

Analytical Framework on Water, Food and Energy Security In the Middle East and North Africa (MENA)

Case Study: Jordan, Lebanon, Tunisia



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1. Introduction

Many of the Middle East (ME) countries face challenges, namely an increase in population growth, unemployment and rise in demands for energy, particularly Jordan, Lebanon and Tunisia that suffer from poor local energy resources and rise in demands for energy due to the influx of refugees to those countries.

Arab countries have an opportunity to achieve many gains if they were to focus on the water-energy-food nexus in their perseverance to achieve the Sustainable Development Goals (SDGs). Pressure factors over these three sectors are huge in the area, so are the restrictions and interwoven relationships among them. It is possible to apply an analytical frame of the nexus on different levels to comprehend the differences in natural resources fortunes owned by the Arab Countries and face complex challenges that stand in the way of attaining the water, food and energy security. This includes joint management of water resources, making decisions related to a mixture of renewable energy resources, energy efficiency usage in Arab Countries, assessments of exerted efforts by governments to achieve the Sustainable Development Goals (SDGs) and food security goals amidst water scarcity and deterioration of lands.

In order to build an analytical framework on water, food and energy security in the Middle East and North Africa (MENA), there has to be a joint vision based on mutual principles that are agreed upon by all Arab Countries; this can be encouraged by adopting a people-based approach, in line with the Sustainable Development Goals (SDGs), supported by a sturdy institutional and political framework across the Arab Region to achieve the water, food and energy security that is enacted through the appropriate strategies and plans in support of the nexus.





2. Global concept

Guaranteeing the right to water, food and energy is not solely reliant on clear provisions and stipulations, but on the philosophy of human rights, based on unity, cooperation and integration among these sectors rendering one matrix, so that no one sector has supremacy over the other. Furthermore, some rights are interwoven among sectors and sub-sectors, hence difficult to segregate or label as authenticated rights, even if not clearly stipulated as such.

The United Nations have given priority to attaining water and sanitation, through Goal 6 of the Sustainable Development Goals (SDGs), that clarifies relationships of many issues like health, food security, climate change (CC) and resilience in facing disasters and working with ecology systems.

Among the targets under Goal 6, is enhancing the quality of water, efficiency of its use and protection of related ecology systems to water, such as mountains, forests, wetlands, rivers, ground water and lakes; extending international cooperation, building capabilities of developing countries in water and sanitation-related programs and activities, inclusive water collection and desalination, efficiency of usage, treatment of waste water (reclaimed water use), recycling and usage of technology. As for energy, the Sustainable Development Goals (SDGs) ensured that it is a guaranteed right to all, at affordable tariffs – in terms of modernized, credible and sustainable energy, in addition to its being a major factor in main global challenges and opportunities for the world progress. Hence, attaining energy is pivotal to all on the levels of work opportunities, security, climate change (CC), food production or increasing income; sustainable energy is needed to promote economies, protect ecology and achieve equity.

Food is also in the heart of the 21st Century Development Program that runs under the umbrella of the United Nations, which was translated in the Sustainable Development Goals (SDGs); as for Goal 2 of the 17 Sustainable Development Goals (SDGs), it clearly depicts the need to “End hunger, achieve food security and improved nutrition and promote sustainable agriculture”. This Goal is to be achieved by 2030 by deeply changing both food and agricultural systems, globally.

1.2. Standardization of the right to water, food and energy

The right to water, food and energy has many components of legal nature that represent the standardized content of that right. This reiterates the nature of this right that is composite and interwoven with other rights; furthermore, these standards represent scientific and legal tools that widely monitor the attainment and grantees of this right, while going ahead with the commitments – by State and related institutions.

Rights include both freedoms and rights alike, so that the elements of the right to water, food and energy should be sufficient to preserve the human life, dignity and health, without tampering – knowingly or otherwise, in the guaranteed rights. The provisions of conventions



have to be interpreted so that they do not narrow down any right nor its content; they should not be interpreted based on quantity or technology, as if rights were economic commodities – but rather upon cultural, social and economic aspects (goods), alike.

1.1.1. Right to water

General Comment No. 15 (2002), the right to water (Articles 11 and 12 of the International Covenant) - Since water sufficiency needed to achieve the right to water varies according to different settings and circumstances, the following factors will apply for all circumstances:

- **Availability:** The water supply for each person must be sufficient and continuous for personal and domestic uses. These uses ordinarily include drinking, personal sanitation, washing clothes, food preparation, personal and household hygiene. The quantity of water available for each person should correspond to World Health Organization (WHO) guidelines. Some individuals and groups may also require additional water due to health, climate and work conditions.
- **Quality:** The water required for each personal or domestic use must be safe, therefore free from micro-organisms, chemical substances and radiological hazards that constitute a threat to a person's health. Furthermore, water should be of an acceptable colour, odour and taste for each personal or domestic use.
- **Accessibility:** Water and water facilities and services have to be accessible to everyone without discrimination, within the jurisdiction area of the State. Accessibility has four overlapping dimensions:
 - (i) **Physical accessibility:** water, and adequate water facilities and services, must be within safe physical reach for all sections of the population. Sufficient, safe and acceptable water must be accessible within, or in the immediate vicinity, of each household, educational institution and workplace. All water facilities and services must be of sufficient quality, culturally appropriate and sensitive to gender, lifecycle and privacy requirements. Physical security should not be threatened during access to water facilities and services;
 - (ii) **Economic accessibility:** Water, and water facilities and services, must be affordable for all. The direct and indirect costs and charges associated with securing water must be affordable, and must not compromise or threaten the realization of other Covenant rights;
 - (iii) **Non-discrimination:** Water and water facilities and services must be accessible to all, including the most vulnerable or marginalized sections of the population, in law and in fact, without discrimination on any of the prohibited grounds; and
 - (iv) **Information accessibility:** accessibility includes the right to seek, receive and impart information concerning water issues.

1.1.2. Right to food

General Comment No. 12: The Right to Adequate Food (Art. 11) depicts that the right to adequate food is realized when every man, woman and child, alone or in community with



others, have physical and economic access at all times to adequate food or means for its procurement. The right to adequate food shall therefore not be interpreted in a narrow or restrictive sense which equates it with a minimum package of calories, proteins and other specific nutrients. The right to adequate food will have to be realized progressively. However, States have a core obligation to take the necessary action to mitigate and alleviate hunger as provided for in Paragraph 2 of Article 11, of the Covenant, subject matter of the General Comment No. 31.

- The concept of adequacy is particularly significant in relation to the right to food since it serves to underline a number of factors which must be taken into account in determining whether particular foods or diets that are accessible can be considered the most appropriate under given circumstances for the purposes of Article 11 of the Covenant.
- The concept of sustainability is intrinsically linked to the notion of adequate food or food security, implying food being accessible for both present and future generations. The precise meaning of “adequacy” is to a large extent determined by prevailing social, economic, cultural, climatic, ecological and other conditions, while “sustainability” incorporates the notion of long-term availability and accessibility.

1.1.3. Right to energy

The Secretary General of the United Nations has the leadership role in the “Sustainable Energy Initiative to All” in order to guarantee that everyone can access modern energy services, enhance energy efficiency (EF) and increased renewable energy (RE) sources.

3. Assessment of the status quo in the Middle East

The Arab Region is one of the most arid in the world with one third of its potable water resources crossing international borders among two or more countries (Source: ESCWA); the water sectors in most Arab Countries today, are facing critical crises, e.g. the water resources originating from Tigris, Euphrates and the Nile have become extremely limited and shared by several countries. Most of the countries of the Region are classified as having dry or semi-dry climate; they are receiving an average of less than 250 mm of rainfall annually. As for renewable water sources per capita, it had reached 650 CBM (Cubic Meters) in 2014, compared to the global average that reached 6,000 CBM per capita, rendering 13 of the 22 Arab Countries within the poorest in water, at less than 500 CBM per capita.

According to the Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) between the World Health Organization (WHO) and the UNICEF on water supply and sanitation, about 8% of the inhabitants of the Arab Region (about 55 million persons) are deprived from accessibility to enhanced potable water resources, in 2015; while 9.5% of the inhabitants of the Region (about 66 million persons) are deprived from accessibility to enhanced sanitation. This percentage is expected to increase due to increased conflicts in



Libya, Syria, Iraq and Yemen¹. In Syria, as an example, 70% of the citizens do not have regular accessibility to potable water due to repetitive electricity interruptions and demolished infrastructure² plus the population growth in the Region, reaching 392.4 million (2015)³, all of which lead to worries over food security across the countries of the Region. Although there had been an increase in the Food Production Index from 82.6 in 2000 to 118.8 in 2013⁴, many Arab Countries are still facing grave problems on the level of agricultural production, due to limited economic resources, low dependency on new technologies, limited crops patterns and over-dominating and limiting environmental conditions. Since the agricultural production is highly affected by the water abundance, crops yields are therefore considered low, particularly when it comes to the basic grains, whose gross production reached about 1769.2 kg/hectare, in 2014, in comparison with the global average of 3886.2 kg/hectare⁵.

Within the same context, most Arab Countries depend hugely on imported food commodities. The Region is therefore excessively affected with global pricing and interruptions in supply chains. Given the ample challenges faced in many of the countries in the Region due to prolonged conflicts, scarcity of natural resources and repetitive droughts, large numbers of persons and children are prone to malnutrition.

The Arab Charter on Human Rights Article 38 depicts that Everyone shall have the right to an adequate standard of living for himself and his family, ensuring well-being and a decent life, including adequate food, clothing, housing, services and a right to a safe environment. The State Parties shall take appropriate measures within their available resources to ensure the realization of this right; and Articles 29 (e) and (f) ensure basic nutrition and clean water for everybody; fighting environmental pollution and supply sanitation systems.

4. Legal framework

The Arab Charter on Human Rights (most recent issue) was adopted by the 16th Session of the Arab Summit, hosted in Tunisia, on the 23rd of May, 2004.

