

WORKING PAPER

WEF - LEBANON

WATER, ENERGY, FOOD NEXUS:

**AN OUTLOOK ON PUBLIC INSTITUTIONS
IN LEBANON**

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**AUBPOLICY
INSTITUTE**

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WATER, ENERGY, FOOD NEXUS: AN OUTLOOK ON PUBLIC INSTITUTIONS IN LEBANON

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It is important to have active cooperation mechanisms between stronger institutions; this would be an important driving force behind introducing a WEF nexus approach in Lebanon.

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INTRODUCTION

Water, energy, and food production resources in the world are facing ever-increasing pressures due to high urbanization rates, population growth, pollution, and climate change impacts. Such pressures are projected to alter the availability of, and increase the demand on, the said resources. The decrease in availability of one of these resources is expected to impact the other, as these sectors are highly interdependent. Water for instance is a key input for energy and food production, and its use in each has a direct effect on its quantity and quality. Water is needed in mining, fuel production, hydropower and power plant cooling. Energy on the other hand is needed for pumping and distribution of water as well as treatment, and discharge of wastewater. Irrigated agriculture, which also requires energy, has been an extremely important source of food production in the world over recent decades. Accordingly, this confluence of impacts on resources will greatly affect the security, and accordingly the development and status and improvements, of their users.

As such, better cross management of resources is needed, in order to help and preserve and sustain them. More importantly, better cross-sectoral planning helps in improving a country's development by reducing unnecessary costs and preserving a country's resources for more efficient uses. The Nexus approach is a highly debated planning approach, which advocates for cross-sector and "scale-integration of management and governance" (Hoff, 2011).

Building the case for a Water – Energy – Food nexus governance study in Lebanon

When considering the application of the nexus it is important to understand the region under study, as the availability and tradeoffs of the different resources and from one scale to another – temporal and spatial. The Middle East and North Africa (MENA) region has one of the highest water scarcity levels (Paul, Reig, Maddocks, & Gassert, 2012) in the world because of the pervasive aridity in most of the countries. However, it is very rich in natural gas and petroleum, where it has the highest oil reserve in the world (Birol, 2006).

Lebanon, which is part of the MENA region, contradicts the physical state of most countries in the region. It has relatively high available renewable water resources per capita per year, but is low on energy sources such as natural gas and oil. However, Lebanon is still facing water and energy shortages and imports more than 80% of its food needs. These are further aggravated by climate change impacts, high population densities and rapid urbanization rates, influx of war refugees, and sectoral mismanagement.

Agriculture in Lebanon is the highest consumer of available freshwater, consuming nearly 60%, while the remaining 40% are distributed amongst domestic use (29%) and the industrial sector (11%) (MoE/UNDP/ECODIT, 2011). The energy sector is able to meet 77% of the total demand with the remaining 33% being provided by private generators on local levels. Only 4.5% of energy in Lebanon is generated by hydropower plants while 95% is generated by thermal plants (Ministry of Energy and Water, 2010a). Lebanon is a net food importing country where 20% of the total demand for food is produced locally and the rest is imported. Nearly 44% of processed food, 30% of livestock and 16% of crops are imported (MOA, 2009).

Climate change, which is altering rainfall patterns as well as ambient temperatures (Ministry of Environment, 2011), is one of the driving factors that is further reducing water supply and increasing demand. Increased population, in addition to increasing demand on water, has also led to an increase in the amount of wastewater produced and consequently the pollution of ground and subsurface water bodies thus further reducing freshwater availability.

The country's urban population, estimated to be 87.5% of the total population in 2013 ("UNdata | country profile | Lebanon,") has resulted in an explosion of built-up areas most of which at the expense of agriculture land. This has led to the further fragmentation of productive areas not to mention abandonment and degradation of productive land mainly due to rural migration. Adding to these challenges was the influx of war refugees resulting from the regional political instability – namely from Syria and Iraq. The subsequent demand on water and electricity rose sharply leading to more severe rationing of electricity and water supply.

Interdependency between Resources

The interdependencies of the Lebanese water-energy-food (WEF) resources are evident in the various sector and national plans, strategies, and projects. One of the physical forms of the interlinkage of the three sectors are dams and their associated hydropower and irrigation schemes. Lebanon for instance has two major dams, Qaroun Dam on the Litani River with a static capacity of 220 million m³ and Chabrouh Dam on the Laban Spring with a static capacity of 8 million m³. At the moment, 14% of the stored water in the Qaroun Dam is being exploited for water supply and irrigation and the rest is used to generate electricity. The entire capacity of Chabrouh Dam is used for water supply and irrigation (MOE/UNDP/ECODIT, 2011). In addition to the hydropower generated by the Qaroun dam, there are four hydropower plants installed on rivers and springs with a total of 83 MW capacity, making the total hydro-capacity in Lebanon 282 MW (CEDRO, 2013). However, these hydropower plants are old and deteriorating, and as such are inefficient and produce less than the intended capacity.

There are 267 public wells which are operated by the Water Establishments and are used within the public supply network. In comparison, there are 42,824 privately owned wells, of which around 51% are illegally drilled (Ministry of Energy and Water 2010). The hidden interlinkage is the amount of energy consumed to pump this water for which there are no official values. In terms of its relation to agriculture, 50% of irrigated lands rely on groundwater (MoA, FAO, & Cooperation Italienne, 2012).

Nearly 50% of irrigated lands are surface irrigated, with the remaining 50% divided among 30% sprinklers and 20% drip (MoA et al., 2012). Implications of such methods of irrigation are a tradeoff between water consumption and the use of energy, as the energy intensive methods save water, whereas water-intensive ones use up very little energy.

The use of machinery in agriculture is another form of the food energy interlink that varies by the size of the holding. Most small-sized holdings tend to use simpler and cheaper machinery to assist in cultural practices. The most used machinery is the truck used in transporting the produce, and power generators for pumping and refrigeration (MoA et al., 2012).

The contribution of the agriculture sector to the water sector is reflected in the negative context of pollution and its use of nearly 60% of available freshwater. The use of pesticides and fertilizers with little compliance to environmental and public health norms, has led to the pollution of water bodies (MoE/UNDP/ECODIT, 2011).

