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Report

Review of National Water Sector Governance in Lebanon

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Review of National Water Sector Governance in Lebanon

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NOTE: This report was completed before the conflict in Lebanon flared up at the end of September 2024. The information and recommendations in this report reflect only the current state of the water sector and the views and perceptions of the stakeholders interviewed.

Introduction

Lebanon has faced persistent water scarcity over the past decades, driven by inefficient water management practices such as leakage, illegal connections, and inadequate maintenance. With water demand exceeding renewable resources by approximately 400 million cubic meters annually, the country has struggled to meet its population's needs. Since the 1990s, rising demand—up by more than 60%—has exacerbated shortages, especially during the dry summer months. Paradoxically, while Lebanon theoretically has sufficient water resources, nearly 40% of available water is lost during distribution due to systemic issues, including leaks, theft, and governance gaps.

Compounding these inefficiencies are Lebanon's economic and political crises, which have further degraded water infrastructure and supply quality. Chronic energy shortages, insufficient funding, and lack of political will have paralyzed the sector, while the COVID-19 pandemic underscored the critical need for clean water and sanitation. Moreover, the influx of Syrian refugees has placed immense pressure on limited water resources and infrastructure, heightening public health risks such as cholera outbreaks.

The legal framework governing Lebanon's water sector reflects a blend of historical and modern influences, incorporating elements of French, Ottoman, and Sharia-based traditions. Since reforms in 2000, governance has been formalized through institutions like the Ministry of Energy and Water (MEW), Regional Water Establishments (RWEs), and the Litani River Authority (LRA). However, challenges persist in harmonizing policies, delineating responsibilities, and creating a cohesive authoritative structure.

This review examines the intricate governance dynamics of Lebanon's water sector, examining the interplay between institutional frameworks, resource management practices, and the socio-political challenges that underpin the nation's water crisis. Through this analysis, we aim to highlight key inefficiencies and propose actionable pathways toward sustainable water governance.

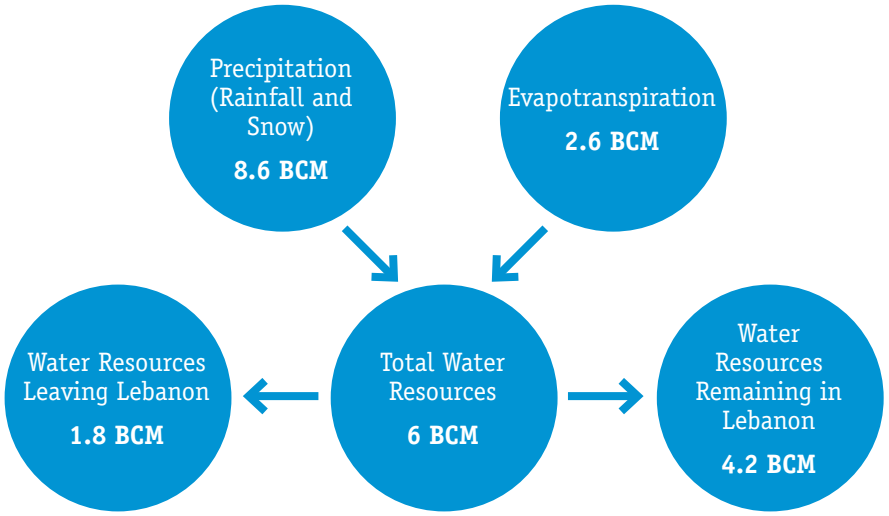
Water Resources in Lebanon

Despite the country's relatively abundant water resources, including seasonal rainfall and 40 rivers, the water sector in Lebanon is facing severe challenges. Lebanon receives an annual rainfall of about 800 mm, translating to an estimated total water volume of 8,600 million m^3.

However, 30% to 50%[1] of this is lost to evapotranspiration, with additional outflows to neighboring countries and groundwater seepage (Fawaz, 1969; Mallat, 1982; Comair, 1998; MEW, 2012, MEW 2024). Figure 1 illustrates the various distributions of water resources in Lebanon.

1
This number is not a measured value but an estimate that has evolved over the years with the original estimate of 50% being presented in 1969 and the 30% most recently presented by the MEW in its National Water Strategy.

Figure 1 **Natural Water Balance in Lebanon – in billion cubic meters (BCM) (adapted from MEW, 2024)**

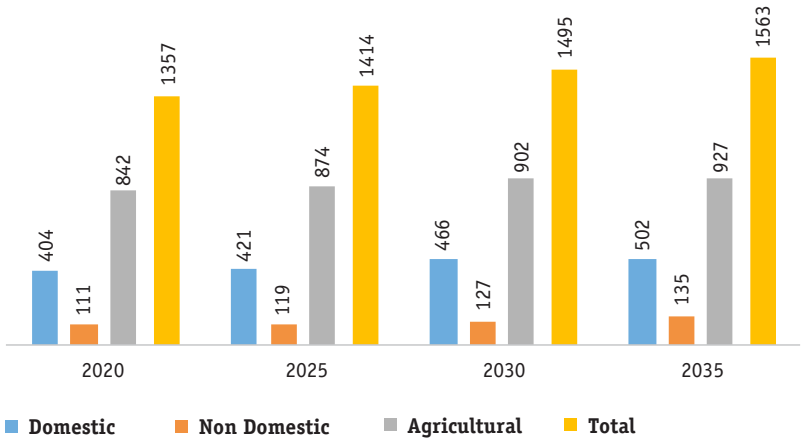


As is shown in Figure 2, the current net available water stands at around 4,200 million m³ per year, sufficient to meet future demands projected at 1,600 million m³ by 2035 (MEW 2024).

Despite substantial investments in water infrastructure since 1990, poor management, aging infrastructure, and inadequate and/or improper investments have led to widespread water shortages.

Pollution, substandard infrastructure, and the impact of socio-political factors have hindered the water sector's ability to meet demand. Challenges include rapid urbanization, demographic growth, and economic development, which have intensified pressure on water resources globally, particularly in dry regions like Lebanon (MoE et al. 2020 and MoE et al. 2011).