Article 1: The present Charter shall undertake, in the context of the national identity of the Arab States, their sense of belonging to a common civilisation, to achieve the following goals: to place human rights at the centre of national preoccupation in the Arab States, to create great (fundamental) ideals for guiding the individual's will in these Arab State, to help him improve his situation (life) in accordance with the noblest human values.

¹ The United Nations Economic and Social Commission for Western Asia (ESCWA) 2015. Summary of issues of regional cooperation on promoting sustainable development in water and sanitation in the Arab Region

² United Nations Office for the Coordination of Humanitarian Affairs, February, 2016 "Syrian Arab Republic: 2016 Humanitarian Response Plan"

³ Population Expectations in the World, Population Department, United Nations (UN)

⁴ World Development Indicators, World Bank. An overview prepared by the Arab Development Portal Work Team, based on most recent available data, as of 30 September, 2016

⁵ World Development Indicators, World Bank. An overview prepared by the Arab Development Portal Work Team, based on most recent available data, as of 30 September, 2016



Article 3:

- Each State Party to the present Charter undertakes to ensure to all individuals within its territory and subject to its jurisdiction the right to enjoy all the rights and freedoms recognized herein, without any distinction on grounds of race, colour, sex, language, religion, opinion, thought, national or social origin, property, birth or physical or mental disability.
- The States Party to the present Charter shall undertake necessary measures to guarantee effective equality in the enjoyment of all rights and liberties established in the present Charter, so as to protect against all forms of discrimination based on any reason mentioned in the previous Paragraph.

Article 37: The right to development is a fundamental human right. All State Parties shall establish development policies and take measures to ensure this right. They must give effect to the values of solidarity and cooperation among them and, at the international level, to eliminate poverty and achieve economic, social, cultural and political development. In accordance with this right, every citizen shall have the right to participate in the development, and contribute to and enjoy the benefits, of their goods and fruits of their labour.

Article 38: Everyone shall have the right to an adequate standard of living for himself and his family, ensuring well-being and a decent life, including adequate food, clothing, housing, services and a right to a safe environment. The State Parties shall take appropriate measures within their available resources to ensure the realization of this right.

Article 39

- The State Parties shall recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health and the right of every citizen to enjoy free and non-discriminatory access to health services and health care centres.
- The steps to be taken by the State Parties shall include those necessary to:
 - e. Ensure basic nutrition and clean water for everybody.
 - f. Fight environmental pollution and supply sanitation systems.

Article 43: Nothing in the present Charter shall be interpreted as impairing the rights and freedoms protected by the State Parties' own laws, or as set out in international or regional instruments of human rights that the State Parties have signed or ratified, including women's rights, children's rights and minorities' rights.

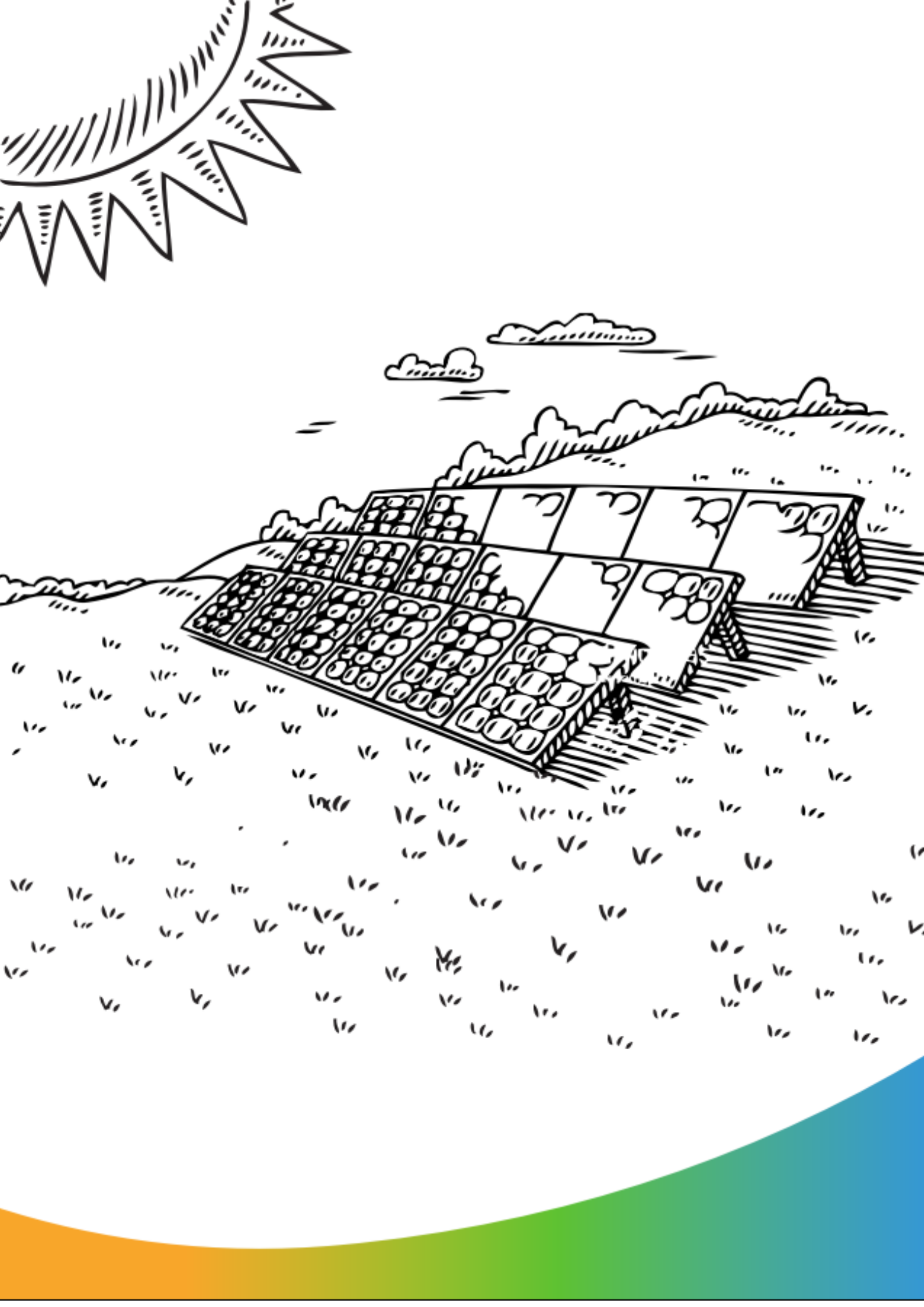
Article 44: Where not already provided for by existing legislative or other measures, the State Parties undertake to adopt, in accordance with their Constitutional processes and with the provisions of the present Charter, the necessary laws or other measures in order to give effect to the rights recognized by the present Charter.



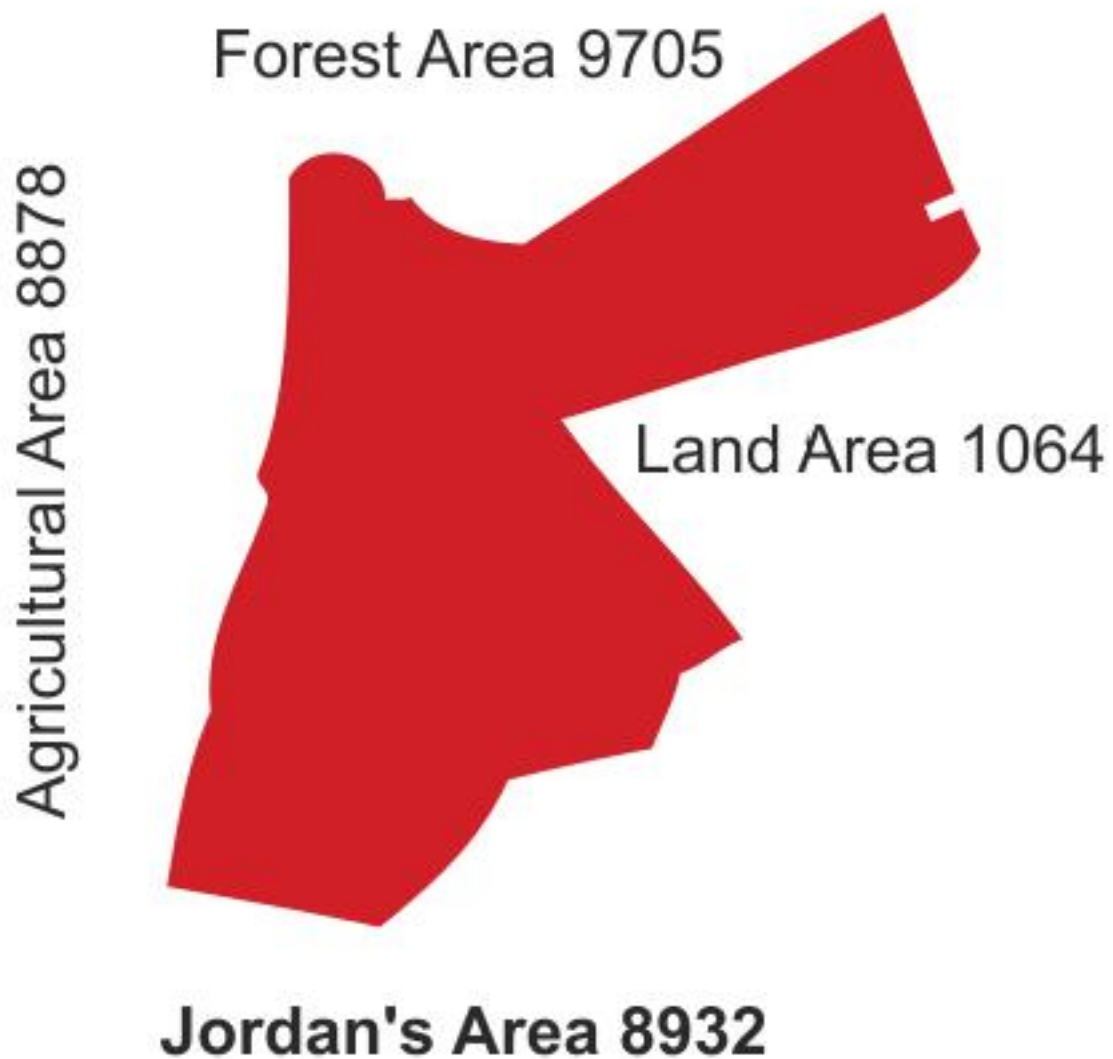


5. Case studies





5.1 Jordan



*Area per 1000 Hectare

*Estimations of the United Nations (UN)
Food & Agriculture Organization 2014

5.1.1 Water

The continuous environment deterioration in areas of energy, water, desertification, loss of biodiversity plus the excessive depletion of the Kingdom's natural resources due to the Syrian refugees crises, are all increasing the challenges of water and energy deficiencies, desertification, deterioration of biodiversity and all what that entails in terms of pollution and climate change (CC) that may not bear immediate economic and political risks but rather long-term wider challenges. Jordan's topography is characterized by desert moors – mainly, in the East and mountains in the West. A huge fissure, named the Great Rift Valley, separates the East and West Banks of the Jordan River, and its successive depressions, like the Dead Sea - the lowest point on earth at less than 408 meters below sea-level.