Institutional Integration for a Nexus Approach

The different physical interdependencies of the WEF sectors should be paralleled by the integration of the governance systems. The presence or absence of these integrations is reflected in the policy-making tools. Policy-making in a global sense includes three main instruments/tools: the communicative ones which are the legislative and the sectoral strategies; the organizational which are the bodies and actors; and the procedural tools which are the courses of action taken to implement such policies (Mickwitz et al. 2011).

The need for an interdependent approach to resource planning and management has already been recognized through different concepts and models such as the Environmental Policy Integration (EPI) and Integrated Water Resource Management (IWRM). The EPI aimed at a more holistic and environmental thinking/ manner when planning for policies (Lafferty & Hovden, 2003), IWRM similarly promoted a more integrated management approach that is centered around water resources (Horlemann & Dombrowsky, 2011). Other trials of the integration systems have also been presented in rural development approaches, but have fallen shy of the aimed target in the implementation of integrated planning (Dale et al. 2011).

One of the more recent interdependent approaches, the nexus approach, identifies the central sectors as the water-energy-food, and advocates for better physical as well as policy and governance integration (Hoff, 2011). The important role that governance and institutions play in enabling policy coherence and a nexus approach is underlined in several reports and frameworks. In the 2011 report “Understanding the Nexus”, “stronger institutions that are better interlinked” are identified as key to a nexus approach (Hoff, 2011). The same report considers institutional capacity-building along with political will, change agents and awareness-raising as enabling conditions for “horizontal and vertical policy coherence”. Another nexus framework which also added to the importance of institutional integration and policy coherence, is the World Economic Forum framework that

recommended the implementation of an “integrated and multi-stakeholder resource planning” (Bizikova, Roy, Swanson, Venema, & McCandless, 2013). Scott et al (2011) assert that “there is a need to explicitly consider institutions and decision-making, not just input and output relationships between water and energy” when considering a nexus approach (Scott et al., 2011).

Bizikova et al (2013), as a result of revising a number of the WEF nexus frameworks, identifies governance, and integrated and multi-stakeholder resource planning as one of the areas for intervention in promoting a WEF approach. Governance, and integrated and multi-stakeholder resource planning is needed “to promote cross-sectoral and cross departmental approaches to planning and working with stakeholders at different levels to improve public sector-led governance, planning and information flows” (Bizikova et al., 2013).

Objective

Going back to the Lebanese case, even though physical interlinkages between the WEF resources in Lebanon exist, it is clear that they are not planned in the most efficient manner. The main problem in Lebanon remains the mismanagement and the governance of these sectors (Lebanese Transparency Association, 2009). In order to provide a supportive structure for water, energy, and food sector integration, there needs to be a more coherent and integrated governance system that harnesses the ability to produce and consume in a sustainable and equitable manner.

To better understand the current institutional set-up, this paper attempts to answer two main questions: are the structures of the state actors in Lebanon aligned in favor of the water-energy-food nexus, and are the policies and the procedures for their development amenable for a nexus approach?

METHODOLOGY

To answer these two questions, a combination of interviews and desktop review has been conducted. At the level of institutions, the executive and operational state actors were identified in order to study the institutional integration. Representatives from the identified actors in the water, energy, and food sectors were interviewed; with special focus on key people in ministries and governmental agencies who have been involved in the development of strategies and policies in their respective sectors. The main purpose of the interviews was to relate institutional obstacles to an integrated approach, and to compare between their mandates and the actual policy planning processes being followed. The interviews also aimed to identify entry points in the institutional bodies where the nexus approach can be introduced.

The desktop review covered reports and peer reviewed literature on the water, energy, and food nexus, and integrated resource planning and management as well as national reports published by international organizations, ministries, and other institutions on the water, energy and food sectors and their relative resources. The official mandates of concerned ministries and the most recent sectoral policy produced were studied.

Based on the interviews and desktop research, the level of cross-sectoral consultation and decision-making processes in the policy formulation was assessed in order to evaluate the depth of interconnectedness between Lebanese policies and within the institutional frameworks governing the water, energy, and agriculture sectors.

IDENTIFYING THE WEF STATE ACTORS

The institutions concerned with the water, energy, and food sectors were identified with a perspective as to how well they are structurally integrated and to what level the governance of the three sectors is integrated within their mandates and their policy outputs.

Executive and Operational State Actors

As stated in the constitution of Lebanon, the executive power is entrusted to the Council of Ministers (CoM) whose responsibility is to present policies and implement them according to the laws. The legislative power lies in the hands of the Chamber of Deputies, represented by 128 deputies. The implementation of the policies however is divided among different operational and technical bodies.

Regarding the state institutions, and ministries in particular, the division between the executive level and operational is not distinct institutionally; the final executive level is tied to the minister's position whereas the operation can fall under the different departments in the ministry or even extend to some external bodies. Accordingly, the ministries house both the policy-makers, and the policy-implementers.

There are two "Line" ministries directly involved in the policy-making, and operation of the water-energy-food nexus in Lebanon. The sectoral planning and management of water and energy falls under one single ministry, which is the Ministry of Energy and Water (MoEW) as mandated by Law 221 (Government of Lebanon, 2000a) for water and Law 462 for electricity (Government of Lebanon, 2000b)¹, and even under the same directorate. However, the institutional structure of the two sectors seems to take two separate and distinct pathways. The MoEW operates, controls, and supervises the operation of the water and energy sectors including the mandate for execution of some projects that fall under its jurisdiction. However, it is important to note that the laws of the two sectors were issued in the year 2000, but have not yet received their respective implementing decrees. As such, the ministry is still operating on the pre-law structure, which results in the unclear division of duties among the different departments inside the ministry and across to the external bodies.

In relation to the food sector and for the purposes

of this paper, state actors and policy related to the agriculture sector will be the focus of the research with a mention of other bodies involved in the food sector in general. As such, the Ministry of Agriculture (MoA) is identified as the key ministry mandated with the planning and management of the agriculture sector in Lebanon and the law that defines its structure and role will be studied. The last update of the structure of the Ministry of Agriculture was in 1994, under decree 5246; which assigns the roles of the different bodies under the ministry (Government of Lebanon, 1994).