Figure 2 **Water Demand between 2020 and 2035 (MEW 2024)**



Impact of the Current Crises

In recent years, Lebanon's water sector has suffered due to regional socio-political instability, conflicts, and internal crises. Since 2011, the Syrian refugee influx has placed additional pressure on the country's water resources, increasing demand by an estimated 8-12% (Triangle Consulting 2023). Furthermore, power outages have frequently interrupted water supply, and poor network maintenance has led to significant water losses, exacerbating the situation. Climate change, leading to increased droughts, has further worsened the water supply, with over 70% of the population facing critical water shortages as of 2021 (Triangle Consulting 2023).

Lebanon's water management is impaired by haphazard exploitation of resources, low storage capacities, and inadequate investment. Water quality is deteriorating due to pollution and insufficient wastewater treatment, and the overall social, political, and economic fragility of the country has reached a breaking point. The combination of these factors has left the Lebanese water sector in a precarious state, threatening the country's ability to meet the water needs of its population and risking further socio-political instability.

Objective of this Review

The main objective of this review is to compile the most relevant and recent laws that govern the water sector along with sector strategies and action plans that in their majority have aimed to improve the performance of water service provision, but for one reason or another have fallen short. This information will be used to

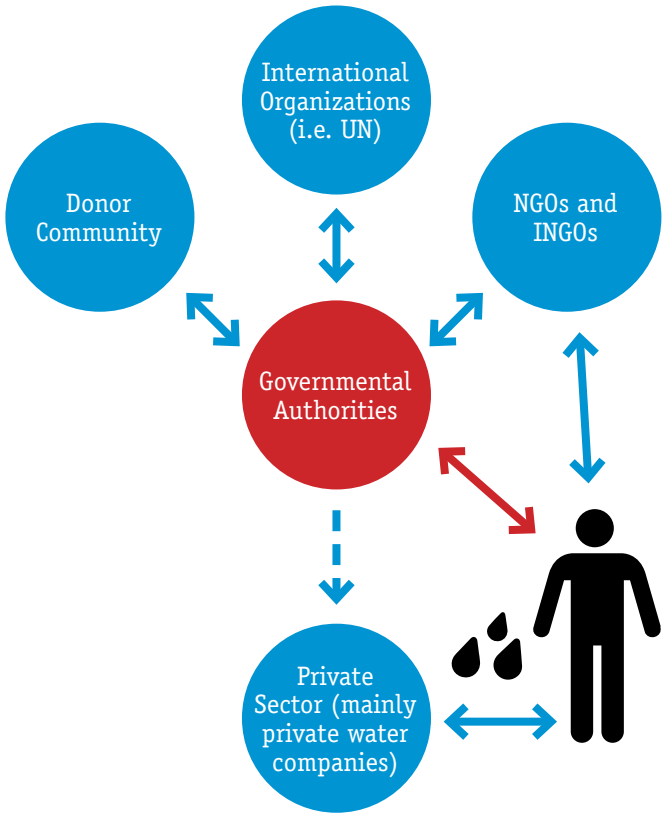
guide a series of interviews with key experts from the private sector (technical consultants), academia, and most importantly the water establishments themselves to attempt to focus and better articulate the critical problems facing the sector and how to fix them.

Key Stakeholders

Since the end of the Lebanese civil war in 1990, a multitude of stakeholders became engaged in the water sector. In addition to central, regional, and local government authorities, many donors like foreign governments and development banks invested in the water sector and operated within it, often through national and international non-governmental organizations (NGOs) and various UN agencies. However, the beneficiaries of the water sector services have largely been left out of planning and decision making.

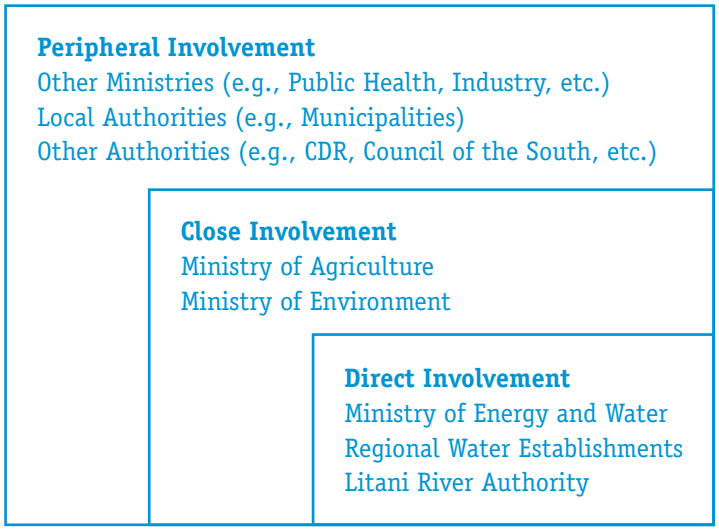
Figure 3 shows the relationships between the various stakeholders. The interventions of many of these stakeholders were to support the regional water establishments (RWEs) and the Ministry of Energy and Water (MEW) along with assistance to local authorities—all with the aim of improving water service provisions.

Figure 3 **Stakeholder interactions**



Within governmental authorities, there are several levels of involvement. Figure 4 visualizes these levels in terms of their mandates and activities.

Figure 4 **Levels of involvements by mandate of governmental authorities**



Such that:

Direct Involvement – Frequent and hands-on participation: Regular, active engagement in decision-making and actions. This implies daily or continuous involvement in operations and governance.

Close Involvement – Moderate, ongoing participation: Engagement occurs periodically. Involved enough to influence decisions, but not on a daily basis.

Peripheral Involvement – Occasional or infrequent participation: Engagement happens at critical points, such as significant decisions on key projects within their areas of mandate or jurisdiction, which is often more consultative.