Jordan is a non-oil producing country, it has key natural resources of phosphates, potash and shale oil – where the latter has not yet been utilized. Jordan has been claimed to be one of the four poorest countries in the world in water, undoubtedly, the rise in the population growth rates, the influx of the refugees due to political instability in the areas, depletion of the ground water reserves and the impact of climate change are aggravating the situation, specially that the rise in the population growth rates and the accelerating economic development have created increased demands for water, at a time when all available water resources are limited and continuously decreasing. Water resources in Jordan can be classified as follows:

- Surface water: like Jordan River and Yarmouk River that Jordan shares with Israel and Syria (respectively), leaving minute amounts of water for Jordan.
- Ground water: 12 renewable and non-renewable groundwater basins (inclusive those with excessive pumping / depletion and over-usage in a non-sustainable way).
- Reclaimed water or treated waste water: more than 97% of Jordanians have accessibility to water services; 67% of them have access to sanitation – comprising the highest rate in the Middle East. The Government is working on preserving this level of supply, water services and increase the accessibility to sanitation to 85% in the next ten years – knowing that Jordan's climate is classified as semi-dry⁶.

In 2015, preservation of the per capita accessible water share at about 120 CBM annually was achieved, amidst water and natural resources scarcity in Jordan, given that Jordan is below the global water poverty line by 88%, also attributed to the global warming, greenhouse effect and repetitive drought. Jordan lacks sufficient renewable surface or groundwater; hence it relies heavily on non-renewable groundwater sources. Jordan is allocating more than 65% of its water to irrigation; It is selling its virtual water to neighbouring countries in the form of vegetables, without considering the real and overall economic value of the utilized water – that is being exported, and its importance in terms of food security in a water-poor country, like Jordan. Among the faced technical challenges is the limitation of water resources, uncontrolled spread of population, old and deteriorated water grids and high percentages of water loss. Its financial challenges include its inability to

⁶ Management of Water Utilities – Case Studies from the Arab World / Jordan. Dr. Khair Masa'id, Secretary General Assistant for Producing and Transporting Water, Water Authority of Jordan (WAJ), 2016



cover the capital and operations expenditures within currently-adopted tariffs, limited financial resources, low governmental support to this sector, rise in costs of research and development of new water resources, rigid (non-dynamic) tariffs that bear no relation to the costs of service provision, rise in the costs of service provision due to high costs of production input and problems in retrieving the costs⁷.

Jordan prepared its Water Strategy 2008 – 2022, with a vision that incorporates major water sector resources and defined plans for the future of water in Jordan, in addition to adopting measures to guarantee availability of water for personal use and normal affairs; the strategy will define what Jordan Vision 2022 is aiming for, by studying all aspect of the water cycle from rainfall, collection, treatment and flow, practical measures to be adopted towards an integrated and effective management of water demand, efficient operations to supply water, in addition to institutional reform based on environments that are similar to Jordan in terms of water scarcity, insufficient energy resources, exponential and inconsistent population growth – all of which merit expanding the scope of service coverage and facing financial challenges. Jordan has accomplished wide strides towards developing the water sector. Realistically, the need to absorb all those challenges and simultaneously provide services to the public, has spurred a multiplicity of development initiatives in the sector on the administrative, institutional, financial, social and economic levels, yet, there remains a lot to be accomplished, not to mention that enhancement and development processes are never really over.

5.1.2 Food security

The modest water quantities that are available are affecting food and water security to a large extent, Jordan has been classified by the World Trade Organization (WTO) Committee on Agriculture (CoA) as being “a developing country that imports food”. The numbers of families living below absolute poverty line are continuously increasing, most of the population tend to be around or close to the poverty line, which means that any economic crisis or implementation of development projects may enter or exit large numbers of families in or out of the circle of poverty. The Syrian crisis increased demands on commodities and services in Jordan, which affected food, rent and public utilities costs, leading to a decrease in food security and nutrition. In order to avoid further deterioration of the situation, the Food and Agriculture Organization (FAO), suggested an innovative approach that is being tested in the northern governorates of Jordan, namely: Irbid and Mafrq, in order to produce family food production and consumption of nutritious food. The approach is based on most recent technologies and sustainable agricultural practices that enable enhancement of inputs and home-based production activities. Jordan families were able generate their own income by selling their produce. Furthermore, and given the savings from rationalizing and controlling purchase of food commodities, families are now able to spend their money on the other basic needs. FAO is also giving ample attention to spreading awareness and education on food to promote nutritional diversities for families and consumption of basic nutrients. Another effort is aiming to enhance nutrition among refugees’ families by providing fresh vegetables, vis-à-vis nutritional education. The

⁷ Water and Development Report No. 6, ESCWA 2015



integrated community approach aims to empower rural women by increasing their knowledge on agricultural practices. The Organization is not only focused on improving the entire community food security but also participating in easing the tensions and promoting social cohesion among refugees and local citizens.

The food importation bill is a burden on the Government, exceeding 3.5 million US\$ annually. The percentage of expenditure by a single Jordanian family on food ranges between 36% to 47% of the total living expenditures; the agricultural sector suffers from many problems like climate change on the one hand, and the inability of the legislations and laws to be up-to-date in regards to the agricultural sector. Production requirements are rising, potable water is declining, agricultural labourers and workers in the agricultural sector are not included or covered by the Labour Law, foreign workers' wages are high, in addition to shortages in irrigation water allocations, and non-suitability for irrigation, etc.⁸

It is important to put forth an expedited and urgent plan to save agricultural lands as result of unjust and arbitrary utilization for housing complexes, which adversely affects the agriculture and impacts food security. Jordan has started to rehabilitate and develop grazing pastures and rangelands, rehabilitate artesian wells, supply thousands of dunams (hundreds of hectares) with water harvesting technologies, while making sure to have sound strategic solutions to the dilemma of food, such as: optimal use to what is available in terms of economic resources, and full integration between economy and agriculture (agroeconomics) on the national Jordanian level and the regional Arab level, coordinate among policies and Arab development plans, abandon foreign food aid – given that the agricultural sector has not have ample attention by the government when distributing state budgetary allocations. Furthermore, the consecutive governments policies did not link fighting poverty and unemployment with the food security plans, on the level of the family.

5.1.3 Energy

Jordan has very low amounts of primary energy resources, which compels it to depend on oil and natural gas, that are imported to general electrical power. According to the Jordanian Electric Power Co (JEPCO), the water sector is the largest consumer of electricity in the country due to pumping, transportation, distribution and managing waste water, all of which is consuming 15% of the total national demand on electricity.⁹

Energy security in Jordan is among the national priorities given its vital role in sustainable development, since energy is the main tool for development across all sector; this requires accurate and well-studied planning to ensure that the Jordanian community is enjoyed energy services, increased welfare, enhanced livelihood, fighting poverty and unemployment. In order to ensure sustenance of energy supplies, there has to be diversification, enhancement and development of energy resources, in addition to

⁸ Human Rights Center Report No. 12 of 2015

⁹ Managing Water Utilities, case studies from the Arab Countries, Arab Society of Water Utilities, supported by the Swedish International Development Cooperation Agency, Jordan. Dr. Khair Al-Hadidi, Assistant Secretary General for the Production and Transportation of Water, Water Authority of Jordan (WAJ), 2016



increasing the renewable energy share and increased effectiveness of adopting energy efficiency utilization across all sectors.

The renewable energy does not play a major role in generating electricity, although it can be readily availed in large quantities (solar and wind energy), due to the absence of a regulative and institutional body and lack of appropriate incentives. However, the reason behind the large percentage of average consumption of energy by the Water Authority of Jordan (WAJ), is based on the need to pump potable water from Jordan valley to the consumers in the cities, in addition to low operational competencies related to operating the water pumps that are being used. In order to mitigate the work load related to electricity saving, and to avoid its interruptions, there is a dire need to benefit from potential energy savings at the Water Authority of Jordan (WAJ). Audits have recently revealed consumption of energy in a number of Water Authority of Jordan (WAJ) pumping stations, that show a potential saving between 25 – 30%. The energy crisis Jordan is going through is resulting in the launch of several projects on energy efficiency (EE) within the water sector. These projects are aiming to increase the efficiency of the pumps used for water production and supply grids, in order to assist in saving energy consumptions in transporting water and through distribution grids by replacing or rehabilitating pumping stations and equipment, developing capabilities, providing technical assistance to enhance managing energy, operational measures and related maintenance. In the next ten years, demands on water is expected to increase for industry (300%) and commerce (200%); hence, with the increased demand for water, the Energy Plan 2007 was established to meet 30% of the national demand through nuclear energy by 2030 and 14% from the oil shale reserves by 2020. These two goals increase the demand for water resources.¹⁰

The main reasons behind the energy crisis in Jordan:

- Shortages in national resources, absence of management at consecutive governments that grantee diversification of energy resources to grantee energy security.
- The government and its procedures are not earnest in following energy consumption rationalization and energy efficiency.
- Non-institutional work to enhance and improve the energy sector, lack of incentives to produce renewable energy and monopoly in producing energy the traditional way.
- Lack of harmony in favour of national interests, in terms of joint work methodologies that regulate relationships among consumers, operators and developers of the energy sector.
- Low levels of awareness and education; prevailing corruption

The Hashemite Kingdom of Jordan, as we said, is facing challenges related to availability and usage of its natural resources. These challenges emerged due to the scarcity of water resources and fossil energy, in light of increasing demands, this is aggravated by the dry and semi-dry climate of Jordan, with low precipitation and high levels of evaporation. 94% of Jordan's lands receive less than 200 mm of rainfall annually; Jordan imports 97% of its fossil fuel from abroad – most of which is used to generate energy and transport. According to the

¹⁰ ESCWA Water and Development Report No. 6, 2015



data of the Ministry of Energy and Mineral Resources (MEMR), 17.6% of the GDP of the Kingdom was spend on energy, in 2014.

