Marlyn). Village life is emphasized, and thus endogamy is a prevalent concept. Patriarchal hierarchy dictates the average family size and structure. A societal association exists between people of the same gender and similar age groups in this type of system. This concept primarily refers to the male heads and the elders who institutionalize their rule in order to gain subordination from the people (Joseph). After the Lebanese conflict with Israel in 1972, a majority of healthcare services had been destroyed. Even though only 42% of the population has health insurance, Imad will live to be 67.5 years of age and Sireen will live to be 71.2 (Makhoul and Harrison, Development Perspectives: Views from Rural Lebanon). There is a high risk of obtaining an infectious disease, whether it is blood bourn, from the food/water, vectorborne, or related to the respiratory system. The most common diseases include hepatitis A, typhoid fever, insect borne diseases, parasitic diseases, dengue fever, filariasis, leishmaniasis, and onchocerciasis (Disease). The maximum dietary intake occurs just after the harvest, but is almost halved during the dry season (Hwalla and Dalia). Education is a prime aspect of Lebanese culture and is emphasized for the male youth. A priority of the nation, about 9.3% of the national GDP goes into education (Frayha). Of the population of Lebanon, it was estimated in 2010 that 89.6% of individuals fifteen or older could read and write. Still, many families neglect to send their

children because of high unemployment rates among high school/college graduates in Lebanon (Makhouli and Harrison, *Development Perspectives: Views from Rural Lebanon*). 50%, or one of Sireen and Imad's children, will remain increasingly profitable by staying at home (Frayha). Livestock such as sheep and goats are an extra source of income (Larwood and Marilyn). Seasonally, Imad will change his crop output with the most common crops being bananas and citrus fruits and during the winter and summer he may grow cucumbers, tomatoes, melons and peppers.

### *Water as a Basic Human Right and the Issue of Water Scarcity*

In a historic effort, the United Nations passed a resolution 141 for, and zero against, which declared water "a human right that is essential for the full enjoyment of life and all human rights" for nations like Lebanon where demand for water is suspected to increase by an up fold of eighty percent in the next fifteen years, and practically run out by 2015 (Sikimic). This demand for water has had its toll on Lebanese society today. Yet, this scarcity exists even with an abundance of water available. Even though Lebanon has the smallest land area than its surrounding nations, it has the most water available (Yeranian). The population has access to twelve rivers, thirty-six streams and over a thousand springs, yet a chronic inadequacy of the water supply plagues the nation. The problem exists within how they harness and then distribute water. The head of the Energy and Water Ministry in Lebanon acknowledged that, "we use about half of that as drinking water or for irrigation and industrial purposes and the rest is dumped in the Mediterranean" (Blanche). Surrounding nations describe the nation as "un château d'eau," a castle of water (Kunigk). The basic flaw exists in the architecture of the Lebanese infrastructure. Its retrieval of water and then its distribution to the people is certainly not adequate. The inability to utilize the totality of this resource aggrandizes the problems of the Lebanese people.

### *Geographic Implications to Water Insecurity*

The location of Lebanon also plays a critical role in the retrieval of water. Annually, Lebanon receives a level of precipitation of nearly 8600 million m<sup>3</sup> of rain, of which a third is available for use (Kunigk). The highest demand that occurs in the regular season relays at 1551 million m<sup>3</sup>, but the nation in general faces a deficit of 690 million m<sup>3</sup> of water in the dry season (Kunigk). Though aquifers in the nation provide 1360 million m<sup>3</sup> of water, an outflow of water to other nations exists with a ratio of 10:1 against Lebanon. (FAO). Also, most rainfall in Lebanon happens at the most inconsequential times of the year, mostly during the winters. Greater than ninety percent of rain happens between November and April (Lebanon State of the Environment Report). The dry periods of the year are the primary times when rainfall is needed, but does not occur. Nearly sixty percent of Lebanon's water is utilized in agriculture, in which 310 million m<sup>3</sup> goes to waste (FAO's Information System on Water and Agriculture - Lebanon). The demand for water is also increasing at a rapid rate. The population of Lebanon is growing by a meager annual rate of 2%, and water consumption is increasing by 1.75%. These increases in the population will nearly double the demand for water in the next twenty-five years. (El-Fadel, Zeinati and Jamali). The increased demand for water is disconcerting because water shortages already exist.

