THE RIGHT TO WATER AND CLIMATE CHANGE 2025 THE ARAB WATCH REPORT ON ECONOMIC AND SOCIAL RIGHTS

THE RIGHT TO WATER IN LEBANON:

Inequality, Ecological and Austerity Crises

Roland Riachi

Assistant Professor of Economics and Political Economy

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Arab NGO Network for Development
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This report is published as part of the Arab NGO Network for Development's Arab Watch Report on Economic and Social Rights (AWR) series. The AWR is a periodic publication by the Network and each edition focuses on a specific right and on the national, regional and international policies and factors that lead to its violation. The AWR is developed through a participatory process which brings together relevant stakeholders, including civil society, experts in the field, academics, and representatives from the government in each of the countries represented in the report, as a means of increasing ownership among them and ensuring its localization and relevance to the context.

The seventh edition of the Arab Watch Report focuses on the right to water. It was developed to provide a comprehensive and critical analysis of the status of this right across the region, particularly in the context of climate change and its growing impacts. The information and analyses presented aim to serve as a platform for advocacy toward the realization of this fundamental right for all.

The views expressed in this publication are solely those of the author and do not necessarily reflect the positions of the Arab NGO Network for Development (ANND), Brot für die Welt, or Norwegian People's Aid.

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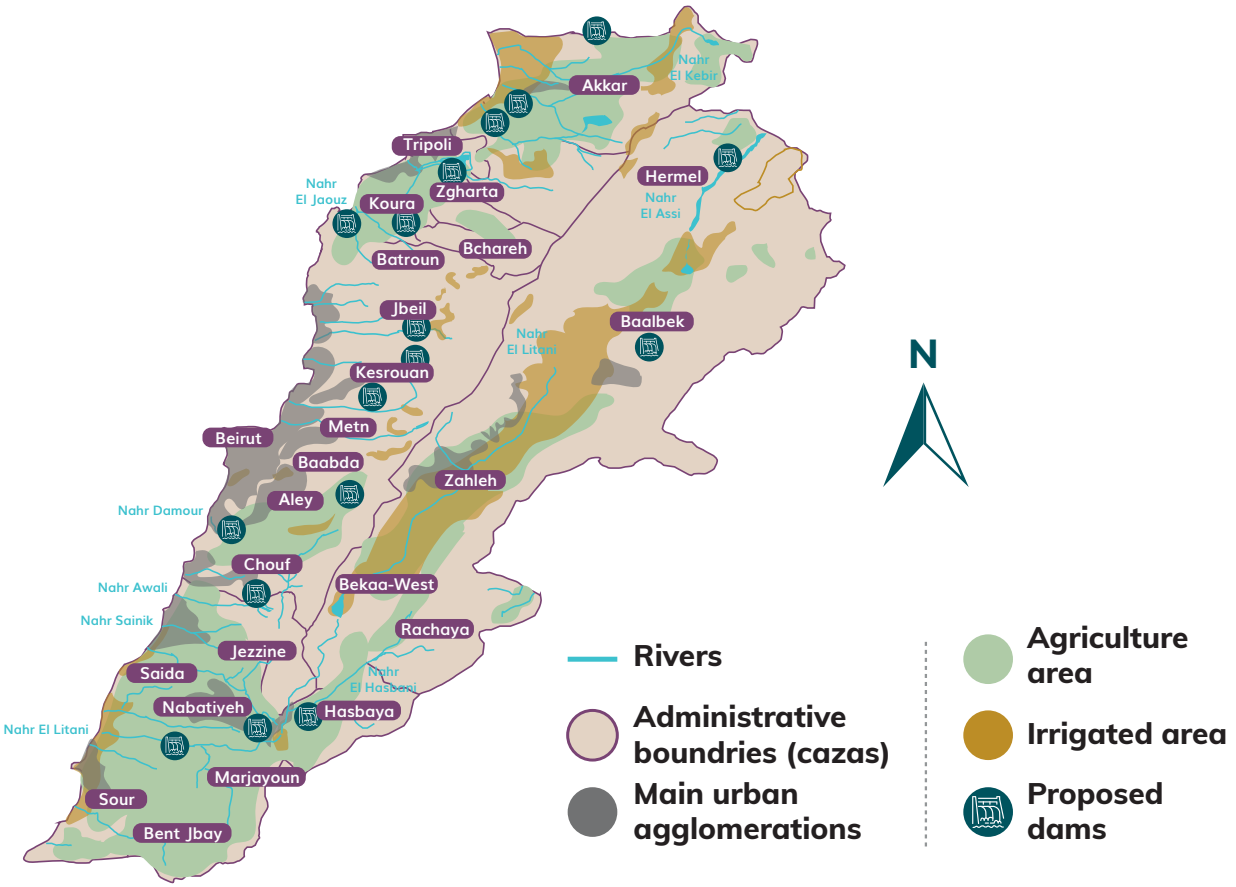
INTRODUCTION