At this stage, and due to the repetitive and continuous political crises in the area, large numbers took refuge in Jordan, particularly the neighbouring country, Syria. This resulted in huge, sudden and recurring demands for water supplies and sanitation services, over and above needs for energy, all of which hamper the methodological and smooth implementation of the water management plans rendering heightened costs. The natural and accelerated population growth increased demand on water and electricity and this is heavily impacting and putting pressures on the water grids, sanitation and energy supplies. Electricity generation in Jordan is mostly dependent on fossil fuel that impact the environment greatly, because of the harmful emissions that contribute to the greenhouse effect and global warming, such as increased Carbon Dioxide emissions and nitrogen oxides.

The energy generation in 2014 was about 18,207 GWh, leading to more than 13.3 million tons of Carbon Dioxide emissions. This in turn leads to the necessity to go towards renewable energy and clean energy generation systems to protect nature and the environment in Jordan. Wind and solar energy are readily available in Jordan and redirecting the country's focus to those resources on the long run will decrease costs of generating energy and create safe energy for the country.

Today, it is possible to produce solar energy from photovoltaic technologies at fixed tariffs of 0.05 – 0.08 JDs/KWh calculated based on 20 years (the life span of the project). Prices are still dropping down, so that this rate is less than the cost of produced electricity traditionally. The Photovoltaic energy supplies systems represent an opportunity for the water sector to mitigate operational expenditures to a large extend, especially when it comes to the turbulent energy prices that rely on fluctuating fossil fuel prices. Water supply in Jordan, on the other hand, depends on water resources that are very far from populated areas, hence the water sector requires huge amounts of energy to pump the water not to mention that the water sector itself needs to disseminate and spread awareness, increase treatment utilities and distribute water. It was estimated, that to pump water in 2014, the energy requirements were 15% of the gross electricity production in Jordan, at a total capacity of 1592 GWh; whereas, the energy consumption for the same year, at the Water Authority of Jordan (WAJ), was 7.51 KWh/CBM (billed) - namely for municipal water and sanitation plus 0.274 KWh/CBM (billed) for the Jordan Valley Authority (JVA) for irrigation and industrial usage. The average general consumption of all sectors was 4.31 KWh/CBM (billed). Taking into consideration that the water sector is subsidized by the government, the energy bill value paid by the Ministry of Water and Irrigation in 2014 inclusive the Water Authority of Jordan (WAJ) and Jordan Valley Authority (JVA) was 138 million JDs, based on the average (mean) cost of energy per kilowatt an hour, at 0.087 JDs/KWh, yet this does not reflect the actual cost of the energy paid by the government. The actual cost reaches 0.189 JDs/KWh, approximately. The actual energy bill for the water sector this year is 301 million JDs paid by the government, knowing that the subsidy amounted to 163 million JDs.¹¹

¹¹ Energy Efficiency (EE) and Renewable Energy (RE) policy, Water Sector, 2016.

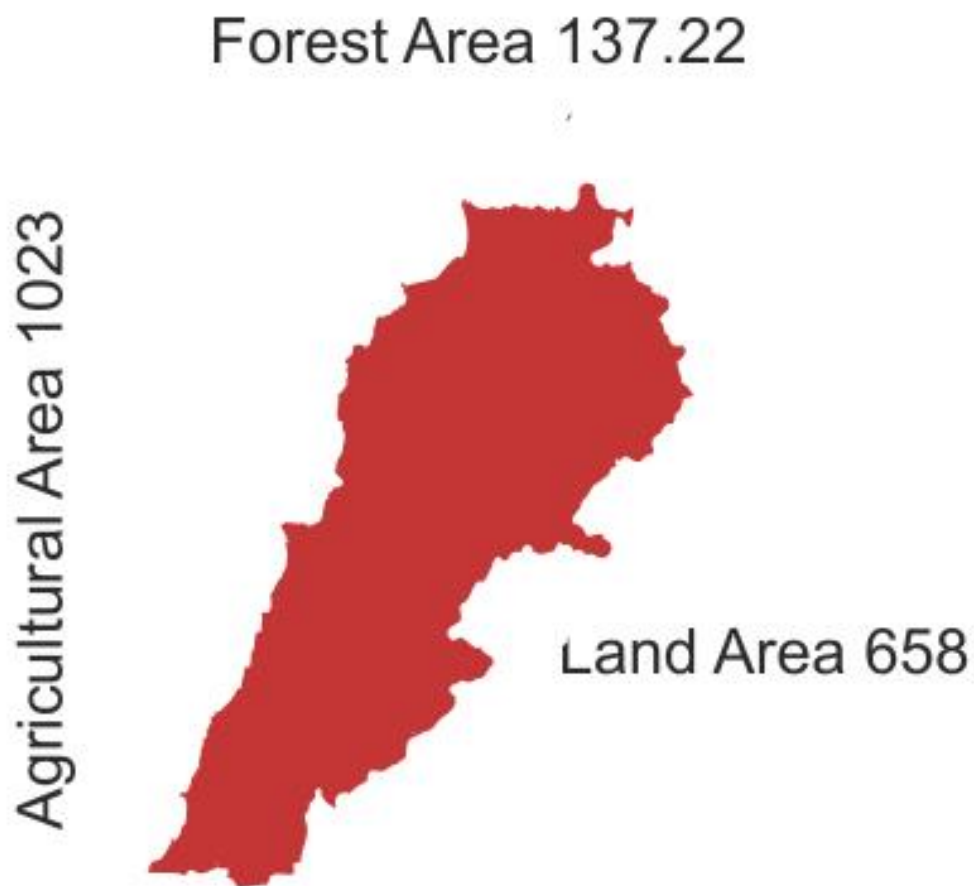


Jordan registered commendable accomplishments in renewable energy by establishing the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) and then launching one of the largest national programs to promote using solar energy by the domestic sector, in addition to establishing the Jordan Atomic Energy Commission (JAEC) to harness nuclear energy for peaceful use, plus developing and sustaining its usage for investment projects that serve national economy. Jordan will start to establish the foundation of a nuclear station in Al-Azraq area, close to Amra Place, in 2018 – in case the government approved this project.





5.2 Lebanon



Lebanon's Area 1045

*Area per 1000 Hectare

*Estimations of the United Nations (UN)
Food & Agriculture Organization 2014

5.2.1 water

The water resources in Lebanon depend on rainfall; the water resources are therefore mainly from surface and ground water. The surface storage is restricted to two dams (Qaróun Dam and Shabruh Dam). Many rivers run through Lebanon, some of which end at the Mediterranean Sea in the West, while others run towards the Baqaa planes, and run up either North then West to the Mediterranean Sea or South then West into the Mediterranean. Some of the most important rivers are: Allitani River that originate from the southern part of Ba'lbak moor, Al-Asi that runs a distance of 6 km before entering Syrian lands, Jordan river that originates from the heights of Lebanon and heads south outside Lebanese borders, plus a number of coastal rivers such as: the Big Southern River, Al-Bared River, Al-Zahrani River and Abraham River – all of which are small and fast mountain rivers, originating from the western mountain bases of the Western Lebanon Mountains, and run steeply towards the Mediterranean. Other rivers include: Al-Khrybeh, Qadishia, Al-Joz, Beirut, Al-Damur and Al-Awwali. Lebanon's climate is moderate and Mediterranean. The coast is cold and rainy in winter, hot and humid in summer. Lebanon faced critical problems in areas related to water – on all levels, whereby Lebanon uses three quarters of its available water, at a time of accelerating demand and shortages during seasons of drought, in addition to deterioration the quality of water and low institutional capabilities in managing water resources. Despite institutional reform and increasing investments, the levels of the general distribution network services that supply the water are still very low. Families are opting to purchase water from private sector suppliers at three times the cost of the public services. The water institutions lack autonomy, independence, technical capabilities and the needed financial resources to enhance services despite huge investments. The treatment of waste water is still very low, which is harmful to the environment.

The Ministry of Energy and Water (MEW) General Directorate of Hydraulic and Electric Resources has prepared a 10-year plan for an integrated management of water, seeking additional water resources, focused on reclaimed water reuse for agriculture and feeding underground basins, in addition to the National Water Strategy that guarantees – but not exclusively: using surface water resources from springs optimally, artificial replenishing of ground reservoirs and storing surface water in dams and lakes, establishing transport and distribution water lines, water tanks, reinstalling water meters to customers in all areas in Lebanon, collecting waste water and treatment - in a more comprehensive manner and reconsidering the organizational charts across water establishments in order to enhance their performance.

The water resources in Lebanon, both surface and ground, are exposed to all sorts of chemical and biological contamination due to the influx of waste water, dumping of solid waste, in addition to the efflux from transformational agriculture products industry, in general. On the level of sanitation, we can say that the majority of coastal cities and villages overlooking the sea are turning their sewage efflux towards the sea. There has been limited attempts to treat the water, up until recent efforts by some of the coastal cities municipalities, yet this has not yet been regulated. Inland cities and towns dwellers are



accustomed to dumping their sewage and solid waste in the valleys, or river basins, so that by the end of the winter season, all this waste is drawn to the sea as pollutants. There have been some discussions in Lebanon, over the last 20 years, on pragmatic solutions facing the catastrophe of pollution. Many plans were prepared to deal with the pollution, several millions of dollars were allocated from international and governmental aid to carryout water treatment plants and sanitation networks, however the State alongside its institutions are incapacitated – hence standing in the way of implementing those plans. We believe that – at the end of the day, municipalities are most capable of following-up and implementing those plans, as long as they are given ample financial and human resources.