### *Absence of Political Enforcement Pertaining to the UN Millennium Act*

This shortage has left a lasting effect on the Lebanese people. Even though the political structure in Lebanon has accepted the UN Millennium Act, there has been no political movement for the implementation of its principles (Makdisi). The regulation of water resources relies on the Ottoman Mejalla code and French Mandate laws. Even though the government proclaims that every citizen of Lebanon has complete access to water, there has been no enforcement of any policy pertaining to this proclamation. One of the main principles of Lebanon's essential codes is that water cannot be bought or sold for profit. In addition, no more than a 100 m<sup>3</sup> area of water can be extracted at one time from a given resource. Religious influence is also present in these principles. These principles demand that there is

enough water for the irrigation of crops and for the grazing of cattle, but do not outline guidelines for humans (Allan and Mallat). A combination of both loopholes in the system and a lack of political enforcement allow for the violation of these principles.

#### *Violation of Proper Water Renewal Methods and Their Implications*

This violation not only leads to the rapid removal of water from its storage, but also causes an increase in the amount of water wasted in the process. A lack of regulation allows for the wastage of water during its extraction as the methods used in order to extract this resource are not regulated (Makdisi). Renewal methods along with conservation are not practiced because both would increase the cost of extraction. The people are ultimately affected by this, as it affects the food security of the individual. This exploitation has caused the decimation of nearly fifty percent of arable land in Lebanon, and water availability polls from the people have shown that only sixteen percent of the population is in fact satisfied with water availability (Assaf, Attia and Darwish). Deforestation, irrigation, and drainage canals, all man-made situations cause eventual soil erosion. This removes the plant cover and diminishes any build-up of groundwater (Lebanon State of the Environment Report). In addition, sewage management capabilities are not available in most rural areas leaving almost 70% of its water to be contaminated by microbial agents which can reach as high as 91% during the dry season. The lack of water has led to increased food shortages in Lebanon. The devastation of the land, the exploitation of perishable underwater resources, and the ramifications of ruthless irrigation techniques has led to a large strain on the food supply for the Lebanese people. The potential for food production is nowhere near maximum capacity. This lack of regulation also leads to problems via the desertification of the land. Overharvesting of the land destroys the top soil turning highly arable land into areas of desert (World Day to Combat Desertification). These irrigation techniques used by the farmers are destructive simply because there are no constraints on the individual farmer on water usage. Thus, Lebanon is unable to produce its own food for its own people. This desertification due to the climate is one of the underlying reasons that food production goes down. Food shortages have forced nearly 33.6% of the food in Lebanon to have to be imported (Agriculture and Food - Lebanon). This increases its dependence on other nations, thus making Lebanon more susceptible for conflict.

#### *The Relationship between Climate and Irrigation Potential*

Due to its diversified climate along with a complex geographical structure, Lebanon faces many problems in irrigation. Marginalized land, where the government has little control, is ravaged through intensive irrigation practices. This has led to pollution, improper extraction of the water, and the contamination of the water resources. This shortage of water forces farmers to use this contaminated water in their irrigational practices (Darwich). In addition, in a field study done at the Faculty of Agricultural Sciences of the Lebanese university, fertilizers that are available in the market are not being used simply for the price and a lack of restriction otherwise (Darwish, Atallah and Khatib). In turn, the cheap fertilizers utilized by farmers degrade the land slowly each day. In other parts of Lebanon, the opposite side of the spectrum is present. Due to water scarcity, farmers cannot access the full potential of their fields. In some areas, only about 41.65% of the land is actually irrigated to its full potential, and at that point the cost of water becomes unprofitable when looked at comparatively to the sale of the product (Karaa, Karam and Tarabey). Economically speaking, the current methods of irrigation are not adequate and are leading Lebanon on a steep path downhill.