Lebanon experienced one of its driest winters on record in 2025; rainfall levels dropped by more than 50% compared to previous years. Despite the existence of a national early warning system platform (NEWSP), no drought control or mitigation measures were triggered, highlighting the persistent gap between institutional frameworks, donor funding, and actions. Already in 2022, UNICEF (2022) found that per capita water supplies from Lebanon's public water authority were alarmingly "falling short of the 35 liters a day considered to be the minimum acceptable quantity" (UNICEF, 2022).

Lebanon faces a severe and multifaceted water crisis driven by an interplay of climate change, resource depletion, pollution, systemic mismanagement, entrenched power dynamics, impacts of economic crisis, and war. While exacerbated by the monetary

system collapse in October 2019, the sector's situation has deeper historical roots from Ottoman and French mandate laws and foundational institutions, Cold War politics, and more contemporary neoliberal reforms driven by international donors. They were all structured around the country's confessional political system. Despite substantial foreign aid and investment in large-scale infrastructure projects over the last three decades, the situation has worsened, highlighting a fundamental disconnect between policies, development indebtedness, and challenging realities.

Under dire financial conditions since the 2019 economic collapse, the sector has been struggling to pay operational costs, lacking fuel to run pumping stations, and with no chlorine or spare parts to maintain a functioning network. As a consequence of this failure, most households are increasingly relying on costly, often unsafe informal water sources since the crisis began. The uncontrolled pumping from wells, along with hazardous illegal pollutant dumping, has led to a resurgence of diseases like cholera over the last few years, which were thought to be under control.

Compounding this structural crisis, between October 2023 and November 2024, repeated Israeli strikes on Lebanon's civilian water infrastructure, including pumping stations, pipelines, reservoirs, and sewage systems, caused widespread destruction concentrated in the South and Nabatieh governorates. An estimated 26 publicly operated water pumping facilities and 28 water pipeline networks were damaged (Action Against Hunger, 2025). Farmers lost irrigation networks such as the Litani–Qasmieh project, which once watered 6,000 hectares of crops, undermining food security and livelihoods. By March 2025, the World Bank estimated that 64% of community reservoirs, 58% of pumping stations, and nearly a quarter of treatment plants had been destroyed or damaged in the area (World Bank, 2025). The bombardment is estimated to have caused losses of USD 171 million in the water sector.

Lebanon's water sector has undergone significant structural transformations over the past decades, largely influenced by globalized policy paradigms driven by international donors. The fragmentation within institutional frameworks and entrenched confessional zuama, coupled with ineffective donor-driven policies lacking contextual relevance, impedes the effective provision of the service. The intensive utilization of aquifers for an export-led agricultural model exacerbates this precarious situation. Addressing the right to water in Lebanon needs to delve into those socio-political and ecological factors that have historically shaped and are still shaping access, use, and abuse of this essential resource. As we examine the evolution of water use and distribution, institutions, and water legal frameworks, it becomes evident that a radical change is utmost needed.