There are other state actors that are also involved in the governance of the water, energy and food sectors; these are identified in Table 1, and are mapped in more details in Figure 2.

1 The concept of the energy sector in Lebanon has been until recently directly associated with electricity production. The law that is related to the energy sector is called "organization of the electricity sector".

Table 1

Key Governmental Institutions

	<i>INSTITUTION</i>	<i>FUNCTIONALITY</i>
Line ministries	Ministry of Energy and Water	Operational and executive actor of the water and energy sector
	Ministry of Agriculture	Operational and executive actor of the agriculture sector
Other high level bodies involved in the executive process	Ministry of Environment	Direct care for the preservation of natural resources
	Ministry of Economy and Trade	Subsidies, food safety consumer protection, regulations
	Ministry of Finance	Financing and funding
	Ministry of Public Health	Quality of water and food safety
	Ministry of Industry	Food processing as well as monitoring for better and environment-friendly industrial practices
Independent institutions under the Prime Minister and the Council of Ministers	Council for Development and Reconstruction	Assists ministries financially and technically in implementing their sector strategies
	Office of the Minister of State for Administrative Reform	Administrative reform
	Investment Development Authority of Lebanon	Encourages investments to export local productions
Inter-parliamentary committees	Water, energy, public works and transportation	Review and discuss proposals from the government and recommend amendments to ensure approval by the full body
	Environment	
	Agriculture	

Line Ministries

Each of the two line ministries identified houses a unit for policy and planning. The sections below describe the structure/framework of each.

Ministry of Energy and Water

In the case of the MoEW, the strategy formulation for both water and energy falls under the responsibility of the Department of Planning in the General Directorate of Hydraulic and Electric Resources (GDHER). This department houses the Water Planning and the Energy Planning units which are two separate units under the same department. A third unit also housed under the Planning Department is the Projects unit whose duties include coordination with the various external organizations and institutions on projects pertaining to the water and energy sectors. Most such projects are related to the Council for Development and Reconstruction (CDR) and the United Nations Development Programme (UNDP). Different departments under the GDHER also work on operating and planning projects, for instance irrigation schemes are operated under the irrigation unit under the hydraulic department.

The Planning Department of the MoEW suffers from 90% vacancy, with 100% vacancy in some units. The total vacancy of the GDHER is 85% (Ministry of Energy and Water, 2010a); rendering the productivity of the ministry's work very low. In order to make up for those vacancies, the ministry relies on outsourcing to different nongovernmental institutions and organizations (Ossayran, 2013). The inefficiency of such a method is the inability to retain the information inside the ministry, since most of the times the outsourced staff tends to be replaced with the beginning of new ministerial mandates.

The MoEW has two other general directorates, general directorate of oil and general directorate of exploitation. The first is responsible for the oil and gas extraction process, and the second deals with the tutelage monitoring for both the water and energy.

Under its General Directorate of Exploitation, the MoEW is mandated to oversee and monitor the work of the Water Establishments and the Litani River Authority as well as the Electricity concessions. There are four Water Establishments (WE) in Lebanon – WE of North Lebanon, WE of South Lebanon, WE of the Beqaa and WE of Beirut and Mount Lebanon. The

WEs are regional authorities, and are autonomous entities, tasked with the provision of water supply and wastewater treatment within their region. They are strictly operational agencies with no official role in policy-making. The Litani River Authority is charged with the management of the Litani River Basin and the monitoring of all rivers in Lebanon, and its duties also extend to the management of the hydro power plant it houses. However, the relation between the WEs and the ministry is unclear in the mandates as the Law still awaits its implementation decrees.

As for the concessions, the MoEW oversees the electricity producing companies mainly Electricité du Liban (EDL) which handles 90% of the generation, transmission, and distribution of electricity throughout Lebanon. The remaining 10% is handled by the private concessions which include Zahle, Jbeil, Alley, and Bhamdoun for hydrocarbon generators, and the hydroelectric generating plants, namely Kadisha plant in north Lebanon and Litani River Authority on the Qaroun dam.

Another energy related body that is directly affiliated to the Ministry of Energy and Water is the Lebanese Center for Energy Conservation (LCEC). LCEC is the main institution working on the development and implementation of green options in production and usage of energy. The center has been working on solar power for production of electricity at the individual dwelling level (LCEC, n.d.).

Ministry of Agriculture

The MoA has a different structure than the MoEW. It only has one general directorate with several directorates operating under it, each housing a planning unit. There is, however, one coordinating directorate called the directorate of studies and coordination, and is divided into several departments for studies and project, economic statistics of the sector, and project coordination and sector planning. According to Article 23 of Decree 5246 the Department of Planning is responsible for producing agriculture policies for all agriculture production in a holistic plan. It is responsible for coordinating with the various directorates in relevant ministries and agricultural institutions during the planning process. However, it is important to note that every department inside the ministry has a dedicated unit for economic studies that refers back to the Department of Studies and Economics. The Department of Studies and Economics' duties as stated in article 20 under decree 5246, prepares all the studies necessary to ensure the productive coordination between MoA and the Ministry of Economy and Trade (MoET), the Ministry of Foreign Affairs, the Ministry of Energy and Water (MoEW), and

all administrations and institutions that are concerned with studying trade agreements. The department also suggests agriculture export policies.

The food sector falls under the direct supervision of the MoA through its various departments and institutions such as the Lebanese Agriculture Research Institute (LARI), the Green Plan, the Higher Council for Agriculture (currently idle) and the Planning and Coordination body (with unclear duties). LARI falls under the direct supervision of the MoA. The Institute's scope of work covers scientific agricultural research aimed at assisting farmers when dealing with crop production and protection problems and also tries to develop methods geared towards overcoming general sector weaknesses including working on irrigation schemes (LARI, n.d.).

Green Plan, an autonomous entity under the direct authority of the Minister of Agriculture, works on implementing small-scaled hill-lakes with a capacity smaller than 100,000 m³, and on the networks between the hill-lakes and farms (Roukoz, 2014), as well as on the modernization of irrigation systems. The Green Plan was put into action in 1963 to perform reforestation and agricultural road reconstruction and land reclamation (Green Plan, n.d.).