The available water quantity in Lebanon is estimated at 8.6 Billion CBM/Year. This represents the average precipitation (rain, hail, snow) that falls in Lebanon, half of this quantity at least evaporates. The cross-border water quantity is estimated at 700 – 800 Million CBM /Year, so that: 200 Million CBM goes to occupied Palestine (surface runoffs and ground seepage) as follow: 37 Million CBM go to Naqura District, Shaqra, Itroun; 10-15 Million CBM go to Marjiyoun District, Al-Khayyam; 150 Million CBM to Al-Wazzani District, Al-Hasbani, Jamal Al-Sheikh; then 550 – 600 Million CBM go to Syria through Al-Asi and Big Southern Rivers, in addition to other natural flow-tracks. The water that flows to the sea through 18 rivers is considered as “lost water”, its value varies between 1 – 1.1 Billion CBM / Year. If we were to use this digit of loss in the water budget, Lebanon will be left with only 2.3 Billion CBM that are susceptible to economic investment.

The water needs for Lebanon are estimated at 1.2 Billion CBM, distributed as follows:

- The need for irrigated crops: the irrigated lands are estimated currently (seasonal and permanent) at 90,000 Hectares. The average need per one Hectare of water is 9,000 CBM. Therefore, the total irrigation allocations are 810 – 900 million CBM.
- Citizens’ needs for potable water, domestic and municipal use: the current quantity of distributed water for drinking, domestic and municipal use, is estimated at 300 Million CBM. The per capita share is 40 CBM – taking into consideration the percentages of wastage and foreigners living in Lebanon, out of the total distributed water, which is about 25%.
- The needs of the industrial and other sectors: this is estimated at 90 – 100 Million CBM, the total consumed water in Lebanon would be in this case about 1,200 Billion CBM / year, inclusive wastage and lost water from the distribution grid.

These quantities remain less than the needs, especially if we take into consideration the per capita share in developed countries that are twice as much (double the share). E.g. a person in Israel has an annual share of 70 – 80 CBM, i.e. double the Lebanese share, knowing that the per capita share in Lebanon from the overall (gross) water fortune is 1075 CBM, i.e. six times that of Israel that stands at 154 CBM.¹²

¹² Water Problems in Lebanon, Wasting Natural Resources, E-News Newspaper, Community and Economy (Mujtama’ wa Iqtisad), Edition 3031, Friday, 11 Nov. 2016 – Hussein Rammal



5.2.2 Food Security

Forty nine percent (49%) of Lebanese people are worried about securing sufficient food. 31% declared they cannot afford to secure health and nutritious food year-round. According to a recent study by ESCWA, entitled “Strategic Review of Food and Nutrition Security in Lebanon”, the study said “While malnutrition is presently not a grave concern for the small Levantine nation, ensuring the dimensions of food and nutrition security (availability, access, utilization, and stability) are sound has, at times, proved difficult”. This is attributed to reasons that are related to the State policies, that destroyed the agriculture sector and forced the farmers out. What is graver than that, is the conversion of the Lebanese food system that is filled with micro-nutrients to a “western” regime, where energy content, sugar and fat are much higher, leading to extreme obesity at 10.9% among children aged between 6 and 19 years of age and 28.2% among adults. The problem of excessive obesity is a very serious matter. Obesity among men is averaging 72.8%, and it is higher than women, who stand at 59.4%, according to the report. The percentage of food importation in Lebanon has reached 80% a year, the consumables market is monopolized by a small group of importers. The report says that Lebanon is also import-dependent on the very foods that it consumes the most, such as bread and other cereals. And while it can maintain a reasonably sufficient supply of food, economic access to food and nutrition creates a raft of issues, especially during price shocks. In 2007/2008 commodity prices sky-rocketed; food and nutrition security in Lebanon faltered. The government responded by re-introducing subsidies on wheat, bread and flour that it had been phasing out, but the effects on economic access to food were still enormous. In 2008 alone, average food prices in Lebanon rose by 18.2% and have only recently begun to enter negative territory. The Lebanese felt these prices hikes both in their wallets and their bodies. As a result of the 2007/2008 price shocks, it is estimated that, on average, micronutrient levels for eight key vitamins and minerals in the Lebanese population fell between 16.3% (Calcium) and 2.8% (Vitamin C). These reductions were registered at elevated levels in urban areas, where over 80% of Lebanese reside. Naturally, the ability of the poor to afford food in this context was also affected. Between 2004 and 2011, the amount of money required to attain minimum caloric needs in one year had risen by 75% to around USD 987.

The report goes on to describe Lebanon’s Baqaa valley that remains its largest agricultural area by surface area and production volume. Perhaps fittingly the valley also embodies the ailments of the agricultural sector. Since the 1950s and 1960s households who lived an agrarian life in the valley for generations began to migrate either to Lebanon’s cities or to join the ranks of the diaspora. Haphazard construction continues to eat away at arable land which could, potentially, be used as a source of life for Lebanon’s needy. Like the valley, the agricultural sector has also been left behind. According to different estimates, agriculture has fallen from as high as 23% of economic output at the end of the last civil war to make up only 4% of GDP today. At the same time, agriculture is thought to account for up to 25% of employment in the country and up to 80% of economic output in rural areas. Agricultural workers are also the poorest workers of any employment sector with around 40% of farmhands considered poor, a double burden for the Baqaa valley which hosts the largest



proportion of Syrian refugees than any other region of Lebanon, many of whom also work in the agricultural sector. This dour situation, however, masks the agricultural sector's true potential. Around 37% of land in Lebanon can be cultivated while current agricultural area is estimated to be just 231,000 hectares, with only half irrigated. Seed diversity is greatly limited while farm holdings remain relatively small and fragmented. Large irrigation projects have floundered and are beset with technical issues while the ability of the government to respond is again limited by financial constraints. At present, the Ministry of Agriculture's budget totals around 0.5% of its overall allocations. Under the recommendations, the report authors warned if a food price shock similar to 2007/2008 were to occur today, the effects would be devastating for food and nutrition security in Lebanon. So, while global food commodity prices remain relatively low, now is the time to implement the much-needed reforms needed to bolster food and nutrition security. Without land, no agricultural revival can take place in Lebanon. Thus, haphazard construction and the lack of land-use planning must cease and the National Land Use Master Plan should finally be enforced. Lebanon has also drafted a National Water Sector Strategy and needs to work diligently towards its implementation.

The Lebanese and the refugees alike are facing absence of food security. 49% of Lebanese have reported being worried about their ability to source enough food, while 31% say they were unable to eat healthy and nutritious food over the course of a year. The increase in food commodities prices, changing nutritional patterns are posing new challenges, such as deficiencies in micronutrients, increased obesity – while reiterating that food security is not related to food quantities or calorific content that are consumed, but related to the type and diversification of food.¹³

5.2.3 Energy

When it comes to the topic of energy, the international environmental agencies and institutions are adamant on assisting Lebanon today, in supporting alternative energy, up until Lebanon became the tenth country in its dependence on alternative energy in ratio to its population, which represents a positive indicator on the importance of supporting Lebanon in clean energy. Lebanon, thus far, has been able to decrease carbon pollution resultant from oil consumption by 12% according to the environment expert Farid Shaaban, who said that the alternative energy in Lebanon has created new work opportunities that had been non-existent beforehand. There are 150 institutions working on promoting alternative energy, particularly solar energy that is being manufactured locally, which is also encouraging workers to work in this field. Shaaban went on to say, that now any citizen can easily install solar energy installations to heat water. Easy loans were facilitated, over and above a subsidy from the Ministry of Energy of 200 \$ to anyone who wants to install solar heating. Despite ongoing encouragement, the rates of solar energy installations dropped from 6,000 to 1,500 US\$. The most recent solar energy initiative, was the Beirut River Solar Snake (BRSS) Project, at Beirut River, named the "Snake" after the shape of the river. This project was created to produce electricity capacity of 10 Megawatt, in the future, but now it started with 1 Megawatt enough to light 100 houses, nevertheless, Shabaan is sorry

¹³ Strategic Review of Food and Nutrition Security in Lebanon", ESCWA, 2016



because these factories that produce energy from water have become old, some older than 70 years and in need for rehabilitation. Once again, Shabaan reiterated that Lebanon can make use of wind energy (just like the windfarm in Akkar) but the latter is inactive given dire circumstances that the country is going through. The “Electricity-Producing Beirut River” is a project that produces electricity from solar energy with a capacity of 1 Megawatt in peak time. The Ex-Minister of Energy and Water, Engineer Jubran Basil, had announced the launch of the executive works to build the First Phase of the Project – Beirut River Solar Snake (BRSS), covering a surface area of 11,000 Meters Squared (MS) of the surface of the Beirut River, securing about 1,655,000 Kilowatt per Hour (KWh) in terms of annual electricity production, i.e. this project can secure electricity to about 1,000 Lebanese homes, especially in surrounding areas. It is expected that the execution of this project will end in one year’s time. The project is a part of the “National Energy Efficiency Action Plan (NEEAP), that the Lebanese Center has worked on to preserve energy upon approval by the Cabinet on the 10th of October, 2011. This included 14 components related to renewable energy (RE) and energy efficiency (EE); environmental impact, execution (only) after conducting the Environmental Impact Assessment (EIA) and attaining the approval of the Ministry of Environment to ensure commitment of the project to all environmental conditions and terms. The Beirut River Solar Snake (BRSS) Project is going to be a perfect environmentally-adhering project.¹⁴

Lebanon has witnessed, in the recent years, a tangible renaissance in the field of renewable energy. This is a bright spot in the grimness of straggling consecutive governments under the toll of crises that are reaching every scope and every sector-file. This is indicative through the crises of garbage, electricity, water and sanitation – yet these are not the sole indicators. Initiating specialized institutions and centers in the field of energy preservation and developing the renewable energy sector is core to a promising launch, that still needs development and support, particularly on the level of concluding and developing legislations and special regulations pertaining to encouraging investments in this sector, organize licencing procedures, conduct public / private partnerships (PPP), and facilitating banking financing processes and borrowing in favour of sector activities. It is worthwhile commending the role of the United Nations Programs in Lebanon, in addition to many donor and international / development agencies under the UN umbrella and the Bank of Lebanon.