Current Laws and Regulations

Lebanese water laws are a blend of various legal traditions, including French and Ottoman civil laws, and Sharia-based codified and customary laws. Modern codified laws have largely replaced older customs. Lebanon's water legal framework operates as a dual system: a formal system consisting of governmental institutions, regional water establishments, and official regulations, and an informal system based on traditional and individualistic water management practices.

Institutional Framework for the Sector

The current water management structure in Lebanon evolved from administrative reforms implemented in 2000. The primary governmental body overseeing water and sanitation issues is the Ministry of Energy and Water (MEW), which collaborates with the four Regional Water Establishments (RWEs) and the Litani River Authority. Their roles are interconnected, yet establishing a clear hierarchical system that aligns decrees with the relevant agencies remains challenging (Comair, 2006).

Ministry of Energy and Water

The Ministry of Energy and Water (MEW) serves as Lebanon's primary authority for water management. It formulates and implements overarching water policies and oversees the execution of projects. Established in 1966 under Law 20, MEW initially encompassed water, energy, mining, and domestic wastewater management (CAMP, 2005). Currently, MEW operates through three main directorates as defined by Article 2 of Law 20/66 and Law 247/2000: the General Directorate of Hydraulic and Electric Resources (GDHER), which focuses on research, studies, and large-scale project implementation; the General Directorate for Exploitations (GDEXP), responsible for supervising RWEs, managing public utilities, handling administrative and financial affairs, and overseeing mines and quarries; and the General Directorate of Petroleum Resources (GDPR) (Comair, 2006).

Regional Water Establishments

In 2000, Lebanon established four Regional Water Establishments (RWEs) through a series of laws that consolidated 22 Autonomous Water Offices (AWOs) and 209 local committees (LCs). Despite this merger, some LCs continue to retain control over their catchments due to various political and administrative reasons (Gharios et al. 2021). The integration of AWOs into RWEs aimed to enhance managerial independence, financial stability, and technical capacity. This transformation was intended to facilitate the recruitment of qualified personnel and pave the way for potential private sector involvement through public-private partnerships (PPPs) (Catafago and Jaber, 2001).

Under Law 221/2000, the newly formed RWEs were granted significant autonomy to manage water resources more efficiently. They assumed responsibility for overseeing irrigation, drinking water, and

wastewater management within their respective jurisdictions. This included conducting studies, implementing projects, and monitoring and rehabilitating water infrastructure. However, the South Lebanon Water Establishment (SLWE) operates separately, as the Litani River Authority (LRA) manages irrigation in that region, highlighting governmental overlap (Gharios et al. 2021).

From 2016, the Beqaa Water Establishment (BME) ceased managing water allocation for irrigation and existing systems in central and north Beqaa (Nassif, 2016). Ministerial Order 118/2010 expanded the role of RWEs to include approving well licenses, particularly for areas not covered by RWE services. Approval required ensuring no adverse impact on public water sources (Nassif, 2016).

Litani River Authority

The Litani River Authority (LRA) was established by a law enacted on August 14, 1954, to oversee the implementation of the Litani dam and reservoir project, encompassing irrigation, drinking water supply, and hydroelectricity (Mallat, 2003). Subsequently, in December 1955, another law granted the LRA the technical and financial authority to manage and develop all projects related to the Litani River Basin (Comair, 2006). By 1962, this mandate expanded to include a comprehensive water development plan for the Litani/Awali basins and the area between the Beirut-Damascus Road and southern Lebanon's boundary (Comair, 2006).

In 1996, a presidential decree further extended the LRA's responsibilities to include planning and overseeing new irrigation projects in the Litani River Basin and South Lebanon (Nassif, 2016). Laws 221 and 241 stipulated that the LRA would continue to adhere to the provisions of the August 14, 1954 law regarding the development and management of irrigation systems in South Beqaa (Canal 900) and South Lebanon (Canal 800). Consequently, the SLWE currently focuses solely on managing drinking water and wastewater, while other tasks have been delegated to the LRA over time, primarily through mandates from the MEW rather than through formal legislative changes. These additional responsibilities include nationwide surface flow monitoring and water quality assessment in the Litani Basin (Allisson, 2005; Nassif, 2016).

Other Entities

Other governmental entities have indirect involvement in the water sector, often leading to unclear roles and overlapping jurisdictions with MEW. For instance, both the Ministry of Environment and the Ministry of Public Health are responsible for monitoring pollution. The Ministry of Agriculture frequently establishes irrigation policies without always coordinating closely with MEW. Additionally, municipalities, traditionally overseeing sanitation, continue to play a role in the sector, especially in constructing networks and managing wastewater treatment facilities (Gharios et al., 2021). The Council for Development and Reconstruction (CDR) is also involved in the water sector, but this involvement is waning now with RWEs and MEW assuming more control. CDR was involved (and to some extent still is) in the planning of infrastructure development, supervising implementation, and mobilizing funds from loans or grants for major water and wastewater projects.

As a summary, Table 1 provides a comprehensive list of all official entities engaged in Lebanon's water sector.

Table 1 **Central Authorities Involved in Water and Wastewater Management (Adapted from Gharios et al., 2021; Jadam and Farajalla, 2005)**

Organization	Water Sector Responsibilities and Roles
MEW	Set the national strategy for the water sector Apply the laws and regulations regarding the protection and use of public waters. Apply, execute, supervise, and manage hydroelectric projects. Exercise the power of administrative supervision over the autonomous water authorities and commissions. Exercise a power of control over water concessions.
RWEs	Study, implement, operate, maintain, and renew all potable water, wastewater, and irrigation infrastructure, based on the general master plan for water supply and wastewater. Propose tariffs for water supply, wastewater, and irrigation services, taking into consideration the general socio-economic conditions in the country. Monitor the quality of supplied drinking water, irrigation water and discharged treated wastewater at the outfalls and outflows of wastewater treatment plants.
Municipalities	Provision and maintenance of storm water drainage systems. Support in maintenance of water supply and sewage networks.
Ministry of Interior and Municipalities (MoIM)	Approve municipal works. Aid municipalities in matters related to storm water drainage systems.