The first section of the chapter examines Lebanon's most pressing water challenges, including climate change, resource depletion, and pollution, to highlight the environmental and systemic pressures. The second section explores water production, distribution, and consumption, revealing deep inequalities shaped by mismanagement, infrastructure deficiencies, and socio-economic disparities. Moving forward, the third section critically engages with legal pluralism and governance failures under austerity. Finally, the fourth section considers alternative approaches to securing an unconditional and universal right to water in Lebanon.

02

URGENT WATER CHALLENGES IN LEBANON: CLIMATE CHANGE, DEPLETION, AND POLLUTION

Lebanon is projected to experience significant climate change impacts, with average temperatures expected to be 1.7°C higher by 2040 under the RCP 4.5 scenario and 2.2°C higher under RCP 8.5, relative to the 1980 to 2005 averages.[1] By the end of the century, temperatures could rise by 4.4°C. This increase will progressively lead to more frequent heatwaves, with days hotter than 35°C potentially occurring 22 to 25 times more often by 2040. Precipitation in Lebanon, while comparably high in the region, varies significantly year to year, averaging 812 mm; it has ranged from a low of 431 mm in 2013-2014 to 905 mm in 2012-2013. By 2040, the combination of increased heat and decreased precipitation is expected to reduce available water by 5.7% under RCP 4.5 and 9% under RCP 8.5. During the dry season (April-September), water availability is projected to decline by up to 50% by 2040, creating a significant and growing gap between water demand and availability. This challenge is further compounded by a projected reduction in snowpack accumulation, increased evaporative losses, and the karstic nature of groundwater resources, which make wet-season water storage for dry-season use difficult.

Already in an alarming situation, snow cover and precipitation rates decreased by 12–16% from the 1960s to 2000s, while spring flows showed a 23–29% drop, and river flows reached half their average volumes (Shaban, 2009). A 2°C rise in temperature is expected to reduce snow cover on Mount Lebanon by 40% (UNDP and GEF, 2022), noting that snow cover is responsible for 80% of groundwater recharge. The diminishing snow cover is anticipated to exacerbate water management challenges beyond effective control by 2030. Decreases in precipitation and uncontrolled groundwater pumping have caused sharp declines in spring flows and aquifer levels, with the situation worsening. The lack of accurately measured data in the water sector makes precise impact analysis challenging. It highlights the critical need for improved data collection and modernized hydrometeorology systems to support strategic responses to these climate risks.

These climatic shifts, including changes in precipitation patterns and storm intensity, also increase the risk of urban flooding, affecting coastal settlements, infrastructure, and services in large cities like Beirut and its surrounding, Tripoli, Saida, and Tyre.

[1] Representative Concentration Pathways (RCPs) are scenarios used in climate modeling to project future climate conditions and their impacts, reflecting different concentrations of greenhouse gases in the atmosphere over time

Projections indicate that Lebanon's GDP could decline by 14% by 2040, dropping even to 32% by 2080, as a result of climate change (World Bank, 2021). The country is experiencing more frequent and intense heatwaves, along with an increased incidence of wildfires, particularly in forested regions (UNDP and GEF, 2022). Coastal areas are also under persistent threat from rising sea levels, impacting coastal areas and infrastructure (UNDP, 2022). Economic losses in critical sectors such as agriculture and tourism are evident (World Bank, 2021). As seawater intrusion into coastal aquifers due to groundwater over-exploitation, this is leading to severe corrosion of pipes and costly maintenance (Korfali and Jurdi, 2009).

The karstic nature of Lebanon, covering 5590 km2 of its surface, allows the formation of extensive underground water systems, which play a crucial role in Lebanon's water resources. A substantial number of springs and rivers that originate from these aquifers are the result of this karstic formation, which is highly conducive to groundwater infiltration. Aside from the Litani and Assi in the Beqaa valley, 17 torrential rivers abruptly run over karst-formed valleys. Lebanon has 51 groundwater basins, of which 6 are severely stressed, 3 are coastal aquifers, and 3 are in the Beqaa valley (UNDP, 2014).