The national work program, in the Republic of Lebanon (2016 – 2020) has been initiated by the Lebanese Center for Energy Conservation (LCEC), which accomplished advanced and ambitious stride towards implement renewable energy projects. Hence many initiatives emerged, namely: small and medium sized projects for generating electricity energy from solar photovoltaic cells and wind energy farms development projects, in addition to plans to develop relatively large projects for solar energy across different governorates in the coming years, especially if these laws (Law No. 288 of 2014 and Law No. 45 of 2015) are enacted appropriately, that allow private sector to develop its own renewable energy projects that feed the national grid. It is important to issue limited licensing to the private sector to produce electricity, using renewable energy technologies, such as solar, wind and

¹⁴ Alternative Energy in Beirut, Large Capabilities and A Bright Future, March 5, 2015 “Green Area”

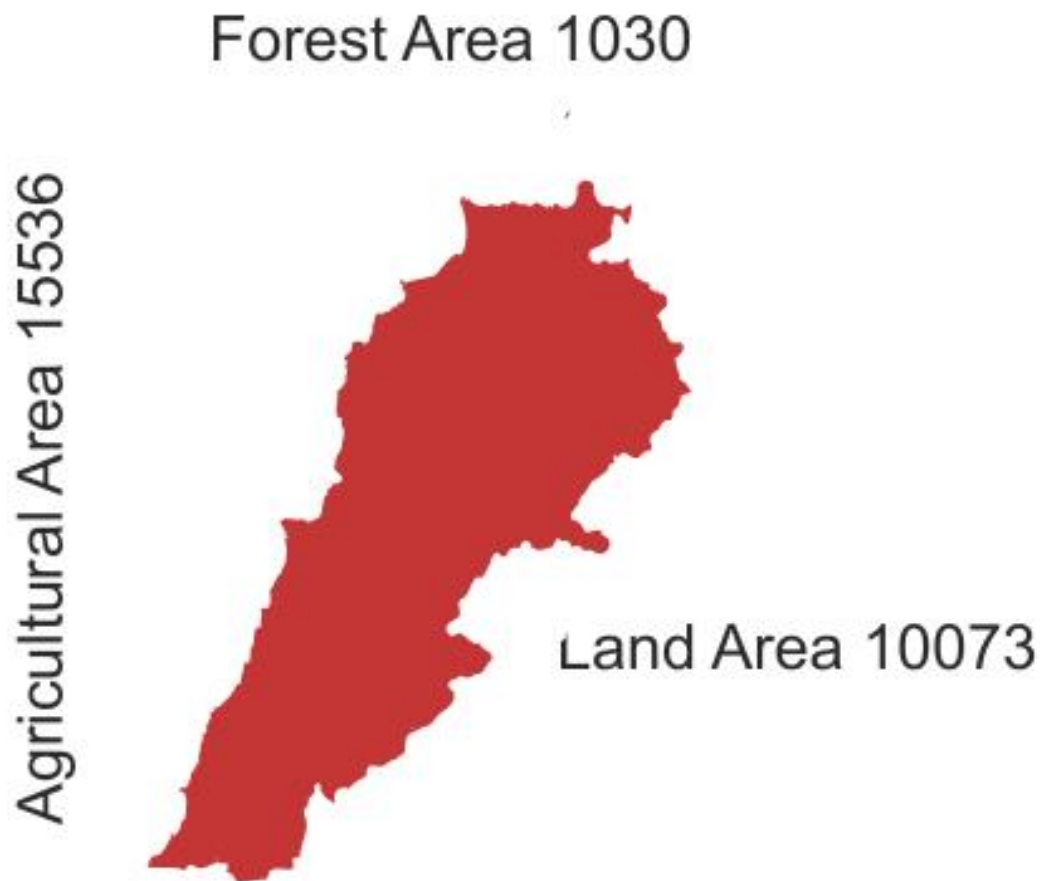


hydroelectric energy. This is apt to encourage private sector participation in securing Lebanon's need of energy, since there is a dire need to endorse the Draft Law on preserving energy "The Renewable Energy and Energy Efficiency Law". This Law, once endorsed, will act as a sturdy legislative lever that propels the renewable energy sector forward, in a country that is stricken with acute crises that challenges its capabilities to provide its citizens and economic sector with the necessary electricity energy that would attain and maintain a sustainable development. This is the aspired lever for economic growth, prosperity and welfare.





5.3 Tunisia



Tunisia Area 16361

*Area per 1000 Hectare

*Estimations of the United Nations (UN)
Food & Agriculture Organization 2014

5.3.1 Water

The surface water in Tunisia is characterized by being connected to the valleys runoffs, which are known to be irregular. The ground water is not renewable, most of the time, with a salinity of less than 1.5 g/lit. for 54% of the water – out of which 84% is in the North. The quantities of available water fluctuate between 2,700 Million CBM of surface water and 2,175 Million CBM of ground water. About 83% is utilized for the agricultural sector, 17% for other sectors. These resources are replenished by 100,000 surface wells and 5,868 deep wells and 88 springs. As for the surface water, it is replenished by 29 large dams, 226 hill dams and 844 mountain lakes.

A series of rivers run across the Tunisian country, mainly in the Northern parts, most important of which is the Mujarradah River that originates from Souk Ahras, West of Algiers and pours in the Mediterranean Sea, on the level of Tunisia Bay, reaching 640 km in length, out of which 350 km run inside Tunisia – it is also permanently running.

The levels of flow of this River vary between 1 CBM / Second to 1,000 CBM / Second according to the precipitation (rainfall). So that its levels vary between 1 CBM / Second to 1,000 CBM / second. The main river tributaries are: Kassam, Bajeh, Malaq, Tasah, Silyanah, and the Dam that has been constructed on this river – which is the Dam of Sidi Salem, one of the largest in Tunisia. As for lakes: the lake of Ishkel has an area of 12,600 Hectare, in addition to some of the most important lakes of Tunisia, Banzirt, Bibyan and Ghar Al-Milh. The water sector in Tunisia is suffering from three main problems, namely, the poorness of available water resources, some of which are non-renewable; increase in the cost of water (gathering, treating, transporting, distributing); and rise in demands for water. There was an increase in the produced water quantities, in 2010, at 6.9% so that it was 528.3 MCM (Million Cubic Meters) in comparison with 494.1 Million MCM, 2009.¹⁵

As for the water resources, there are surface and groundwater resources. The Tunisian citizen enjoys 460 CBM only per year, which ranks Tunisia far behind on the list suffering countries from water scarcity, which necessitates revising a national plan for water reuse and treatment, amid vast discrepancies between what is available in terms of water and what is about to be utilized.

The execution of sea water desalination has commenced, so that water desalination is considered one of the new resources for agricultural use. In addition to connecting dams – such as the Big Dam, via canals, pumping water and control its utilization, given that all the Dams in Tunisia are connected.

The issue of reclaimed water reuse is of the essence, in light of the various climatic, environmental and economic challenges, and reusing water for different purposes, particularly in agriculture, tourism and industry. In addition to reusing water in propelling

¹⁵ Managing Water Utilities, case studies from the Arab Countries, Arab Society of Water Utilities, supported by the Swedish International Development Cooperation Agency, Jordan. Dr. Khair Al-Hadidi, Assistant Secretary General for the Production and Transportation of Water, Water Authority of Jordan (WAJ), 2016



the economic dynamics and preserving the environment matrix, particularly in light of exponential increase in the world populations, scarcity of water and what that entails in terms of impact on international economies and environmental balance.

Reclaimed water reuse is considered to be an added value that boosts industrial and tourism performance, amidst a health monitoring framework, supported by local, regional and international legal norms – on the one side, and the impact of utilized water on the environment and surroundings – on the other side.¹⁶

5.3.2 Food Security

The total drawn water for irrigation purposes in Tunisia reaches 86%; however, in the areas of Al-Shatt, the ground artesian wells rendered economically feasible dates cultivations for exportation. The Tunisian awareness on factors affecting the ground reservoir in the Northern West Desert has led to enhanced national water policies and adopting integrated water resources management (IWRM) approach. This has lead in turn, to the adoption of the sector-development guidelines, as an enhancement tool, to better manage underground water reservoirs, and monitoring them. Tunisia is indeed persevering to fix the rate of current water withdrawals, in addition to meeting the food security three core requirements depicted by the United Nations Food and Agriculture Organization UN-FAO by providing needed adequate food quality and quality and continuously availing food products throughout the year; so that the prices of the food products are affordable by the citizens. Tunisia came in the 53rd rank out of 113 countries in terms of the Food Security Index, 2016, and according to preliminary strategic studies results on food security in Tunisia, prepared by the Tunisia Institute for Strategic Studies, in cooperation with the UN-FAO.

The study pointed out existing availability of supply in terms of food in Tunisia, which was seen as sufficient due to local production. As for accessibility to food, Tunisia accumulated a total of 56.7 points, versus 62.2 points for availing food. However, this situation did not stop further developments in the level of food commodities supply, that was 9.2% of the total Tunisia imports.