LRA	Manage the Litani dam and reservoir, which provides irrigation water and hydroelectricity. Build a hydropower facility to generate income for home and irrigation supply plans. Measure and record all rivers and streams in Lebanon.
MoPH	Recommendations to prevent pollution of water sources. Control pollution at water intakes points. Carry out water sampling and analysis. Maintain statistics on water borne diseases. Provide technical assistance to water authorities on installation, maintenance, and operation of water quality equipment. Review and approve sewerage and drainage schemes.
CDR	Suggest mitigation measures for water source pollution. Control pollution at water intake locations. Update data on illnesses caused by drinking water. Supply water authorities with technical support for the installation, upkeep, and use of water quality equipment. Examine and approve drainage and sewerage plans.
MOE	Monitor and control environmental protection, preservation of natural areas and amenities, prevention of pollution, protection of wildlife, and preservation of environmental balance. Regulate pollution from wastewater activities. Establish environmental requirements, norms, and policies for industries that might have an impact on the environment. Coordinate campaigns to raise environmental awareness.
MOA	Responsible for irrigation water quality, research, extension, and training for use of irrigation water.
Ministry of Information	Raise awareness.
Ministry of Foreign Affairs	Play a role in negotiations over international transboundary waters.
Interior Security Forces	Enforce arrest warrants and manage environmental infractions in accordance with governmental orders.
Ministry of Transport and Public Works (MOTPW)	Maintenance of roadside ditches used for irrigation, overlap with irrigation authorities and farmers.
Executive Council for Major Projects, Beirut	Rehabilitating the infrastructure for storm water, sewage, and water delivery

Laws and Decrees Governing the Sector

Before 1999

Customs and practices in Lebanon, based largely on common sense, were gradually formalized and approved by legislators over time (Catafago and Jaber 2001). A significant transformation occurred with the Ottoman reforms of 1839 and the Mecelle (Mecelle, or Majallat al-Ahkam al-Adliya, published by the Ottoman Empire in 1877) code of 1877, which incorporated customs, Sharia law, and the French civil code. The Ottoman Irrigation Code of 1913 and its 1918 addendum

regulated agricultural water management. During the French Mandate (1920–1943), fundamental water protection and utilization laws were introduced (Orders 144-S/1925 and 320/1926), alongside major hydraulic projects initiated by French engineers.

After Lebanon gained independence in 1943, the General Directorate of Hydraulic and Electric Affairs was managed by the Ministry of Public Works (MPW) until 1959. In 1966, the Ministry of Hydraulic and Electrical Resources (MHER) was established (Law 20, 29 March 1966). The Beirut Water Office was created in 1951, followed by 22 additional AWOs to improve water services. Decree 4517/1972 regulated these AWOs and their relationship with the MHER. The LRA was established on 14 August 1954. Between 1984 and 1990, over 200 Local Committees (LCs) were formed to manage water resources in the government's absence, under the nominal supervision of Autonomous Water Offices (AWOs). Decree 108/1983 regulated potable water exploitation.

In 1990, after 15 years of civil war, Lebanon faced significant challenges in managing water resources due to damaged infrastructure, a disorganized administration, and a fragmented territory. The country initiated an ambitious social and economic reconstruction program to rebuild its infrastructure. This reconstruction was largely financed by borrowing from domestic banks, leading to a substantial government debt burden.

By 1998, the mounting debt from the postwar reconstruction program became a critical issue, worsened by the collapse of the real estate sector. This financial strain halted the ambitious social and economic reconstruction efforts initiated in the 1990s.

Water Policy Reform since 1999

Since 1999, four key events have shaped water policy reform in Lebanon:

1. The adoption of a Ten-Year Water Plan in 1999.
2. The enactment of water administrative laws in 2000 (Laws 221, 241, and 247).
3. The development of a National Water Sector Strategy in 2012 (Resolution no. 2).
4. The approval of the Water Code in 2018 (Laws 77 and 192).

The first two reforms were continuations of existing policies, maintaining a focus on large-scale projects as the primary approach to water development.

The proposed Ten-Year Water Management Plan (2000–2009) combined elements of older plans from the French mandate and post-independence periods. It was largely based on reports from the US Bureau of Reclamation and the French International Institute for Research and Training for Harmonized Development in the 1960s, as well as plans from private companies in the 1980s (Riachi 2016).

In May 2000, the Lebanese Parliament approved Law 221, reorganizing the water sector by consolidating 22 AWOs into five RWEs. In August 2000, Law 241 further reduced these to four RWEs plus the LRA. Law 247/2000 renamed the Ministry of Hydraulic and Electrical Resources to the Ministry of Energy and Water. Law 377 in March 2002 empowered RWEs to manage wastewater collection and treatment, creating ambiguity as municipalities were excluded from this role. Several decrees, such as Decree 8122 (July 2002), addressed legal and procedural issues, solidifying a new institutional policy for water management, though enforcement decrees were delayed until 2005.

On September 13, 2010, Ministerial Order 118 was enacted, which focused on the restructuring of licenses for groundwater drilling and extraction (Molle et al., 2017). The licensing procedure for well drilling and development involved collaboration between RWEs, the Ministry of Energy and Water, and municipalities, with permit applications centralized at the ministry level (Riachi, 2016). Order 118 instigated institutional changes, delegating certain responsibilities, like technical studies and monitoring, to four pre-approved private engineering firms that were previously managed by the ministry (Riachi, 2016).

On March 9, 2012, the Lebanese Government formally adopted the National Water Sector Strategy (NWSS) through Resolution 2. Initially finalized in December 2010, an operational strategy for surface water and dams was subsequently published in June 2011. Developed by the Ministry of Energy and Water (MEW) in collaboration with over thirty national and international stakeholders, the NWSS was partially based on the framework established by the preceding ten-year Water Management Plan (WMP). Its primary objective was to ensure a consistent and optimal supply of water, irrigation, and sanitation services across Lebanon, emphasizing environmental, economic, and

social sustainability (MEW, 2012). The initiative included plans for constructing twelve dams nationwide to increase annual water-storage capacity by more than 316 million cubic meters (Armstrong, 2015). Additionally, significant upgrades to Lebanon's wastewater treatment infrastructure were planned, alongside the creation of a national water council aimed at enhancing coordination among local municipalities, which often pursued divergent agendas (Armstrong, 2015).