Other high level bodies involved in the executive process

Other ministries involved in the executive process in relation to the water, energy, and food sectors (represented here by the agriculture sector) include the Ministry of Environment (MoE), one of the youngest ministries, which was created under Law 216 in 1993. The MoE acts as a point of reference for all environmental regulations and policies, and controls pollution across different sectors (MoE/UNDP/ECODIT, 2011). A few of the ministry's responsibilities include the production of policies and regulations pertaining to the environment and natural resources exploitation. The Ministry of Industry has a strong link to the water, energy, and food sectors where energy, water, and agricultural production are primary inputs for many production processes especially in food industry. The industry sector has great potential to drive a greener economy through improved resource efficiency due to its capacity to implement guidelines and conditions for greener productions. The Ministry of Economy and Trade (MoET) has a main influence on what type of food products/categories get consumed in Lebanon by "encouraging a certain type of production over the other through the taxes and subsidies it enforces" (Melki, 2014). MoET also houses a consumer protection unit that deals with the consumer side rather than the supplier and is there to ensure the safety of the product being used in terms of quality.

The Ministry of Finance is the entity directly concerned with aligning strategies, action plans and projects with the national budget and therefore influences the work of the sectoral ministries. In a way, and according to the priority and urgency of the subject at hand, the Ministry of Finance allocates the budgets for every plan, or strategy. Finally, the Ministry of Public Health has a minor role to play in monitoring drinking water quality for consumers in Lebanon.

Other semi-independent bodies that work on cross-cutting issues as opposed to just sectoral include the Council for Development and Reconstruction (CDR) which operates under the Office of the Prime Minister. CDR's main role is "the reconstruction of Lebanon", somehow taking part of the mandates that the Ministry of Planning used to have before it was terminated ("Council for Development and Reconstruction (CDR) - Profile," n.d.). "The CDR is, in the institutional hierarchy, the main flagship of the Council of Ministers that complies with their instructions and coordinates with the concerned ministries" (CDR profile). Thus, the CDR assists the ministries in the implementation of their relevant sector-based projects in terms of planning and financing through processing external or national budgets (CDR Profile). An example of the coordination role that the CDR plays is through the development of the National Land Use Master Plan which was led by CDR and that involved coordination between different stakeholders and the creation of a team from different backgrounds in order to produce a well-rounded plan (CDR Profile). The CDR is also concerned with implementing different kinds of infrastructure projects that include drainage, electricity networks, and water supply and sewage networks and therefore is involved in the water and energy sectors on the infrastructure level.

The Office of the Minister of State for Administrative Reform in Lebanon (OMSAR) is a governmental organization that seeks to develop the institutional and technical capacities of the Lebanese ministries, central bodies, public agencies and municipalities. OMSAR is thus responsible for assessing and implementing developmental and reform projects. It is also involved in administrative reform through development projects, capacity building projects, and identifying improvements based on the conducted studies. OMSAR works closely with Lebanese administrations as well as with international donors, non-governmental organizations, and the civil society. Accordingly, even though OMSAR does not have a direct role in managing the water, energy or food sectors, it could be an entry point to enhancing collaboration between the line ministries by developing their institutional and technical capacities.

The Investment Development Authority of Lebanon

(IDAL) is a national agency that is also under the Office of the Prime Minister; it acts as the national investment promotion agency and was established in 1994. More importantly, due to investment law number 360, the agriculture sector was one of the important socio-economic sectors identified that needs proper investment marketing. Moreover, IDAL also works on promoting and marketing Lebanese agriculture and agro-industrial exports (IDAL, n.d.).

Other soft bodies

Councils, committees and units which play a role in influencing the executive process, are also created as the need arises. The difference between the three depends on the importance of their purpose; for instance, councils and committees need to be approved at the CoM whereas units are usually approved by the minister (Kabakian, 2013). A Higher Council of the Environment was created under environmental protection Law 444, Decree 8157. The council consists of 14 members representing the ministries of finance, interior and municipalities, public works, energy and water, from the governmental side, in addition to different private stakeholders namely representatives from environmental associations and environmental experts. The council assists with and advises the ministry on environmental priorities and goals and suggests changes to the released policies, and coordinates with the institutions, directorates and ministries on environmental preservation. Parliamentary committees are also set up to address the different legislative reforms of the relevant sectors such as the environmental committee, and the water, energy, public work, and transport committee.

Institutional Interlinkages

Institutional interlinkages in relation to the WEF nexus elements in Lebanon are present within and between state actors on both the executive and operational levels. These interlinkages take different forms such as common departments for policy and planning for two of the elements, joined committees, a coordinating body/unit/department, single body implementing projects or plans in relation to the three elements. The interlinkages between institutions are mostly on a bilateral level of the WEF that is in relation to energy-water or water-agriculture; as such the interlinkages are more water centric. The identified line ministries house units for coordination and for horizontal outreach across other ministries as well as within the ministries themselves showing a structurally integrated system. In relation to water and energy, the policy and planning for both sectors is housed in the same ministry and the same department which

implies a structurally integrated system on that level. The MoA reaches across to other ministries and bodies through the Department of Studies and Economics including the MoEW and the MoET when it comes to issues related to trade which is an important factor in WEF nexus planning approach. Moreover, the MoA's mandates stress a lot on the cooperation between the MoA and the MoET, where it was confirmed by one of the interviewees that there is a common council between the MoET and the MoA that meets regularly every two months in order to discuss the required needs between regulating and monitoring food production related to exports and imports.

However, there is significant overlap in the role and duties of different state actors, especially when it comes to water and agriculture. Such overlaps, which are considered as hindering factors for proper implementation of policy and plans on one level, could on some levels be considered as an interlinkage between institutions.

In terms of entry points to a more "nexused" approach, the MoE can play an advanced role in coordinating between the line ministries of the WEF nexus elements and in promoting its theoretical approach, as it is mandated to produce policy related to natural resources exploitation. Furthermore the MoE is assigned as a focal point on climate change in Lebanon and heads the Higher Council for the Environment which is a coordinating body including representatives from main ministries concerned with environment in Lebanon.

The Parliamentary Committee on Public Works represents another soft form of "institutional interlinkage" that could play a role in ensuring that policy planning is being done in an integrated manner when it comes to the WEF elements as it is part of the policy process in its legislative arm.