Cereals and grains represented 43% of the total food imports, followed by food oils, sugar and its derivatives. On the level of risks that threaten food security, the study showed many risks, such as: climate change and deterioration of the natural resources due to water-related issues. Tunisia came in the 33rd rank among countries that are going to face acute water shortages by 2040 according to the World Resources Institute (WRI). It is possible to lose 80% of its non-renewable resources. Tunisia is facing several problems such as deterioration in the quality and fertility of soil, over and above soil erosion and desertification (with the possibility of losing as much as 50% of good agricultural land by 2050). Land ownership was divided and importation was relied on to meet the need in terms of grains (60%). As for accessibility to food, the study revealed the difficulty with which the fragile groups can access food due to economic and financial barriers, retreating

¹⁶ Babnet / Minister of Agriculture, Water Resources and Fisheries: Samir Taieb.: The Tunisian citizen enjoys 460 MCM only per year, Wednesday, 19 September, 2017



purchasing power, dependency on importation and (low) economic growth. Among such fragile groups are the rural areas in the mid, west and north-west regions, women, children and rural family headed by women (as sole bread-earners).

The study showed real threats on health due to malnutrition in Tunisia, where 46% of the population suffer from gain in weight versus 29% suffering from anaemia.

In addition to availing and accessing food, the study showed extravagant behaviour when it comes to food, which is a real threat to food security, so that 16% of the bread bought in Tunisia ends up in garbage bins, the same goes for 10% of basic commodities of grains (6.5% loss), milk and dairy products (2.3%) and meat (2%). The study recommended a national multi-sectorial strategy for sound and health nutrition, in addition to spreading awareness on the value of food and warn against wastage.

The agricultural sector registered growth of 4% during the first quarter of 2017. It contributes by 8% to the GDP and has been contributing to annual growth of about 2.8% during the last 20 years.

Despite good results in availing food, markets supply and diversity, food security in Tunisia remains fragile in several sectors, given that Tunisia is importing around 50% of its needs of grains and 50% of fodder and 100% of poultry feed.¹⁷

5.3.4 Energy

Tunisia is meeting about 85% of its basic needs of energy from oil and local gas, and the rest of the oil and gas are imported. Imports into the country in terms of energy comes as gas from Algiers – whether it was through ‘crossing-over fees’ going to Italy or from its direct import. Up until the beginning of the millennium, Tunisia was one of the gas exporters, but it has long run out, hence the demand on energy grew with an accelerated rate that was faster than the local product growth, imports of oil and gas increased exponentially, so that the expectations over demand on energy and its local current supplies, show potential deficiencies in the production of main energy by 2020, approximately.

Although there are opportunities to develop new gas fields in Tunisia, these reserves remain limited and uncertain. The gap between current supply and demand is widening, amidst huge subsidies to the energy sector that has been contributing 5% of the GDP in recent years. All the prices of oil derivatives, natural gas, domestic and industrial electricity are subsidised. In 2015, there was a huge decrease in the subsidies due to the drop in oil prices, but it may increase again should the oil prices change direction, either way, this (subsidising) is depleting public financial resources and encourages wastage (extravagance) in consumptions, in the absence of awareness. This is definitely not helping the poor whose energy consumptions are lower than other socio-economic groups.

¹⁷ Tunisia ranks 53rd out of 113 countries on the Food Security Index, 14 June 2017. A study by the Tunisian Center for Strategic Studies on Food Security in Tunisia, 2016



With the increasing dependency of Tunisia on imports of energy and local renewable energy, it has to focus on retrieving the cost while continuing to put socially-oriented tariffs, safety social nets for the poor and encouraging rationalizing the use of energy to prevent reaching a status of subsidies that becomes a financial budgetary burden i.e. reaching a stage whereby it can no longer be sustained. There has to be an increase in the electricity and natural gas tariffs to cover the costs of the costlier energy resources – whether local or imported, in addition to increasing financial independence of the sector to attract private sector investments that are urgently required. At the same time, Tunisia has great potentials for using the solar and wind energies, which it has not yet probed.

Renewable energy sources contribute to the electricity grid by 3% only, through 2 wind farms. The Tunisia solar energy plan has been adopted in 2012 to increase the share of renewable energy in the electricity grid to 30% by 2030, based on wind energy at 15%, electrovoltaic energy at 10% and condensed solar energy at 5%. Tunisia is also focusing on increasing electricity efficiency (EE) between 2013 – 2020 deriving at decreasing demand on electricity by an annual mean (average) of 1.4% compared to the normal scenarios.

In order to get ready for the 21st United Nations Climate Change Conference Paris, Tunisia suggested it decreases its greenhouse gas (GHG) emissions by 41% by 2030 in comparison with its GHG emissions in 2010. It will focus its efforts to mitigate climate change impact on the energy sector that will account solely to 75% of the expected reduction in gas emissions. Tunisia's needs for new investments to reduce carbon dioxide emissions is estimated at 18 billion US\$, at the same time, renewable energy can play a vital and viable part in the future energy mix in Tunisia. There is still a need for continuous energy sources that are guaranteed to facilitate the change of dependency of the electricity grid towards renewable energy resources, which (so far) have not been sustained. This may be attributed to the huge expected annual increase in the demands for electricity which is expected to increase in the few coming years – estimated at 5%, annually. The natural gas is an ideal choice to provide such grantees, given its competitive cost and the flexibility of the electricity generating technologies that use gas. However, there is a decrease in the local gas reserves. Tunisia has to achieve and balance a number of goals, namely: (1) lower the cost of energy, (2) increase the security of supply, (3) protect the environment. There is room for reducing the speed of decrease (accelerated decrease) of local gas production, and benefit from the shale gas potentials in Tunisia. The last option may take ten years to be realized, however, Tunisia may increase its imports via gas pipes from Algiers, given retreat in demand by Europe, which was the main market for Algerian piped-gas. Tunisia can also build an infrastructure that would convert liquefied natural gas (LNG) and storing it after importation from other sources – other than Algiers. Jordan and morocco are not persevering to carry out this option to meet their local energy needs.

The global markets for LNG have retreated considerably in recent years due to a drop in oil prices and increase in the production of shale oil in the USA. The World Bank is currently funding a study on future gas sources in Tunisia that may assist the government in making appropriate strategic decisions for this vital and viable industry (2016). Without a clear



guaranteed plan to avail natural gas supplies, Tunisia may study adding coal to generate electricity to its energy mix.

In recent years, the prices of coal dropped, with a global abundance of its reserves, making it a competitive source to generate electricity, however, coal releases double the gas emissions – particularly carbon emissions in the atmosphere in addition to other pollutants such as sulphur and nitrogen oxides. In order to mitigate these emissions, the cost of generating energy will increase. For sure, seeking to use coal would be against Tunisia's goals to mitigate climate change impact, not to mention expected opposition by public opinion due to adverse environmental impact.

A more attractive and available choice for Tunisia on the short to the medium terms, is to extend a marine line to Italy to transport its huge surplus in terms of gas-generated energy and make use of it. This project would require a 192 km cable at a depth of 750 meters to connect the northern part of Tunisia with the south of Sicily using marine (tested and tried) technologies (such as marine transport cable used to connect grids and networks across other areas). This will allow Tunisia to import 600 – 1200 Megawatt with competitive rates from existing stations working on gas that had been stopped for a number of years due to low economic activities in Europe, in general, and in Italy in particular. This (cable) will also complement Tunisia's strategy on seeking options ranging from importing gas or importing electricity, depending on the prevailing prices of those two commodities. The line will bridge the gap in connectivity via high voltage lines between the "Maghreb" countries and Europe, leading to larger integration and continuity to both grids. Morocco is actually importing 18% of its electricity needs from Spain, given the economic situation in Europe. Tunisia can use a connecting line to export solar energy to Europe. Tunisia is therefore facing very important decisions to make to bridge its future energy needs in a financially and environmentally sustainable way. There are ongoing discussions in the country on these issues, so that the choices will have consecutive impacts on the energy sector and economy growth in Tunisia for years to come.¹⁸

6. Conclusions

The status quo is being evaluated in each of Jordan, Lebanon and Tunisia by comparing their respective levels of commitments to the adopted legal framework by the Sixteenth Arab Summit.

6.1 Jordan

According to the Third Report of the National Center for Human Rights, 2016 (main points):

- Continuous environment challenges for Jordan, in terms of the energy, water and other sectors.

¹⁸ World Bank. Difficult choices ahead of Tunisia in facing increased future demand for energy, by Maez Sharif, Tuesday, 01/19/2016



- The legislations and laws are not aligned with the existing developments in the agricultural sector such as the Agricultural Risk Management Fund Law, that limited compensations to only frost waves.
- Deficient legislations that do not include workers in the agriculture sector in the Labour Law, due to lack of such regulation for workers in agriculture.
- Continuous wastage (loss) of water.

On the other hand, there were good and commended achievements in the government's direction towards alternative energy to mitigate the size of the oil bill and preserve the environment, by commencing with these two projects:

1. Shams (*the Sun of*) Maan
2. Wind energy

These two projects are expected to feed the electricity company with clean energy void of carbon dioxide emissions.

The government has been also working on supplying water to areas using nature gravitational flows as opposed to pumping which contributes to a decrease in energy consumption costs in the water sector, new instructions have already been issued to limit water loss.

Within the Intended Nationally Determined Contributions (INDCs) pertaining to climate change (CC), Jordan presented a document in compliance with the Paris Agreement requirements by mitigating emissions by 14% by 2030.

Work on the Second Report has concluded on the environment status in Jordan with the participation of all concerned agencies, to aid decision makers in making decisions related to development, environment and facing urgent national issues such as water scarcity, desertification, environmental deterioration and perseverance towards a sustainable economy.

6.2 Lebanon

Lebanon has a long history in protecting and promoting human rights. It has participated in setting the United Nations and the Universal Declaration for Human Rights. Lebanon is therefore committed to all international treaties and covenants, namely:

- Endorsed the National Human Rights Plan 2014 – 2019.
- Proposed a law to establish the Independent National Commission for Human Rights.
- Participating in dissemination of the culture of human rights.
- Coordinating with civic sector organizations (CSOs) to promote human rights concepts, and participating in preparing laws.



- The country is currently spending huge sums from its own resources to secure sanitation services and potable water supply and is trying to deal with the climate change and pollution problems.
- As for food safety, the Ministry of Health carried out a monitoring campaign over all tourists and food institutions in 2015, across Lebanon, to ensure adherence of food commodities with the Lebanese standards. The resulting report pointed out obstacles faced – namely, lack of political stability and security in addition to the Syrian refugees' crisis.