Following the adoption of the NWSS, the MEW launched the National Strategy for the Wastewater Sector (NSWS), which the Lebanese government endorsed six months later through Resolution 35 on October 17, 2012 (NSWS, 2012).

On April 13, 2018, Lebanon promulgated the Water Code under Law 77, later amended by Law 192 in October 2020. The Water Code aimed to establish a Water Cadastral Registry to consolidate water rights and well data, and it proposed the designation of surface and groundwater protection zones (Gharios and Farajalla, 2020). Emphasizing integrated water resources management, the code introduced principles such as the 'polluter-pays' approach, river basin planning, and 'contrats de milieu' modeled after French practices, which foster partnerships between national and private entities for basin management (Riachi, 2016). However, it did not clearly define exemptions for well permits nor provide precise definitions for proposed protection zones (Molle et al., 2017). The code suggested revitalizing old solutions, including the establishment of a National Water Council.

In addition to laws directly pertaining to the water sector and its institutions, several laws relevant to water resource management in Lebanon target non-water institutions. Given that water quality monitoring falls under the Ministry of Environment's jurisdiction, it is pertinent to briefly outline the development of relevant environmental laws.

Lebanon enacted its Environmental Protection Act on July 20, 2002, through Law 444, which established mechanisms for cooperation on water protection between the MEW and the Ministry of Environment (MoE). Articles 47 and 48 of this law focused on biodiversity conservation, the creation of nature reserves, and the regulation of access to genetic resources.

Law 444/2002 provided a comprehensive legal framework for Lebanon's environmental policy. A decade later, in 2012, Application

Decree 8633 addressed environmental impact assessments, particularly concerning dam construction, amidst public concern over projects like the Janneh Dam on the Ibrahim River. Finally, the Master Plan for the Development of the Lebanese Territory (SDATL), adopted under Decree 2366 on June 20, 2009, delineated regulations pertaining to natural risks and the vulnerability of water resources.

Water-Related Sections in Relevant Strategies

National Water Sector Strategy

In 2010, the MEW developed the National Water Sector Strategy (NWSS) to enhance Lebanon's water sector, focusing on water resource management, supply, sanitation, and wastewater management. Subsequent strategies include:

National Wastewater Management Strategy (NWMS): Aims to improve wastewater treatment and reuse systems, ensuring urban wastewater receives at least secondary treatment and promoting the sustainable reuse of treated wastewater (MoEW, 2012).

National Water Reuse Strategy (NWRS): Supports the safe and sustainable use of treated wastewater for non-potable applications like groundwater recharging, industrial operations, and irrigation, and aims to develop appropriate regulations and guidelines (MoEW).

Decentralized Wastewater Management Strategy (DWMS): Promotes decentralized wastewater treatment systems in rural and small cities where centralized systems are impractical, providing sustainable sanitation services and encouraging the reuse of treated wastewater (MoEW, 2016).

In 2020, the NWSS was updated to focus on reforms, establishing a national information system, and addressing infrastructure gaps to ensure access to water services for all. This strategy is crucial for sustainable water management amid environmental degradation, climate change, and population growth. It aims to create an effective and sustainable water supply and sanitation system, including appropriate wastewater management and reuse systems (MoEW, 2012).

In 2024, the MoEW developed the 'Towards a Sustainable Water Sector: Lebnon's National Water Strategy 2024 – 2035.' This strategy builds on the Updated NWSS of 2020, the Water and Wastewater Sector Recovery Plans of 2022 prepared in collaboration with the Agence

Française du Développement (AFD) under the EU funded program, and the NWSS of 2012 approved by the Council of Ministers. It focuses on prioritizing institutional and legal reforms, as well as efficient interventions, to enhance services. It also aims to ensure financial sustainability and address the impact of climate change on the water sector through both mitigation and adaptation efforts. The strategy is built on four key pillars for Enhanced Water Security, which will enable the sector to achieve its goals by 2035:

- the national water storage capacity will be increased to 838 million cubic meters,
- the ministry will have a fully operational data management and monitoring system,
- compliance with water quality improvement and pollution prevention measures outlined in the Water Act will be fully realized, and
- effective water allocation will boost hydropower production capacity from 282 MW to 325 MW.

Improved Provision of Public Services

By 2035, 90% of the population is expected to have reliable access to publicly provided water services, compared to the current 80% with intermittent supply. Wastewater collection and treatment will cover 60% of the population, up from the current 8% treated to secondary levels. Irrigation efficiency will improve from 8,400 m^3/ha/year (60%) to 6,720 m^3/ha/year (75%), and irrigable land will expand from 100,000 ha to 138,000 ha.

Sustainable Utilities

By 2028, operating costs of water and wastewater services will be recovered through adjustment of tariff, increased collection (80%) and subscription (75%) and reduced cost of production, and the Water Sector Transformation Program will start financing the transformation of the sector.

By 2030, 15% of the annual turnover of Water Establishments will be mobilized for investment in further development of the service.

By 2035, Non-Revenue Water (NRW) will decrease by 25 percentage points from the current average of 50%. Energy costs in the water sector will be reduced by 30% through energy-efficient technologies, sustainable practices, and the integration of renewable energy sources,

supported by enhanced water storage infrastructure. Additionally, the digital transformation of Water Establishments will be fully implemented.

Good Governance and Leadership

By 2030, sector reforms related to governance, performance management, and monitoring and evaluation will be fully implemented at the MoEW. By 2035, digital solutions and advanced technologies for data driven decision-making will be fully implemented at the ministry.