Less than 10% of the wastewater generated in Lebanon is treated. The Litany River in Lebanon suffers from severe pollution, with most physicochemical parameters exceeding permissible limits and significant fecal contamination detected during all seasons (Bohlok et al., 2025). Studies highlighted alarming levels of total dissolved solids, nitrates, and chemical oxygen demand, pointing to both industrial and agricultural pollution sources. Furthermore, nationwide assessments have revealed similar issues in other rivers across Lebanon, with high densities of fecal indicators and antibiotic-resistant Escherichia coli, indicating widespread and urgent water quality challenges that require immediate attention (Hashisho et al., 2018; Jamali et al., 2021). Kouzayha et al. (2013) found residues of 67 pesticide compounds, due to intensive farming practices, in rivers, wells, and tap water across Lebanon at very high levels. Such chemical components are harmful to human health and aquatic ecosystems, affecting neurological function, disrupting hormones, and threatening biodiversity through toxicity and bioaccumulation.

Lebanon recently faced a severe cholera outbreak in 2022, the first in over 30 years, driven by economic decline and poor access to clean water and sanitation. The outbreak resulted in 8,007 suspected cases, 671 lab-confirmed cases, and 23 deaths. Despite efforts like the Ministry of Public Health's oral cholera vaccination campaign, the outbreak posed significant health risks. In October 2024, a new cholera case was confirmed in Akkar governorate. According to a UNICEF report (2021), Lebanon's water system is at the brink of total collapse, putting the health of millions of people, particularly children, at risk (UNICEF, 2021). The report highlights that electricity shortages make it impossible to pump sufficient water, causing pumping operations to shut down completely in the four Water Establishments over the last years since the 2019 crisis.

In terms of hydrophysical availability of the resource, there is a striking difference among official reports when accounting for national groundwater levels. For example, the National Water Sector Strategy report (MoEW, 2010), among many other reports,

states that Lebanon's annual water balance includes 0.5 Bm^3 of natural groundwater recharge and 0.7 Bm^3 extracted, resulting in a yearly 200 Mm^3 groundwater deficit. The updated version of the National Water Strategy 2024–2035 (MoEW, 2010), updated the annual water balance numbers with a new evapotranspiration rate of 30%, instead of 50% in all previous reports. According to the updated strategy, what remains in the country includes: 0.7 Bm^3 as dynamic groundwater reserves, 2 Bm^3 as springs discharge, and 1.5 Bm^3 as surface runoff. While for the first time, an official strategy recognizes the limits of the annual water balance as it "should not be adopted for water management plans at the national scale". In contrast, the 2014 UNDP report on groundwater assessment presents much higher values of groundwater recharge, ranging from 3.6 Bm^3 in a dry year to 6.1 Bm^3, which is five to ten times more than previously mentioned numbers. However, when it comes to groundwater storage, official reports have never estimated actual reserves, with no official efforts to study them. For example, studies on groundwater storage capacities have shown that Assi's Ain Zarka system alone holds up to 27 billion cubic meters, a figure far exceeding earlier estimates (Bakalowicz et al., 2007). The lack of official storage assessments, despite evidence of vast reserves in karst systems, points to a critical research gap that must be addressed to ensure sustainable water management. This underscores the urgent need for comprehensive hydrogeological studies, aquifer mapping, and transparent monitoring mechanisms.