6.3 Tunisia

The National Report on Human Rights in Tunisia, 2017

The National Report was prepared in consultation with CSOs, independent commissions and other national agencies. The Report referred to the Tunisian Constitution that guarantees human rights and general freedoms, guaranteed by all judicial agencies to protect against violations. The Constitution of the State stipulated that the State guarantees the freedom of belief and conscious, and that no amendment is permissible if it violates any human rights or guaranteed freedoms. As for signing on and endorsing international agreements and conventions, plus cooperation with the United Nations systems and methodologies – the Tunisian Constitution was clear in that all approved and endorsed conventions by the Chamber of Deputies are higher than the laws and lower than the Constitution.

As for United Nations reports and abstaining from delays in submissions, the Report denoted that a new National Coordination Committee has been established to prepare and submit reports and follow up on the recommendations. Tunisia has also permitted numerous international non-governmental organizations to open their respective offices in the country, such as the World Organisation Against Torture (OMCT), Human Rights Watch (HRW) and the Democratic Control of Armed Forces (DCAF).

Within the legislative framework, Tunisia works on customizing and localizing national legislations related to human rights with the Constitution and its international obligations.

As for the independent constitutional commissions, the Constitution specified a special chapter that obligated all State institutions to facilitate their (Commissions) work, amongst those independent commissions are: The Sustainable Development and the Rights of Future Generations Commission in Tunisia; the Human Rights Commission to work as a national institution that protects and promotes human rights; and the Access to Information Commission.

Factual and real protection and promotion of human rights on the ground and building capacities in areas of human rights wherebt the Tunisian Constitution guarantees in its Chapter (39) the culture of human rights, in addition to 964 Judicial Annexes on human rights content and the conduction of training workshops for judges in cooperation with the United Nations High Commission for Human Rights.



The government is therefore earnestly persevering to expedite adoption of the constitutional commissions, resume legislative paths, and issue laws to create new commissions. The State will also dedicate governance principals and prevention of corruption via a national credibility matrix, enhance human resources capacities and support competencies. The government will also focus its efforts to create the National Social Council for Dialogue; it will also avail services in education by generalizing the preparatory year, by 2020, convert 50% of the universities to institutions that have scientific and technological characteristics, shrink illiteracy among age groups 10 to 59 years of age from 18% to 16% by 2020. Work will be done to raise up the operational energy for growth, enhance group preparations and basic utilities where potable water is supplied, connect purification network to enhance livelihood. Within this framework, 100,000 housing units within housing complexes will be accomplished within the next five years. The percentage of public transport will be increased from 30 – 40%.

- **United Nations Higher Commission for Human Rights Report**

The report recounted that the Tunisian Constitution has promoted the legislative framework by depending on a series of national laws pertaining to human rights

- **Stakeholder entities on Tunisian Affairs Report**

They commended the new Constitution that included provisions on the protection of the civil, political, social, cultural and economic rights, in addition to other freedoms. It recommended through this provision, that Tunisia expedites establishment of a Constitutional court and legislative reform of Tunisian laws that are not aligned with the Constitution and international standards on human rights.¹⁹

7. Recommendations

7.1 On legislative level

- Put in place a unified water law that regulates the sector and sets its policies
- To have one reference for decision making and working on launching a new Unified Arab Agricultural Investment Law, while heeding local agricultural laws for each country, deriving at food sufficiency.
- Establish a national commission for renewable energy (RE) and energy efficiency (EE).
- Promote and develop legislations and national laws to fight desertification and climate changes (CC).
- Create linkages – when placing legislations, among guarantees of water security and diversification of energy resources and food security as a vital strategic priority for the future of our nations.
- Deal earnestly with Global Environmental Performance Indicators (EPIs) and the Carbon Footprint (CFP) Indicator to enhance the status in the Middle East and North Africa

¹⁹ Geneva International Centre for Justice (GICJ), Independent NGO, according to civil Swiss law. Headquartered in Geneva, alongside headquarters of the European Center of the United Nations, international organizations – special those related to human rights and several other NGOs.



(MENA) particularly in areas of water, energy, quality of ground water and water scarcity.

- Put forth national or regional indicators to combat the rise in the carbonic footprint in the energy and water production sectors, in addition to houses (domestic sector).
- Issue and update legislations and laws that guarantee promotion of the struggle of producing and rationalizing usage of energy and water.

7.2 On strategy level

- Encourage research in energy efficiency and renewal energy usages to save services, open markets to new renewal energy resources that had not been focused on by all sectors – none other than bio-energy and ground energy, it is also worthwhile mentioning that the Aqaba Gulf area is one of the best in the world for using ground energy to generate electricity with huge power.
- Enhancing efficiency of energy use in the sector of water and incorporate renewable energy technologies within the sector leading to reduced costs, water supply, avoidance of unnecessary losses in this sector. Attaining these results will contribute in enhancing the sector and will therefore solve grave challenging facing sustainable development in Jordan – caused by different pressures such as limitation of resources and ineffective managements.
- Focus on enhancing financial sustainability facing accelerated increase of energy and supply costs.
- Review and re-stratify the priorities in gathering and using water resources, and support investment in non-conventional water resources, such as water desalination and reclaimed water reuse.
- Develop national production by depending on economic feasibilities and preferential budes within approximation frameworks aiming to develop natural resources and preserving their sustenance abilities, taking into consideration the principles of sustainable development with its three economic, social and environmental dimensions, amidst growing climatic changes phenomena to convert national economics from a consumer-based to a productive, sturdy, strong and regulated economy.
- Build joint strategies to achieve national food security, aiming to decrease dependency on importation while necessitating that this unified strategy is based on the principal of supremacy for food, water and energy.
- Increase joint investments in the agricultural sector and food production; increase allocations for scientific research in water, food and energy security.
- Build a joint strategic food storage to overcome risks.
- Conduct fair strategic agreements with countries of water origins to ensure availability of potable and irrigation water.
- It is important to have the Arab civil society as a main partner in stratifying priorities, planning, implementing and expressing accountability.
- Adopt unified development strategies based on the sustainable development approach to bridge gaps among Arab countries and support the countries that need investments in their lands, based on principles of equity, partnership and international laws to



achieve food security and food supremacy; and stop investments that do not comply or agree with this approach.

7.3 On policy level

- Re-direct the support of the sector to meet the needs of the poor or continue working on individual initiatives that poor people benefit from.
- Enhance administrative practices and efficiency; look into developing water resources and capital investments. It has been proven that involving the private sector is effective in enhancing administrative and managerial practices; in addition to studying costs versus benefit (investment return) for infrastructure projects and enhancing administrative technologies – in order to define most cost-effective models that can reduce water loss.
- Activate the role of the League of Arab States (LAS) in promoting Arab integration and achieve food supremacy to enable and empower CSOs to rise up to their challenges and fully play their roles, incorporate the participation of the civil society through its (LAS) affiliates such as the Arab Organization for Agricultural Development (AOAD) to focus on rationalizing use, increasing awareness on national water related issues and joint international water. The goal of this “water culture” revolves around the route towards “sustainable development” with the intention of preserving human dignity.
- Raise awareness and education for behavioural change across communities to instil the concept of “water culture” that aims to promote and exchange information; and take whatever necessary humongous steps pertaining to Integrated Water Resources Management (IWRM) and achieving sustainable development of water resources in the Middle East (ME).
- Coordinate public policies; give attention to studying the cohesive relationship among water security, energy security and food security.
- Increase knowledge regarding technological choices.
- Merge issues of climate change and natural disasters in the processes of decision making.

END





The MENA Region Initiative as a Model of NEXUS Approach and Renewable Energy Technologies Project (MINARET) - Regional Initiative on Water, Food and Energy

MINARET: Promote Sustainable Development Roles of Municipalities

The Regional MINARET Initiative on Nexus among Energy, Water and Food main goals is to promote regional cooperation in the Middle East (ME) by implementing an integrated management approach of the “NEXUS” with merged renewable energy (RE) technologies across municipalities to mitigate climate change (CC) impact and combat poverty.

Main Goals

1. Build and promote municipal capabilities to face climate change impact by adopting alternative energy programs, promoting energy efficiency (EE) applications, support water management technologies and participate in achieving food security.
2. Work on building government agencies institutional capacities related to the project by promoting dialogue methodologies pertaining to policies and implementation of specialized programs in building capacities and capabilities.
3. Promote regional cooperation among municipalities to build good governance, deal equitably and justly with the needs, promote cooperation, promote human rights - inclusive refugees within and around the four concerned municipalities boundaries.
4. Activate the roles of women, youth and marginalized segments within the society by incorporating their participation in implementing a comprehensive and integrated approach to manage environmental resources: the water, food and energy nexus.
5. Design a dialogue program within the scope of the Middle East that focuses on exchanging experiences, lessons learnt and dissemination of knowledge on national and regional levels.

Project overview

The Regional MINARET Initiative on Nexus among Energy, Water and Food was developed with the aim of promoting regional cooperation in the Middle East and North Africa (MENA) by implementing a regional initiative on the water, food and energy nexus, using renewable energy (RE) technologies and energy efficiency (EF) on the level of municipalities to combat and limit climate change (CC) impact and other negative impacts on the environment. The project also aims to build the capacities of local municipalities, civil sector organizations (CSOs) and women associations in regards to the energy and water nexus to achieve the Sustainable Development Goals (SDGs). Through its activities, the project is targeting the new municipality of Chouf in Lebanon, Monastir in Tunisia and both Sahab and Karak municipalities in Jordan. The project will also work on the regional level by establishing a Regional Dialogue Forum that brings together different experts in areas of renewable energy (RE), sustainable development and water issues in order to exchange experiences, benefit from the experiences of others, discuss policies and technologies that are adequate and localized to the terrains for implementation. The project will also include scientific and technical study exchange visits among participating countries in the project.

Projects partners: Royal Scientific Society (RSS), National Energy Research Center (NERC), International Union for the Conservation of Nature (IUCN) and the Future Pioneers for Empowering Communities.