#### *Preservation of Water Resources*

Water management is also a crucial factor which adds to the severity of the situation. The inability to harvest and utilize renewable resources of water causes underground reserves to run out and puts a strain on a nation's aquifers. About fifty percent of Lebanon's annual rain is drained out to neighboring nations

or it evaporates (Ghaddar). In addition, the privatization of the water sector has made it harder for farmers to access the water resources. Though the Lebanese Government's legislation prohibits this type of privatization, this change has led to water shortages and has made water unavailable to farmers and the people hurting both the farm and the individual who runs the farm. Rural areas in Lebanon also face a physical shortage of this resource, forcing them to use illicit methods in order to gain access to this resource. The poorest in this area feel the wrath of even more devastating problem, neglect. In Lebanon one's economic status is primarily defined by the absolute poverty line, the point where a Lebanese family can meet the complete living requirements for a family of five. Twenty-eight percent of families cannot fulfill this requirement (Haddad). Eight percent of citizens live below the extreme poverty line leading to one million Lebanese who are unable to support themselves and 250,000 citizens who barely have the means of survival (Haddad). The poor typically do not have a significant agricultural holding. The high production costs due to the scarcity of water prevent poor farmers from remaining profitable. Unfortunately, this trend is worsening. Seventy-five percent of citizens who work in agricultural sector are poor, and 40% of these people are classified as extremely poor (Benouahi). In addition, two thirds of the population representing the extremely poor live in rural areas and make up about twenty-five percent of the population. There is also no system in place for an individual to gain access to credit and loans. Arable areas that are deemed unprofitable remain unharnessed. The areas of Bekaa's Valley and northern parts of Lebanon have the highest un-met demand compared to other parts of Lebanon because its production value is not as economical as other areas (Benouahi). All these factors deprive many of the essential right to water. In the last quarter of the fiscal year, the price of food in Lebanon rose by an astounding 30% (Saif). Unlike the developed nations of the world, poverty represents a large portion of Lebanon.

#### *Regional Implications Accelerate Water Scarcity*

This problem intensifies due to regional conflicts in the area. One of the crucial components to economic viability and stability in Lebanon is its interaction with other Middle Eastern nations. The Middle East currently supports about five percent of the World's population, but has the water capacity of less than one percent (Fisher and Askari). Not only do multiple nations control a single water source, but more powerful nations utilize their hegemonic powers to gain control of this resource on the land of others. Conflicts have arisen over this water resource. In the past century, nations such as Israel and Jordan have fought for the control of water. Though under a different political flag, Israel has made many moves in direct correlation of its water scarcity. With its conflicts in 1978, followed by withdrawal in 2000, and then occupation of the south in 2006, not only has Israel displaced millions of Lebanese people, but has also diverted hundreds of thousands of gallons of water into the Jordan River flowing in its own direction (Godesky). A General in the war in 1978 was quoted as saying that the prime reason for the invasion was due to a lack of sanitary water for its people (Godesky). During Israel's former years, the diaries of its Prime Minister had already begun to display interest in occupation of Southern Lebanon (Amery). The Israeli population receives five times as much water as the average Lebanese man and pays nearly one fifteenth the price (Godesky). Lebanon's interrelatedness with other nations have given the people an unstable situation in both food scarcity and water scarcity. Due to this instability, fear has driven people from their land, further decreasing the price of crops. Those driven away are thrown into poverty, further degrading the situation. Israel's invasion in 2006, code named "Operation Litani", is still operational in the southern part of Lebanon today, and continues to utilize the river's innate resource (Godesky).

#### *Transcending Traditional Economic Thought to Promote Water Conservation and Reduce Water Scarcity*

The primary solution is not directly through investment into the infrastructure, but through investment focused on a humanistic based approach. One of the primary initiatives of the UN Millennium is to make water an intrinsic human right. The inability of the Lebanese Government to enforce this policy is at the very core of the issue. This can be effectively solved by investing in a way that transcends traditional

economic thought. By working specifically with small scale farmers and consequentially adding in a humanistic perspective in the provision of water, one can alleviate the problem of water scarcity. This, along with a modification of the Lebanese political agenda, will help alleviate food scarcity and up regulate agricultural production. The two main problems that mark water insecurity are the inability of the small farmer to gain access to the necessary resources and the lack of enforcement of government policies. The small farmer simply does not have the ability to expand the farm and does not have the money to invest in new technology. Typically a farm will not invest in new technology unless the value of this new technology exceeds the cost of implementing it (Carey and Zilberman). For a poor rural farmer, the only time, typically, that this situation happens is when the crops of others have devastated immediately raising the price of crops. The farmer then has the incentive to invest into new technology and irrigational techniques in order to provide more products for more profit. The unfortunate part about this is that once the farmer invests in the new technology, the decimation of the crop has already taken place and there is little the farmer can do to benefit from the situation. Thus, it is first important to provide a market for the farmer which provides tools for proper irrigation and implementation techniques while taking note of proper water conservation. This must happen before a lower crop yield occurs.