National strategies tend to inflate surface runoff values while downplaying aquifers. This framing aligns with a political narrative that portrays river discharge to the sea as "wasted water." Such rhetoric strengthens the case for dam construction while minimizing the role of aquifers as natural reservoirs (See Section IV). Aquifers, however, provide more stable storage with lower evaporation losses and fewer ecological disruptions compared to dams. Like its predecessor's national water policies, Lebanon's updated National Water Strategy (2024-2035) sets dam construction as the top priority in its 17 pillars. The strategies have long advocated for River Basin Management, overlooking the complexities of karst hydrogeologic systems. In these geologies, aquifers intersect different valleys, making watershed and river basin approaches inadequate. In addition, the porous and fragile nature of karst geology, with an extensive network of caves, sinkholes, and underground rivers, makes it difficult to ensure the structural integrity, seepage control, and water-tightness of dams. The unpredictable nature of groundwater flow in karst regions further complicates the engineering and maintenance of large-scale hydraulic structures. Although Lebanon is geographically small, its water challenges are numerous, highly localized, and deeply shaped by complex hydrogeological geomorphology. Consequently, management strategies must move beyond uniform, infrastructure-driven, and supply-sided policies toward approaches that recognize local specificities. Alternative nature-based water solutions such as managed aquifer recharge, watershed restoration, and decentralized storage are therefore required, with groundwater playing a central role in ensuring resilience and sustainability.

03

WATER PRODUCTION, (MIS)USE, AND INEQUALITIES

Both local water authorities and international development agencies have long focused on the need to increase surface water storage to meet the growing demand, as if the primary cause of water issues is population growth. However, such a Malthusian approach of demographic pressure has overlooked the anticipated population stabilization with a decreasing trend in Lebanon by the 2040s. It is worth noting that the Lebanese population is an aging one, with a significant demographic shift underway, as the proportion of those aged 65 and above is expected to rise from 11.2% in 2020 to 27.1% by 2050. By 2040, Lebanon will have more older people than children. This reality challenges the dominant narrative that population pressure is the primary driver of Lebanon's water issues. The persistence of this Malthusian framing has nurtured a xenophobic discourse in which the Syrian refugee crisis is portrayed as a major cause of water service failures and pollution. Such claims represent a gross exaggeration that diverts attention away from the deeper roots of mismanagement and failures. Rather than scapegoating vulnerable populations, water policy should prioritize humanitarian needs and address systemic inefficiencies in infrastructure and the inequality in resource allocation.

In Lebanon, the primary source of drinking water for households is bottled water, which accounts for 69.1% of the total. Tap water in the dwelling follows as the second most common source at 21% (CAS and ILO, 2020). This heavy reliance on bottled water indicates significant issues with public water infrastructure safety perceptions, along with the degrading service quality. In addition to the economic burden of accessing drinking water, plastic pollution from bottled water is a severe problem in Lebanon. Lebanon's per-capita bottled water consumption spiked from 68 liters per person in 1999 to 121 liters in 2010, placing it in the 8th position among the top 10 countries in terms of bottled water consumption per capita in the world (Pacific Institute, 2013). According to Lebanese customs data, Lebanon imports around 140,000 tons of plastic-related products, most of which are used in the production of PET water bottles (Customs RoL, 2025). Given the lack of sorting and recycling facilities, the hazardous dumping of plastic materials contributes to the release of microplastics that infiltrate terrestrial and marine food chains. Prolonged exposure to microplastic contaminants is correlated with significant health outcomes, including congenital disorders and neurotoxic effects, and is classified as carcino-

genic by international health authorities. Bisphenol A and phthalates have already been detected in authorized bottled water brands in Lebanon. Special attention must also be given to consigned polycarbonate jugs, which are frequently reused and may present long-term exposure risks to BPA (Dhaini et al., 2014).

The majority of households in Lebanon are connected to and rely on piped tap water for their non-drinking water needs, which accounts for 78.3% of the total, while wells account for 16.2% of the supply. To address the gaps in water supply, particularly during the dry season, households often resort to using tanker trucks for water delivery. This solution, though costly, does not guarantee the quality of the water provided. Before the crisis in Lebanon, poor households already spent a significantly higher percentage of their income on water compared to wealthier households. According to a report by the World Bank (2010), low-income families spend up to 15% of their income on water, while wealthier households spend around 3% (World Bank, 2010).