Even though OMSAR does not have a direct role in managing the water, energy, or food sectors however it could be an entry point to enhancing collaboration between the line ministries by developing their institutional and technical capacities. The CDR in its turn can provide an institutional interlinkage for WEF nexus sectors planning as it is already mandated to assist all sector ministries in planning and implementation.

On the operational level the LRA is a good example of a single institution implementing projects related to water, energy, and agriculture even though this is done on a river basin level as opposed to a national level.

SECTOR OUTCOMES AND POLICY PROCESSES

The process of formulating the sector policy does not necessarily conform to one typical pathway. As confirmed by the interviews, policy-making in Lebanon can follow a top-down approach where the policy change is initiated at the ministerial level or a bottom up approach where the civil society and other non-governmental organizations draft and advocate for a policy change.

However, the approval process for the sector policy once it has been formulated has to follow an established path. The concerned ministry has to present its policy to the Council of Ministers (CoM) for approval and for budget approval from the Ministry of Finance. In some cases, when accompanying legislative tools are needed, the required decree additions are raised to the parliament for any legislative updates/modifications, and are therefore referred to the relevant parliamentary committees. After the required amendments are made the final policy draft is presented to the CoM, and once approved is passed on to the chamber of deputies for final approval.

Sector strategies, policy tools and action plans span over a period of five years, more importantly, strategy releases usually coincide with new ministerial mandate formations. Several factors such as new ministerial mandates, new international agreements, and urgency of certain matters require new plans or changes to existing ones (El Khoury, 2013; Kabakian, 2013; Mousallem, 2013).

Strategy Interlinkages

Both line ministries have in the past five developed strategies for their respective sectors.

Ministry of Energy and Water

The MoEW presented its National Water Sector Strategy in 2010. It aimed at providing continuous water supply for households and irrigation water for farmers and improving water treatment in a more sustainable manner. The strategy spans across the years 2010 to 2020; however it was only accepted by the CoM in 2012.

The strategy focused on improving water supply through the rehabilitation and upgrading of networks and completion of distribution and transmission systems; building of new storage facilities; and optimization of surface water resources. The strategy also addressed artificial groundwater recharge

focusing on two reasons, first to increase storage, and second to avoid or reduce salinization. Another part of the strategy tackled wastewater treatment and reuse of treated sewage effluent. The strategy concentrated on the importance of irrigation practices and provided scenarios based on irrigation efficiency and the influence of planned agriculture expansion of MoA, accordingly the strategy plans on increasing irrigated lands.

The energy sector has been stagnant since the end of the civil war, very little has been done to improve and empower that sector. Moreover, the energy sector lacks a global strategy, and is divided among an electricity policy paper, and a renewable energy plan. The MoEW released a policy paper in 2010 whose major goals were improving the EDL status by “new sustainable, reliable, and efficient delivery of electricity (Ministry of Energy and Water, 2010b). The main mission was clearly to provide continuous electricity with no power outages, and was strictly directed to the EDL functions. In that sense, policies presented cover the infrastructure, supply/demand problems and the financial problems to solve most of the basic problems that the sector is facing. Each policy was presented with the cost and time needed for execution (Ministry of Energy and Water, 2010b). On the supply side, the EDL policies include fuel sourcing and renewable resources. Fuel-sourcing policy is based on diversifying the resources in terms of type and origin. The plan is to use 60% natural gas and more than 12% renewables. Suggested implementations are related to infrastructure preparations in terms of new pipelines and resource adaptable plants. The EDL policy also “commits to launching, supporting and reinforcing all public, private and individual initiatives to adopt the utilization of renewable energies to reach 12% of electric and thermal supply”. There are plans to look into wind and photovoltaic farms as energy sources, and encourage the use of waste to energy methods as well as “initiatives to produce hydropower”(Ministry of Energy and Water, 2010b). On the demand side, EDL’s main strategy is to encourage more efficient use of energy through the use of energy saving bulbs, solar water heaters, and setting up new energy efficient laws. Tariffs are also planned to increase in order to have a more equal balance of payments for the EDL. The legal framework covers norms and standards, corporation of the EDL and the legal status. Norms

and standards cover concession issues, encourage more green building and comply with the international standards of efficient energy use for better environmental proposes.

The National Energy Efficiency Action Plan (NEEAP) is the output of the Lebanese Center for Energy Conservation (LCEC) in collaboration with the Ministry of Energy and Water and was approved by the Council of Ministers. It is an action plan that promotes efficient and green methods of energy production and usage. It is based on 14 separate but related initiatives, covering suggested policies by the EDL. Initiatives include practical and legal issues (LCEC & UNDP, 2012). The NEEAP is more relevant to energy conservation and the use of renewables and climate change mitigation. Different projects are taking place in terms of greener energy for housing (solar water heaters, net metering, use of fluorescent lamps); moreover, LCEC is in the process of preparing a new action plan for 2015-2020 with a hint of work related energy efficient agriculture projects (El Khoury, 2013).

Policies released by the MoE do not tackle the management of the sectors; they are more of a cross cutting and preventive nature. In its work plan, the MoE plans to activate environmental management of water basins and reconcile between energy projects and environmental considerations. It specifically states the need to coordinate with the MoEW for the development of an “integrated plan for the adoption of integrated management of water basins”, and for the preparation of “strategic environmental assessment of the petroleum sector, and the related environmental decrees”.

Ministry of Agriculture

Since 2010, the MoA has released two strategies; the first for the years 2010-2014 and the second for the years 2015-2019. The latter has been finalized and is awaiting approval from the CoM. The first strategy paper tackled problems the MoA faced that ranged from legal issues, to structure improvements within the ministry and enhanced relations with other governmental and non-governmental institutions and organizations, renovation and infrastructure planning to reduce tradeoffs across sectors. The strategy also aimed at monitoring agriculture practices, raising the standards of product quality, encouraging small and medium enterprises through micro finance loans, and lastly to protect the natural resources within its scope which are soil, forests, biodiversity, and land management (MOA, 2009).