This strategy also identifies conditions for its successful implementation that include the following main factors:

- Adequate human resources to effectively oversee its implementation. This includes skilled personnel capable of managing and executing various aspects of the strategy, from planning to monitoring.
- Technical assistance to support and accompany the MoEW and the Water Establishments in enhancing their staff capabilities in effectively managing the implementation of the strategy.
- Buy-in and support from the water sector stakeholders and donors through financing the strategy and aligning their interventions with its priorities.
- Political support at both national and local levels to facilitate implementation of policies, regulations, and projects associated with the strategy and garner public support for the initiatives outlined in it.

Agricultural Sector Strategy

The National Agriculture Strategy (NAS), issued in 2016 and updated in 2020 by the Ministry of Agriculture (MoA), highlights the importance of sustainable water resource management, including wastewater and water reuse activities, to boost the resilience and productivity of the agricultural sector (MoA, 2014; MoA, 2018). Key measures in the strategy to encourage water reuse and wastewater management in agriculture include:

- Policy Framework: Establishing a comprehensive policy framework for sustainable water resource management, including guidelines for wastewater management and water reuse.
- Treated Wastewater for Irrigation: Promoting the use of treated wastewater for agricultural irrigation and supporting the

development of necessary wastewater treatment infrastructure.

- Water-Saving Practices: Encouraging water-saving techniques such as drip irrigation to reduce water use and promote resource reuse.
- Monitoring and Evaluation Systems: Developing systems to monitor and evaluate water resource usage in agriculture, including treated wastewater and reuse activities.
- Research and Development: Enhancing research and development efforts to promote the sustainable use of water resources in agriculture, particularly the viability and risks of using treated wastewater for irrigation.

The 2020 update of the National Agriculture Strategy (NAS) aims to create a unified vision for the agri-food sector, focusing on sustainable development and transforming the sector into a key driver of resilience, economic productivity, and food security. This update addresses challenges from Lebanon's financial and economic crisis and the COVID-19 pandemic, positioning the agri-food sector as vital for economic recovery.

The NAS emphasizes national responsibility for food security, requiring coordinated macroeconomic and agri-food sector policies within a clear national priority framework. It aims to manage the agriculture and food industries to ensure sector growth, institutional structure, and overall management, ultimately achieving national food security and supporting Lebanon's economic recovery.

Environmental Sector Strategies

Lebanon's environmental sector strategies are closely linked to water management due to the critical role that water plays in environmental sustainability, public health, and economic development. These strategies are deeply interwoven with water management practices. Effective water management is crucial for achieving the goals of these strategies, such as improving biodiversity, adapting to climate change, ensuring sustainable development, and protecting coastal zones. By integrating water management into broader environmental policies, Lebanon aims to promote a sustainable and resilient future for its natural resources and communities. Table 2 lists Lebanon's key environmental sector strategies and their involvement with the water sector.

Table 2 **Lebanon's Environmental Sector Strategies and their Involvement in the Water Sector**

Strategy	Objectives	Involvement in Water Sector
National Environmental Action Plan (NEAP) *MOE, 2005*	Improve environmental management, governance, and pollution control while protecting natural resources.	Focuses on reducing water pollution through better waste management and wastewater treatment practices, ensuring clean water resources.
National Biodiversity Strategy and Action Plan (NBSAP) *MOE, 1998 and updated in 2016*	Conserve biodiversity, manage natural resources sustainably, and restore ecosystems.	Protects aquatic ecosystems, promotes the sustainable use of freshwater resources, and supports the conservation of wetlands and rivers which are crucial for biodiversity.
Climate Change Mitigation and Adaptation Strategies (Outlined in the Nationally Determined Contribution (NDC) submitted to UNFCCC) *MOE, 2015 and updated in 2020*	Reduce greenhouse gas emissions, enhance climate resilience, and adapt to climate impact.	Addresses the impact of climate change on water resources, including droughts, floods, and changes in water availability. Promotes water conservation and efficient use.
National Sustainable Development Strategy (NSDS) CDR and UNDP, 2015 *CDR and UNDP, 2015*	Integrate environmental considerations into national development plans and promote sustainable economic growth.	Ensures that water resource management is a key component of sustainable development, promoting water-efficient practices and technologies.
National Waste Management Strategy *MOE, 2010*	Improve waste collection, recycling, disposal methods, and reduce environmental pollution.	Prevents water pollution by managing solid and liquid waste effectively, reducing the contamination of water bodies.
Integrated Coastal Zone Management (ICZM) Strategy *MOE, 2011*	Protect coastal and marine environments, manage coastal resources sustainably, and mitigate coastal pollution.	Addresses pollution control in coastal waters, protects marine ecosystems, and manages freshwater inflows into coastal zones.

Key Regional and International Agreements

Lebanon has signed up to several regional and international agreements that impact the water sector either directly or indirectly. Table 3 lists select international agreements and guidelines that influence Lebanon's legal and governmental frameworks for water use and reuse.

Table 3 **Selected International Conventions and Protocols**

Selected Conventions and Protocols	Description
The Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (1976 and amended in 1995).	A legally binding agreement aimed at preventing and reducing marine pollution in the Mediterranean Sea. One of the key areas covered by the convention is the management and treatment of wastewater, including the promotion of wastewater reuse. In 1995, Lebanon became a signatory to the Barcelona Convention and has made efforts to improve its wastewater treatment and reuse practices.
The Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources, also known as the Athens Protocol (1980, and entered into force in 1983).	An international agreement aimed at reducing and preventing pollution of the Mediterranean Sea caused by activities on land, such as industry, agriculture, and urban development. Lebanon is one of the countries that has ratified the Athens Protocol and is therefore legally bound by its provisions. As a Mediterranean country with a coastline of over 200 km, Lebanon has a direct interest in protecting the Mediterranean Sea from pollution and has taken steps to implement the Athens Protocol's requirements.
The Convention on Biological Diversity (CBD) (1992)	An international agreement that aims to advance biodiversity protection, sustainable use of its elements, and fair and equitable distribution of the advantages brought about by using genetic resources. The CBD was ratified by Lebanon in 1994.
The United Nations Framework Convention on Climate Change, an international agreement known as the UNFCCC (1992)	An international agreement with the intention of reducing greenhouse gas emissions and halting climate change. In 1994, Lebanon ratified the UNFCCC.
The Ramsar Convention (1971)	An international agreement with the intention of protecting wetlands and fostering their sustainable usage. The Aammiq Wetland was chosen as Lebanon's first Ramsar site in 1999 after Lebanon signed the Ramsar Agreement in 1997 (Ramsar Convention, 1971).
The Helsinki Convention (1992)	An international agreement with the intention of safeguarding the Baltic Sea's marine ecology from all forms of pollution. Lebanon is a participant of the Mediterranean Action Plan (MAP), a regional program of the United Nations Environment Program (UNEP) that strives to safeguard the Mediterranean Sea and its coastal areas.
The Protocol on Water and Health (1999)	An international agreement formed in 1999 with the goal of enhancing human health through the provision of safe drinking water, sanitary conditions, and the encouragement of good hygiene and active lifestyles. The Protocol on Water and Health was ratified by Lebanon in 2007 (Protocol on Water and Health, 1999).