The economic crisis and episodes of hyperinflation over the past five years have exacerbated this burden, making water even more unaffordable for poorer households and taking larger shares of their meager revenues (UNHCR, 2023). For example, from January 2021 to September 2023, bottled water prices increased by 16% in USD and an incredible 2598% in LBP, water trucking costs rose by 297% in USD and 1665% in LBP over the same period (UNICEF, 2023). In August 2023 alone, bottled water prices spiked by 54% in USD (57% in LBP), further straining households' limited budgets. As a result, poorer households are being forced to allocate larger shares of their meager revenues to secure access to water, deepening socio-economic inequalities.

Agriculture is estimated to use 60-70% of the total annual freshwater diversions in the country. The disparity in land ownership and the shift towards export-oriented agriculture have created challenges that affect both the availability and quality of water in the country. In Lebanon, a small percentage of landowners control a large portion of the agricultural land. This concentration of land ownership contributes to economic disparities and limits opportunities for small-scale farmers. According to the most recent general agriculture census conducted in 2010, 70% of farms are smaller than 1 hectare, yet they represent only 18% of the total agricultural area. In contrast, farms over 10 hectares constitute only 2% of the total number of farms but account for 33% of the agricultural area.

Furthermore, the disparity intensifies with irrigated land, where just 0.2% of landholders control 42.6%. Such concentration not only marginalizes small-scale farmers from access to water but also exacerbates challenges in managing water resources equitably. Only 5% of the total irrigated area is supplied by public-operated schemes, mainly Qasmieh-Ras el Ain (Canal 200), managed by the Litani River Authority in the south. Many irrigation schemes in Lebanon have transitioned from predominantly using surface water to increasingly relying on aquifer pumping. In areas such as Chamsine-Anjar, Terbol, Bouday, Alleq, Bar Elias, West Beqaa, and Rashaya, centuries-old spring-fed communal irrigation canals are now being supplemented by wells. This shift includes direct pumping from the Beqaa Valley aquifers, which have experienced significant depletion over the past three decades, as well as more recent drilling in highland aquifers,

leading to diminished spring flows in turn.

Lebanon's agriculture has increasingly focused on export-oriented crops, tripling irrigation surface in 50 years, from 40,000 hectares in the 1960s to 120,000 hectares nowadays. The inequality in access to land and water means that small farms struggle to access the resources, but also to lucrative export markets. The shift towards high-value crops has been driven by demand from Gulf countries and the potential of making higher profits. Lebanon produces as high as threefold its local demand in apples, citrus, grapes, bananas, avocados, and other water-intensive crops (Riachi, 2013). Exported fresh water is estimated to represent one-third of the overall annual freshwater consumption in the country. However, this focus on exports has led to several challenges. The inequality in land ownership, along with an export-oriented agriculture, has significant implications for water resources in Lebanon. This overreliance on groundwater, combined with inadequate regulation and monitoring, poses a threat to the sustainability of water resources. The intensive use of fertilizers and pesticides in intensive agriculture has also led to the contamination of water resources. This contamination affects not only the quality of water available for irrigation and high levels of pesticides in food, but also the drinking water supply. Also, the recent halt of GCC importing fruits and vegetables from Lebanon has collapsed this market. Raising concerns over pesticide residues and drug smuggling, the consequences have been far-reaching, with farmers and exporters losing access to one of their most lucrative markets, leading to spoiled and unsold produce in recent years. Understanding the structural reasons behind such unequal access and market-led policies requires examining the evolution of water laws and institutions in Lebanon.