#### *Implications of Investment at Lebanon's Rural Base*

By providing the necessary resources and providing a base for rural farmers to build on, Lebanon can prepare its farmers for a competitive future, and higher crop yields. In addition, Lebanon should aim to industrialize its process of water extraction. If this process is made profitable, then retrieval of the resource, properly, is made a priority. It can then be sold to surrounding nations which makes it a priority of the nation of Lebanon to reduce the wastage of water and even make it into a profitable avenue. This would ensure the proper conservation of water, protect the land from desertification, and also protect the individual economically. By saving water, one can alleviate the problem of unemployment in the agricultural sector as there will be both enough water for more irrigation, and thus higher employment in that area and also employment in the water extraction industry. Though this effectively combats the first step to the solution, there is a second part required for success. The government must view water as essential element for the human being and implement the policies that it had promised to. If this acknowledgement is enforced, then it must provide water for all its citizens regardless of their economic standing. A majority of those who fall under the shadow of water scarcity are in fact poor rural farmers. By accepting water as a human right, one is able to provide this essential resource for these rural farmers. These small holders are then able utilize this for further crop production. This, in combination with effective irrigational practices can provide the Lebanese people with the necessary resources. It may also allow Lebanon to harvest its water resources and profit with it. This can be used to allay international tension and reduce its dependency on surrounding nations. A more directed government would allow Lebanon to deal with its shortage crisis, and integrate itself on the global scale. The current government's policies are backed by the United States, and it just takes motive to implement them (Godesky).

#### *Conclusion*

The scarcity of water presents itself as the very root to the political, social, and economic problems in Lebanon, all of which lead to its present situation of food insecurity. Though it is an abundant resource in many parts of the world, this is not true for all nations. Lebanon currently stands with a superfluous amount of water, but its people simply do not have the tools, and its government does not have a focused political agenda to implement its own endorsed policies. Ten percent of deaths of all children in Lebanon are due to ineffective water filtration. The water is not pure. The land is abused to the point that deserts form for miles on end. The land is not pure. The people are those who are ultimately affected. The people are no longer pure. A more effective marketplace and political system with a push towards a humanistic perspective for water would allow for peace and increased food security for Lebanon. The ramifications of water scarcity are irrevocable, and failure would be disastrous.

### Works Cited

- "Agriculture and Food - Lebanon." World Resources Institute (2007): 2-6.
- Allan, J. A. and C. Mallat. "Water in the Middle East: Legal, Political and Commercial Implications." New York: I.B. Tauris (1995): 50-62.
- Amery, Hussein A. "The Litani River of Lebanon." *Geographical Review* (2003): 229-238.
- Assaf, Karen, et al. "Water as a human right: of the Middle East - A four country analysis The understanding of water in the Arab countries of the Middle East - A four country analysis." *Global Issues Paper* (2004): 1-38.
- Benouahi, Mohammed. "Republic of Lebanon Water Sector: Public Expenditure Review." Sustainable Development Department Analysis: Middle East and North Africa Region. 2010.
- Blanche, ED. "Middle East Water Wars." *Current Affairs* June 2010: 11-16.
- Carey, Janis M. and David Zilberman. "A Model of Investment under Uncertainty: Modern Irrigation Technology and Emerging Markets in Water." *Agricultural & Applied Economics Association* (2002): 171-183.
- Darwich, Tala. *Sustainable Land Management Practices to Reverse Land Degradation in Lebanon*. Beirut: United Nations - Economics and Social Council, 2009.
- Darwish, T, et al. "Fertigation and Conventional Potassium Application to Field Grown Potato in Lebanon: Perspective to Enhance Efficiency." *National Council for Scientific Research* (2004): 24-48.
- Disease vector ecology profile, Lebanon . Washington, D.C.: The Center, 1984. Print.
- El-Fadel, M., M. Zeinati and D. Jamali. "Water Resources in Lebanon: Characterization, Water Balance and Constraints." *Water Resources Development*, Vol. 16, No. 4, 615–638 (2000): 616-641.
- FAO's Information System on Water and Agriculture - Lebanon. 2008. 11 September 2010 <<http://www.fao.org/nr/water/aquastat/countries/lebanon/index.stm>>.
- Fish, W.B. "The Lebanon." *Geographical Review*, Vol. 34, No. 2 (Apr., 1944): 235-258.
- Fisher, Franklin M and Hossein Askari. "Optimal Water Management in the Middle East and Other Regions." *Finance & Development* 38 no3 S (2001): 52-56.
- Frayha, Nemer. "Education and Social Cohesion in Lebanon." *Prospectsolaw RevJal Pract* 33 NO1/213 (March 2003): 77-88.
- Ghaddar, Hanin. All dried up. 14 September 2007. 2010 14 September <<http://www.nowlebanon.com/NewsArchiveDetails.aspx?ID=13065>>.
- Godesky, Jason. "Israel's Water Wars." 15 August 2006. The Anthropik Network. 12 September 2010 <<http://tobypeople.com/anthropik/2006/08/israels-water-wars/>>.
- Haddad, Antoine. "The Poor in Lebanon." *The Lebanon Report* (1996): 94-98.