As for the second strategy, it also has eight pillars, but with a more elaborate and detailed planning, some of which were carried over from the previous strategy such as improved food quality, the protection of the natural resources but with an addition of the concept of good governance, the development of the ministerial capacities, and the improved funding. Newly introduced pillars were the improvement of product competitiveness, strengthening of the extension systems and research and most importantly the plan to respond to climate change impacts (MOA, 2015).

Policy Formulation

The approaches to developing their national sector strategies varied between the two line ministries.

Ministry of Energy and Water

An initial draft of the water sector strategy was first developed by the advisors to the minister contrary to the mandates of the role of the department of planning, however the final strategy was the result of a consultative process that involved the majority of stakeholders (Anonymous 2, 2014). The consultative process started by sending personal and official invitation letters to the various stakeholders from governmental, non-governmental, and international institutions to participate and provide feedback on the draft national water sector strategy. The procedure took place through several phases with every consultation phase lasting around two days, where the Ministry suggested a strategy draft and received feedback from the various participants in the meetings. This aided in the alignment of a more rounded and complete strategy. In some cases, such as the MoE, the participation at this process was at the level of advisors to the minister as opposed to permanent staff from the ministry. (Mousallem, 2013).

The energy policy paper was also prepared mostly at the level of advisors to the minister at the MoEW (Ossayran, 2013). The production of the energy policy paper did not follow the same consultative process as was done with the water sector strategy. The energy policy paper was prepared and then sent to various ministries for comments which were incorporated into the final policy paper where seen fit.

Ministry of Agriculture

The agriculture sector strategy development process remained within the MoA and involved an internal technical committee from within the ministry, representing the four main directorates and did not include other institutions or ministries (Anonymous 1, 2014). Feedback from other ministries was solicited after the strategy was completed.

The MoA did however release in 2013 a progress report that focused on the actions and plans that had been implemented from the sector strategy (Anonymous 3, 2014).

The second strategy prepared in 2015 did involve a more participatory approach and was coordinated by the Ministry of Agriculture and the agriculture and rural development program under the European Union (MOA, 2015).

Policy Interlinkages

The strategy development process of two of the three separate sectors was not initiated by the permanent staff at the ministries, as the mandates inform, they were initiated at the level of advisors to the ministers. It is clear from the process that the existing institutional interlinkages within and between ministries were not taken advantage of.

Moreover, the mandates of the ministries seemed to give a simpler and clearer coordination mechanism however the interviews revealed a different status quo when it comes to the cross-ministerial coordination. Coordination was sometimes deemed difficult due to the extensive bureaucratic procedures that inhibit the system. For example, in relation to correspondence within a group composed of several ministries, official letters need to be sent up the managerial ladder all the way to the minister and/or director general who would then instruct the involved personnel to respond to the letter – a task that they were initially assigned to do.

In retrospect to ministerial coordination, the government in 2012 released a decree related to the publishing of all official documents and laws on the governmental websites for a period of 15 days in order for the different stakeholders to provide feedback (Official Gazette, number 27, 30/8/2012).

CONCLUSION

The water-energy-food nexus is a concept based on the introduction of better interdependent planning on a policy level as well as the technical one, thus aiming at achieving better synergies across the sectors in order to reduce harmful tradeoffs and attaining the highest levels of efficiencies and sustainability. The nexus approach also requires integrated governance, institutions, and policy planning. So far, the governance of the water-energy-food nexus has remained a theoretical concept as it has to be adapted to a country's existing state actors and mandates. As such the need to understand the current policy processes and state institution structures is highly indispensable, in order to understand how a nexus approach can be achieved and what can be considered as entry points to such an approach within the institutions.

In Lebanon's case, the state actors, divided among executive and operational, have shown a rather integrated system according to their mandates, where the ministries house planning and coordinating bodies that are intended to extend to relevant ministries and other general stakeholders in the process of policy-making. However, a deeper look at these institutions reveals obstacles to better coordination within and between institutions starting from the high vacancy rates in the ministries, complicated bureaucratic procedures, where the processes of cross ministerial coordination are tied up in bureaucratic red-tape and protocol, and the lack of a common methodology for setting strategies. Moreover, the high number of vacancies in the various ministries is causing a great loss in efficiency and institutional memory as many tasks are outsourced.

This was reflected in the sector strategies and policy outputs and through the strategy formulation processes. The strategies in general showed very little intended overlap across the different sectors, where the water strategy mainly aimed at improving supply, with very little mentioned about irrigation and response to climate change. The electricity policy paper also dealt mainly with supply where the only mention of green and sustainable power being the 12% renewable target by 2020. The recent agriculture strategy however showed an improvement from its initial strategy to include a pillar on cross sector integration planning and responding to climate change. One example of the lack of coordination

between the ministries producing these strategies is evident with the different outlook on irrigation and irrigated land between the water sector strategy and the first agriculture strategy.

It is clear that having interlinkages between institutions is not enough to have an integrated policy in this case between WEF sectors. It is important to have active cooperation mechanisms between stronger institutions; this would be an important driving force behind introducing a WEF nexus approach in Lebanon.