Perspectives from within the Water Sector

As stated earlier, one of the aims of this review is to seek the view of insiders in the water sector on the main challenges facing the governance of the sector. To accomplish this, targeted interviews were carried out by key personnel in the regional water establishments,

NGOs, consultants, and experts in the field. The interviews were based on a Key Informant Interview (KII) that consists of 35 open-ended questions subdivided into eight main sections as below:

1. Background Information – includes areas of expertise and years of experience
2. General Perception of Water Sector Governance
3. Institutional and Regulatory Framework
4. Coordination and Collaboration
5. Funding and Resources
6. Water Quality and Service Delivery
7. Public Awareness and Participation
8. Future Outlook and Recommendations

The KII was prepared in both Arabic and English (See Annex 1).

Seven Key Informants were interviewed. Four interviewees from the public sector (with managerial positions at the Ministry of Energy and Water, BMLWE, NLWE, and BWE) and three from the private sector (seniors at UNICEF and the Water and Sanitation Project (WSC), a project funded by USAID). Since some interviewees requested anonymity when sharing their perspectives, their responses in this report were anonymized and attributed to Key Informant Interviews (KIIs). The paragraphs below summarize the key points raised by the KIIs.

Water governance is plagued by significant weaknesses that have hampered its reform and development. Identified weaknesses exhibited a greater impact than the perceived strengths. Identified strengths mostly revolved around efforts to reform the water sector through Law 221 and the recently passed Law 192, both of which include restructuring of the water establishments to enhance administrative and financial independence and flexibility; a focus on utilizing technical specialists (employees and contractors); and improvements in performance through the digitalization of administrative and financial operations. Additionally, national strategies, master planning, business plans, a water sector strategy, and a water code have played crucial roles in guiding these reforms, though these have been criticized for lacking measures that address emerging critical issues such as climate change, water scarcity, and droughts.

The major weakness in the sector has been the slow adoption and implementation of reforms as proposed by and indicated in the laws that had been passed. The process has been plagued by

delays in approving executive decrees, mostly due to political strife and the associated economic crisis that have plagued Lebanon since the 1990s. Furthermore, the laws granting the Regional Water Establishments (RWEs) independence remain inadequately implemented, with political interference continuing to undermine decision-making and transparency.

Persistent issues such as incompetent management, political interference in recruitment, and financial weakness, along with a lack of competent human resources, have negatively impacted sector performance, leading to low morale among workers and consequently poor job performance. Inadequate monitoring, evaluation, and updating of performance data further exacerbate the situation, with RWEs struggling with poor technical, financial, and commercial performance, particularly in revenue collection and cost recovery. Unreliable sector data and a lack of functional water metering (at the household and establishment levels) contribute to inaccurate billing and heightened production costs. Despite significant investments from donors and international financial institutes, the delays in institutional and managerial reform have negatively affected RWEs' water service provision capability. The on-going political and economic crisis is making the situation worse. Additionally, the RWEs suffer from a shortage of tenured qualified personnel, a lack of customer service culture, and deficiencies in planning and monitoring.

Finally, interviewees emphasized that current water-related policies and regulations fail to address crucial and increasingly pressing issues in the sector, such as the development of proper water safety plans and corresponding mitigation measures. There is a lack of risk management plans, climate change adaptation strategies, considerations for population growth, and the absence of drought management plans. There are a number of grey areas related to jurisdiction and mandate between RWEs, ministries, and municipalities; with overlapping jurisdictions and mandates leading to confusion and passing on responsibilities instead of taking the required action. One such example is that of water quality and wastewater treatment which are not backed up in operational procedures and budgets with ministries and RWEs passing the buck to each other.

NGOs were found to have a positive impact on the development of the water sector; however, some interviewees stated that many NGOs

lack transparency internally and towards the water establishment and the ministry. NGOs and the private sector have played a crucial role in improving water governance through conditional financing of sector reform programs. In response to the economic crisis and the Syrian refugee influx, international donors shifted their aid toward crisis management, supporting water establishments in maintaining minimal service levels. Their assistance included providing chemicals, repairs, and fuel as funding became available. Some projects were directly implemented by NGOs in coordination with municipalities but proved unsustainable. Most failed because their operations were not integrated into the budgets of RWEs or relevant ministries, leading to their termination once project funding ceased.

Insights and Recommendations

On Legal Matters

This review of laws and regulations indicated that Lebanon does have the requisite laws and institutional frameworks to properly govern the water sector; however, implementation and enforcement of these laws have been irregular, inconsistent, and frequently unreliable. This observation has been reinforced by the interviewees, many of whom have complained about the lack of enforcement and enactment of laws. Further, the delay in implementation decrees and political interference in the implementation of laws has been a major obstacle in the governance of the sector. Therefore, it is imperative that the requisite implementation decrees be issued by the relevant authorities and approved by the parliament along with the development and enactment of a policy monitoring and evaluation process to ensure that laws are properly implemented and perform as intended.