04

LEGAL PLURALISM, PROPERTY, AND WATER RIGHTS

The legal framework of water in Lebanon is best understood through the lens of legal pluralism. The concept captures the coexistence of overlapping and often competing normative systems within a single legal system. As Boelens et al. (2005) emphasize, legal pluralism in water laws is not only about the coexistence of formal and informal rules, but a way for elites to strategically maintain power (Boelens et al., 2005). By preserving overlapping and sometimes contradictory legal systems, selectively enforcing rules, recognizing certain rights while ignoring others, and maintaining ambiguity that favors those already in control. In Lebanon, this manifests in a layered legal architecture where customary local arrangements, Hanafi jurisprudence, Ottoman reforms, French mandate decrees, and modern statutes continue to operate simultaneously. This hybrid assemblage enables legal ambiguity, discretion, and elite capture, particularly in groundwater regulation. Drawing on Boelens and Vos's (2014) notion of hydraulic property creation, one can see how legal water right recognition is often tied to land ownership (Boelens & Vos, 2014).

Before the Tanzimat reforms (1839–1876), water access in Lebanon was largely governed by informal local customs. Customary norms structured communal irrigation, defining distribution schedules, canal maintenance duties, and conflict resolution. While Hanafi jurisprudence governed private entitlements such as wells and springs, it ensured the protection of the Sublime Porte Amiri domains of lands and water bodies. The Tanzimat period introduced legal codification within the Ottoman Empire. The Defter Khane land registry system, implemented in 1858, transformed collective mushaa lands into private holdings, the Tapu titles, effectively privatizing many communal water rights in the process and leading to massive transfer of properties to local feuds (Mundy and Smith, 2007). The Medjelle, issued in 1877, created a unified legal code blending the Napoleonian legal system with Hanafi principles (Riachi, 2013). It codified the classification of water sources into public and private domains and introduced regulations on drilling, water usage rights, and pollution prevention.

During the French Mandate period, colonial authorities brought their legal structures. Decree 3339 (1920) acknowledged individual water rights, and Decree 144 (1925) went further by declaring all water resources part of the public domain, though it simultaneously preserved usufruct rights on private land deeds, solidifying a core tension between public property

and private ownership. Groundwater regulation was first articulated in Decree 320 (1926), which granted landowners the right to drill wells without permits if they did not exceed 150 meters in depth or 100 cubic meters per day in flow. Later, Decree 14438 (1970) upheld the same threshold exemptions, and more recently Order 118 (2010) reiterated these limits, underscoring the endurance of historical privileges despite increasing environmental stress. Even the most recent Water Code Law No. 77 (2018) and its amendment Law No. 192 (2020) failed to explicitly repeal the 150 meters and 100m³ drilling exemption and lacked any mention of groundwater protection zones. While draft decrees and regulatory projects have been prepared to address these gaps, none have yet been enacted into binding legislation.

As one can argue, Lebanon's recent policies are "reforms without change", wherein the appearance of modernization masks the continued dominance of entrenched interests, in this case, big landowners. Legal ambiguities and enforcement gaps have allowed thousands of unregulated private wells to proliferate in the country, placing enormous pressure on aquifers and undermining long-term water security. It is estimated that Lebanon has on average 8 to 10 wells per square kilometer (representing 80 to 100 thousand wells in total), most of which are illegal. Attempts to impose restrictions on groundwater withdrawal existed in Lebanon, but all were temporary, such as the 1963 drilling wells ban in the Beqaa, or Law No. 86/67 (1967) limiting groundwater extraction in Greater Beirut, and Order 2528/S (1996) protecting the Kneisseh aquifer from quarries. Lebanon's approach to groundwater remains absent and fragmented, dependent on discretionary executive power rather than codified, enforceable law.

Of Lebanon's 55 aquifers, only one, the Kneisseh aquifer, benefits from any formal protection. Nestlé Waters, which sources groundwater from this aquifer, operates a bottling facility in Ain Zhalta, within the Kneisseh–Niha corridor, and has partnered with the Shouf Biosphere Reserve to implement site-based stewardship efforts. These initiatives are framed under the Alliance for Water Stewardship (AWS) standard, introduced globally in 2014. While these actions are part of corporate environmental responsibility (CSR) aligned with Nestlé's commercial interests, they remain non-binding and geographically limited. Crucially, they cannot substitute for a coherent, rights-based national water policy. In the absence of enforceable public regulation, rooted in law rather than private initiative, such interventions function as transnational corporate greenwashing, offering symbolic legitimacy while leaving systemic governance failures unaddressed.