WORKS CITED

- Anonymous 1. (2014). Personal Interview.
- Anonymous 2. (2014). Personal Interview.
- Anonymous 3. (2014). Personal Interview.
- Biol, F. (2006). World Energy Prospects and Challenges. *The Australian Economic Review*, 39(2), 190–195. doi:10.1111/j.1467-8462.2006.00411.x.
- Bizikova, L., Roy, D., Swanson, D., Venema, H. D., & McCandless, M. (2013). The Water-Energy-Food Security Nexus: Towards a practical planning and decision-support framework for landscape investment and risk management, (February).
- CDR. (n.d.). *Council for Development and Reconstruction - Profile*. Retrieved October 22, 2015, from <http://www.cdr.gov.lb/eng/profile.asp>.
- CEDRO. (2013). Hydropower in Lebanon; History and Prospects, (4), 1–17.
- Dale, V. H., Efromson, R. A., & Kline, K. L. (2011). The land use–climate change–energy nexus. *Landscape Ecology*, 26(6), 755–773. doi:10.1007/s10980-011-9606-2.
- El Khoury, P. (2013). Personal Interview.
- Government of Lebanon. (1994). Decree 5246/1994: Organization of the Ministry of Agriculture. *Official Gazette*.
- Government of Lebanon. (2000a). Law 221/2000: Organization of the Water Sector. *Official Gazette*.
- Government of Lebanon. (2000b). Law 465/2000: Organization of the Electricity Sector. *Official Gazette*.
- Green Plan. (n.d.). *About Green Plan*. Retrieved October 23, 2015, from <http://www.greenplan.gov.lb/ar-gp/>.
- Hoff, H. (2011). Understanding the nexus. *Background Paper for the Bonn2011 Conference: The Water, Energy and Food Security Nexus*. Stockholm Environment Institute, Stockholm., (November).
- Horlemann, L., & Dombrowsky, I. (2011). Institutionalising IWRM in developing and transition countries: the case of Mongolia. *Environmental Earth Sciences*, 65(5), 1547–1559. doi:10.1007/s12665-011-1213-7.
- IDAL. (n.d.). *About Us - Who We Are*. Retrieved October 22, 2015, from http://investinlebanon.gov.lb/en/about_us.
- Kabakian, V. (2013). Personal Interview.
- Lafferty, W., & Hovden, E. (2003). Environmental policy integration: towards an analytical framework. *Environmental Politics*, 12(3), 1–22. doi:10.1080/09644010412331308254.
- LARI. (n.d.). *Mission History*. Retrieved October 23, 2015, from <http://www.lari.gov.lb/MissionHistory/tabid/56/Default.aspx>.
- LCEC. (n.d.). *About us*. Retrieved October 28, 2015, from <http://www.lcecp.org.lb/aboutus.php?i=1>
- LCEC, & UNDP. (2012). THE NATIONAL ENERGY EFFICIENCY ACTION PLAN FOR LEBANON.
- Lebanese Transparency Association. (2009). *National Integrity System Study Lebanon 2009*. Retrieved October 23, 2015, from http://www.undp-aciad.org/publications/other/NIS_Report_Lebanon_2009_en.pdf.
- Melki, R. (2014). Personal Interview.
- Ministry of Energy and Water. (2010a). *National Water Sector Strategy*.
- Ministry of Energy and Water. (2010b). Policy Paper for the Electricity Sector, (June).
- Ministry of Environment. (2011). LEBANON'S SECOND NATIONAL COMMUNICATION TO THE UNFCCC.
- MOA. (2009). Strategy for Agricultural Development 2010 - 2014.
- MOA. (2015). Ministry of Agriculture Strategy 2015, (November 2014).
- MOA, FAO, & Cooperation Italienne. (2012). *Resultats Globaux du Module De Base Du Recensement de L'agriculture 2010*. Retrieved October 13, 2015, from http://www.agriculture.gov.lb/html/RESULTATS_RECENCEMENT_AGRICULTURE_2010/RAPPORT_RESULTATS_GLOBAUX_DU_RECENCEMENT_2010.pdf.
- MOE/UNDP/ECODIT. (2011). State and Trends of the Lebanese Environment 2010.
- Mousallem, M. (2013). Personal Interview.
- Ossayran, K. (2013). Personal Interview.

Paul, Reig, Maddocks, A., & Gassert, F. (2012). *World's 36 Most Water-Stressed Countries* / *World Resources Institute*. World Resource Institute. Retrieved October 12, 2015, from <http://www.wri.org/blog/2013/12/world%E2%80%99s-36-most-water-stressed-countries>.

Per Mickwitz, Francisco Aix, Silke Beck, David Carss, N. F., Christoph Görg, Anne Jensen, Paula Kivimaa, C. K., Wiebren Kuindersma, María Mániz, Matti Melanen, S. M., & Anders Branth Pedersen, H. R. and S. van B. (2011). *Climate Policy Integration, Coherence and Governance. PEER Report No 2. Helsinki: Partnership for European Environmental Research*. Retrieved from <http://www.peer.eu/publications/climate-policy-integration-coherence-and-governance/>.

Roukoz, S. (2014). Personal Interview.

Scott, C. A., Pierce, S. A., Pasqualetti, M. J., Jones, A. L., Montz, B. E., & Hoover, J. H. (2011). Policy and institutional dimensions of the water-energy nexus. *Energy Policy*, 39(10), 6622–6630. Retrieved from <http://ideas.repec.org/a/eee/enepol/v39y2011i10p6622-6630.html>.

UNdata. (n.d.). *country profile / Lebanon*. Retrieved October 12, 2015, from <http://data.un.org/CountryProfile.aspx?crName=LEBANON#Social>.