Hwalla , Nahla , and Dalia Tannous Dit El Khoury. "Lebanese Traditional Diets and Health Effects." SpringerLink 31 (2008): 35-41. Print.

Joseph, Suad. "Conceiving Family Relationships in Post-War Lebanon." Journal of Comparative Family Studies 35 no2 (Spring 2004): 271-93.

Karaa, K., F. Karam and N. Tarabey. Participatory Water Saving Management And Water Cultural Heritage: Lebanon Country Report. Lala: OPTIONS Méditerranéennes, 2008.

Kunigk, Emmanuelle. "Policy Transformation and Implementation in The Water Sector in Lebanon: The Role of Politics." Water Issues Study Group School of Oriental and African Studies (SOAS) (1998/99): 1-32.

Larwood, Elaine, and Marlyn Raschka. Beqaa Valley, Lebanon . Beirut: Ministry of Tourism, 1995. Print.

Lebanese Republic Nutrition Profile. Developmental Indicators. Beirut: Nutrition and Consumer Protection Division, 2007.

Lebanon. Rural Poverty in Lebanon. Web.  
<<http://www.ruralpovertyportal.org/web/guest/country/home/tags/lebanon>>.

Lebanon State of the Environment Report. Population Report. Beirut: Ministry of Environment/LEDO, 2009.

Makdisi, Karim. "„Reform“ , Towards a Human Rights Approach to Water in Lebanon: Implementation beyond ." Water Resources Development (2007): 369–390.

Makhoul, Jihad and Lindsey Harrison. "Development Perspectives: Views from Rural Lebanon." Development in Practice, Vol. 12, No. 5 (Nov., 2002): pp. 613-624.

Massoud, May A. "The Challenges of Sustainable Access to Safe Drinking Water in Rural Areas of Developing Countries: Case of Zawtar El-Charkieh, Southern Lebanon." Journal of Environmental Health (2010): 24-30.

Roudi-Fahimi, Farzaneh, Liz Creel and Roger-Mark De Souza. "Finding the Balance: Population and Water Scarcity in the Middle East and North Africa." Reference. 2010.

Saif, Ibrahim. "The Food Price Crisis in the Arab Countries: Short Term Responses to a Lasting Challenge." Carnegie Endowment for International Peace (2008): 1-5.

Sikimic, Simona. UN vote declares access to water a basic human right. 30 July 2010. 5 September 2010  
<[http://www.dailystar.com.lb/article.asp?edition\\_id=1&categ\\_id=1&article\\_id=117621#axzz0ygyTFucg](http://www.dailystar.com.lb/article.asp?edition_id=1&categ_id=1&article_id=117621#axzz0ygyTFucg)>.

The Millennium Development Goals Report. Rep. 2010. Print. United Nations.

World Day to Combat Desertification. 17 June 2004. 8 September 2010  
<<http://www.undp.org.lb/programme/environment/events/wdcd04/wdcd04.cfm>>.

Yeranian, Edward. Lebanon Has Lots of Water, Chronic Shortages Persist. 22 March 2010. 10 September 2010  
<<http://www.voanews.com/english/news/middle-east/Lebanon-Has-Lots-of-Water-Chronic-Shortages-Persist-88837127.html>>.