A related issue to the laws associated with the water sector is the plethora of laws that have been promulgated over decades have added to the confusion in the governance of the sector. Some old or obsolete laws have not been stricken from the registry, causing confusion when addressing certain aspects in water resources governance. This has led to the creation of loopholes that are often exploited to the detriment of water resources in the country. To overcome this hurdle, workshops should be organized by the relevant ministries and authorities with the aim of identifying and striking off old/obsolete laws from the registry and streamlining current laws to ensure easier

comprehension, adoption, and implementation. Such a workshop would be led by the Ministry of Justice and Ministry of Energy and Water as key conveners with other stakeholders, when and as needed.

On Institutional Matters

Both interviewees and the literature review highlighted concerns regarding the legal framework governing RWEs. A key issue is the need for greater empowerment and autonomy for these establishments. The legal texts should explicitly articulate the desired level of independence and incorporate the necessary enabling, legal, and regulatory reforms.

Further, a better integration of public-public and public-private partnerships must be pursued by both RWEs and the MoEW. Such an endeavor would enhance coordination among governmental agencies (especially MoEW, the MOA, the MOE) and would greatly reduce one of the key obstacles to the proper governance of the sector: the overlap in jurisdiction amongst authorities. Moreover, this type of integration would allow for a more coherent vision of, and cohesive strategy for, the water sector and its cross-cutting implications and associations with other sectors (e.g. agriculture, industry, and environment). On an operational level, public-public and public-private integration would lead to streamlining of operations (capital investments and/or operations and maintenance) related to common infrastructure and other projects that involve both private and public sectors.

Finally, the implementation of good governance practices is necessary for the sector. The literature and the interviewees agreed that these are best reflected in the following:

- The adoption of an independent oversight/regulatory body which would monitor performance and benchmark against other similar utilities globally (some suggested that the body operates according to the International Water Association standards)
- Establishment of independent regulatory bodies with clear mandates to oversee the sector in terms of socio-economic related fiscal and technical performance. A special item here is that the RWEs' budget is sufficient not only to provide proper service to their customers, but also to be able to invest in enhancement of these services and for future expansion and growth.
- Clear monitoring and evaluation mechanisms within the RWEs and relevant stakeholders.

Future Challenges

Some key challenges were identified by the interviewees and some from literature. These are listed below:

- Climate change – climate is warming in the eastern Mediterranean at a faster rate than the world. Climate action must be recognized by the authorities in the country's development but more importantly mainstreamed in sector strategies.
- Water scarcity – not one that is naturally induced, but rather that which is caused by increasing population. Natural population increase in Lebanon has not been as high as in neighboring countries. The increase of concern is the influx of refugees and their high birthrate and the resulting rapid increase in their numbers. Provisions must be made in investments and operations in the sector.
- Uncontrolled urban development has eaten into permeable surfaces reducing groundwater recharge and leading to increased urban flooding and associated disasters. Nature-based solutions must be integrated into developments that would allow for reduced runoff, increased infiltration, and the provision of locally generated sources of water for non-potable consumption.
- Other challenges do exist, but the above are key examples of the most pressing anthropogenic challenges.

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Annex 1: Key Informant Interview for National Water Sector Governance

This interview is designed to gather qualitative data from key informants, allowing for in-depth analysis of the current state and future prospects of water sector governance in Lebanon.

Section 1: Background Information
1. Name:
2. Position:
3. Organization:
4. Years of Experience in the Water Sector:
5. Contact Information (optional):

Section 2: General Perception of Water Sector Governance
6. How would you rate the overall governance of the water sector in Lebanon? (1 = Very Poor, 5 = Excellent) o 1 o 2 o 3 o 4 o 5
7. What are the main strengths of the current water sector governance in Lebanon?
8. What are the main weaknesses of the current water sector governance in Lebanon?

Section 3: Institutional and Regulatory Framework

9. How effective are the existing institutions in managing water resources in Lebanon? (1 = Not Effective, 5 = Very Effective)

o 1 o 2 o 3 o 4 o 5

10. Are the current water-related policies and regulations adequate? Please explain.

11. What changes, if any, would you recommend to improve the regulatory framework?

Section 4: Coordination and Collaboration

12. How well do different governmental agencies coordinate their efforts in the water sector? (1 = Very Poorly, 5 = Very Well)

• 1 • 2 • 3 • 4 • 5

13. To what extent are non-governmental organizations and the private sector involved in water governance?

14. Can you provide examples of successful collaborations in the water sector?

Section 5: Funding and Resources

15. How sufficient are the financial resources allocated to the water sector in Lebanon? (1 = Very Insufficient, 5 = Very Sufficient)

• 1 • 2 • 3 • 4 • 5

16. Are there effective mechanisms for financial accountability and transparency in the water sector? Please explain.

17. What alternative funding sources could be explored to enhance water sector financing?

Section 6: Water Quality and Service Delivery

18. How would you rate the quality of water services provided to the public? (1 = Very Poor, 5 = Excellent) • 1 • 2 • 3 • 4 • 5

19. What are the main challenges in ensuring water quality and service delivery in Lebanon?

20. How can the service delivery be improved in both urban and rural areas?

Section 7: Public Awareness and Participation

21. How aware is the general public about water governance issues in Lebanon? (1 = Not Aware, 5 = Very Aware) • 1 • 2 • 3 • 4 • 5

22. Are there adequate platforms for public participation in water governance?

23. What strategies can be implemented to enhance public awareness and involvement in water governance?

Section 8: Future Outlook and Recommendations
24. What are the biggest future challenges for the water sector in Lebanon?
25. What opportunities exist for improving water sector governance in the next 5-10 years?
26. Please provide any additional comments or recommendations you may have regarding water sector governance in Lebanon.

Closing
27. Would you be willing to participate in a follow-up interview or provide further insights if needed? (Yes/No)
28. Please provide any additional comments or suggestions.

Thank You
Thank you for your time and valuable insights. Your responses will significantly contribute to the understanding and improvement of water sector governance in Lebanon.