Figure 1

Distribution of Agricultural Land in Lebanon

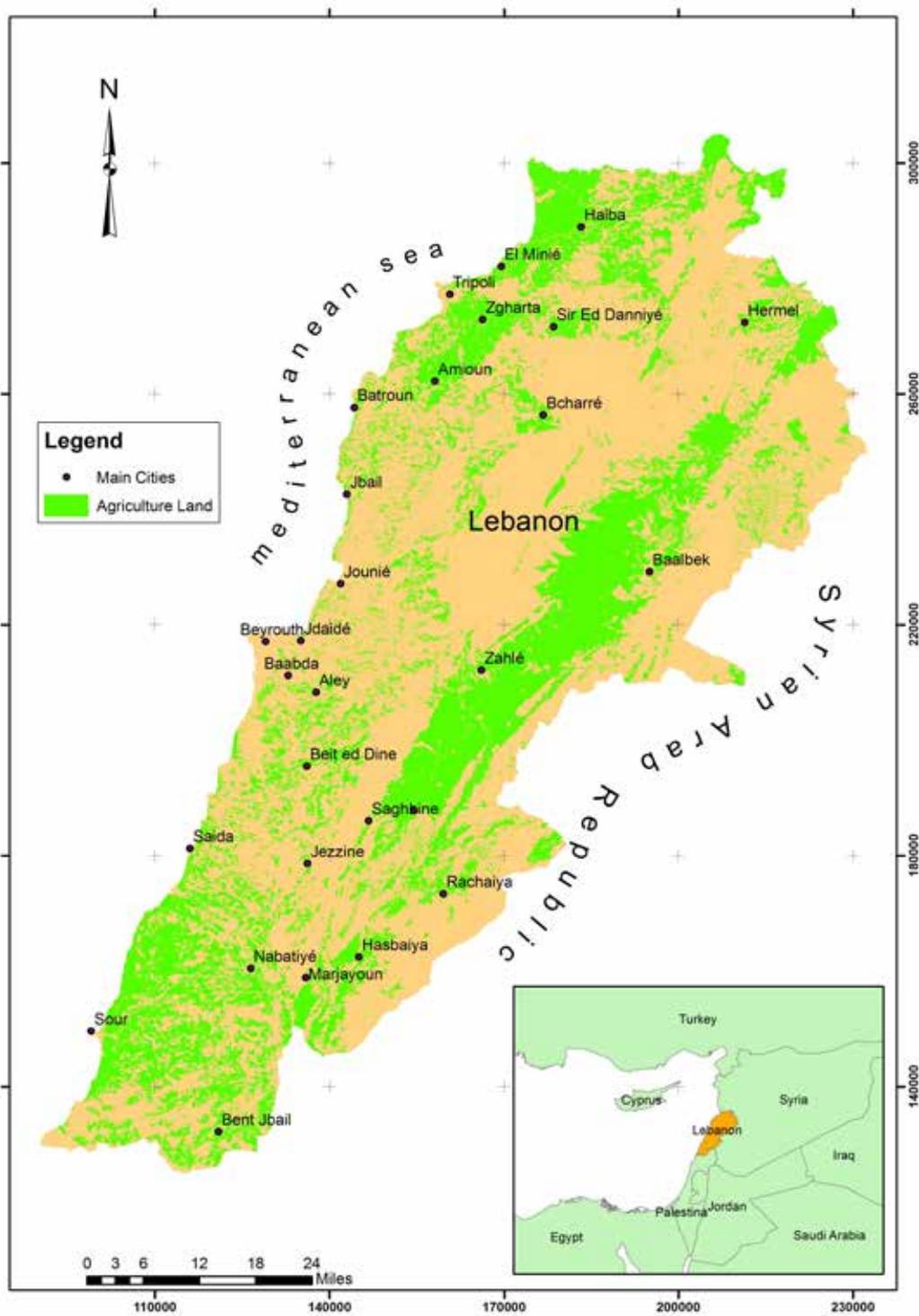
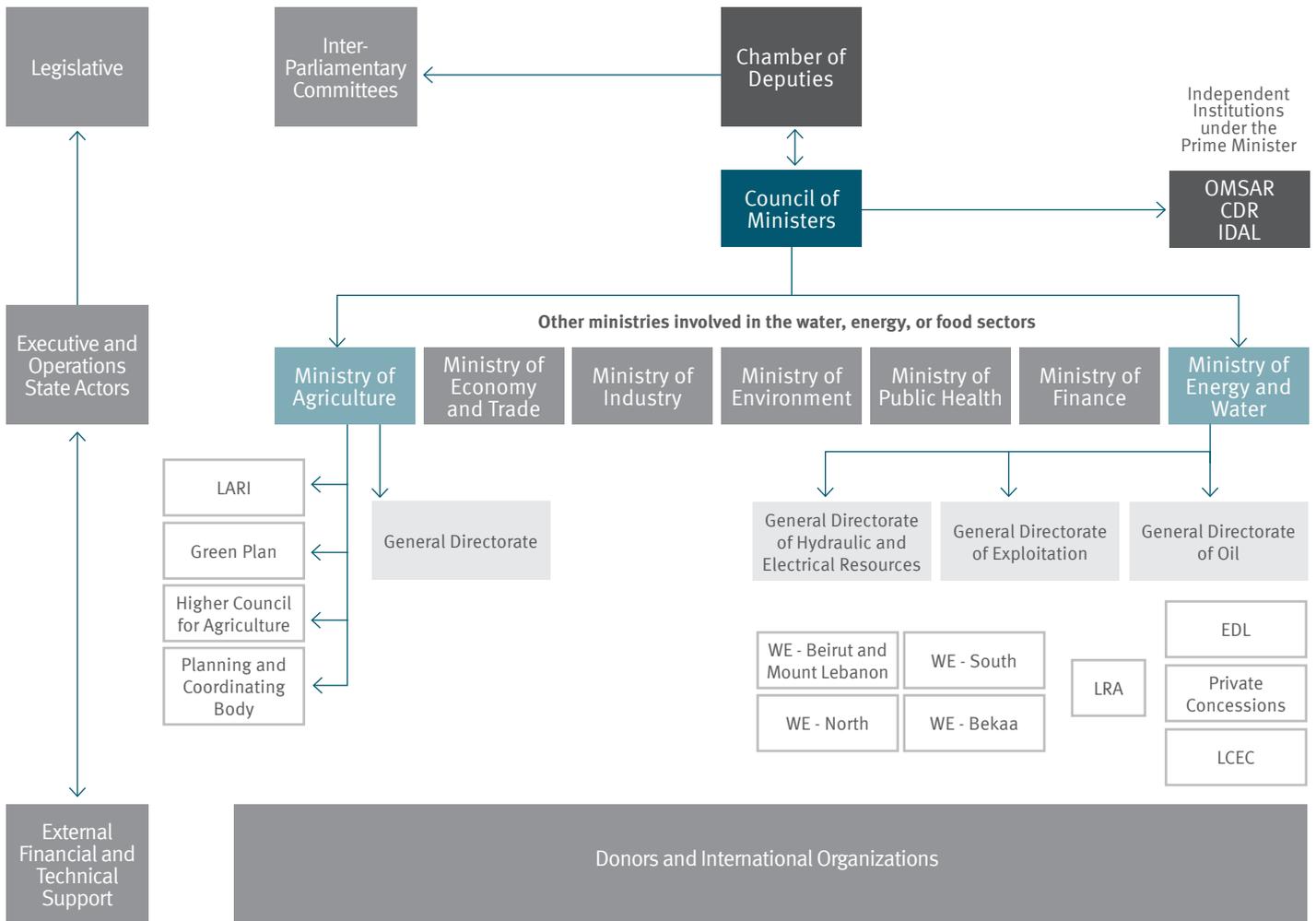


Figure 2
 State Actors of the Water-Energy-Food Nexus in Lebanon





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