Ultimately, Lebanon's water regime continues to privilege private rights anchored in land ownership, while relegating sustainability, equity, and public accountability to the margins. To address these structural deficits in reaching a universal right to water, the country must abandon its reliance on layered legal texts and donor-driven policies. Instead, it must confront the legacies of century-old exemptions, challenge the hegemony of landed interests, and construct a unified legal architecture that treats water as a public resource, governed locally, transparently, equitably, and ecologically.

05

INSTITUTIONAL ASSEMBLAGE: WATER DEVELOPMENT UNDER AUSTERITY

Lebanon's water sector is defined by a deeply rooted history of privatization, external influence, and profound institutional fragmentation, which collectively undermine sustainable water resources management, and climate change is making things worse. The origins of water privatization in Lebanon can be traced back to the late Ottoman period, when the empire, facing substantial public debt, began granting concessions to European companies to run public services. The Nahr el Kalb project, which supplied water to Beirut from 1877 to 1951, serves as a prime example of this early trend (Mallat, 2005; Riachi, 2013). The subsequent French Mandate further solidified this trajectory, introducing a "hydraulic engineering paradigm" that initiated urban and rural projects under this concession model. Following Lebanon's independence in 1943, private water concessions started to be nationalized, and new forms of foreign aid and concessions emerged during the Cold War period.

The Qaraoun dam project, one of the first internationally funded water projects, was initiated with a World Bank loan in 1952 and led to the establishment of the Litani River Authority (LRA) in 1954. This marked a pivotal shift towards a techno-financial vision of water development. This period also saw the U.S. Bureau of Reclamation drilling hundreds of wells in the Beqaa, furthering a persistent focus on supply-side solutions. Marketed as technical assistance and "modernization," these interventions outsourced infrastructure planning to foreign consultants and centralized decision-making in the hands of an international bureaucracy. Far from empowering local actors, Point Four entrenched foreign influence and set a precedent for top-down water management. A brief interlude of nationally-driven institutional construction was reached with President Fouad Chehab (1958–1964), who sought to strengthen state capacity and reduce regional inequalities. Chehabist reforms created bodies such as the Department of Hydraulic and Electric Resources, expanded rural development programs, such as the Green Plan. Yet these agencies lacked the political insulation to survive Lebanon's sectarian struggles.

A significant institutional reform attempt was made with Law 221/2000, which was pending since the 1970s, largely driven by the World Bank and other international donors. This law aimed to restructure and centralize the water sector by merging 22 local water offices into four regional Water Authorities – Beirut-Mount Lebanon, North, South, and Beqaa – while maintaining the LRA. The stated objective was to imple-

ment "cost recovery" principles and promote "Public-Private-Partnerships (PPP)". Although explicit mention of privatization was removed from the final law due to parliamentary opposition, the Higher Council for Privatization was established shortly thereafter, indicating the continued intent for private sector involvement in the water sector. Despite these reforms, Law 221/2000 did not alter the structure of central authorities on resource policy. This meant that responsibilities remained scattered across numerous ministries, including the Ministry of Energy and Water (MoEW), Interior and Municipal Affairs, Public Works and Transport, Agriculture, Environment, Health, Industry, and Tourism.

A central actor in this fragmented institutional landscape is the Council for Development and Reconstruction (CDR), which was created in 1977 but became very active in the 1990s. The CDR functions as the primary governmental body responsible for tendering and managing large-scale investment projects, funneling the majority of international funds for water initiatives. Approximately 20% of the US$30 billion channeled through the CDR was allocated to water and wastewater projects. The political economy of water in Lebanon is profoundly influenced by the "confessional" political system, where sectarian power-sharing allows political networks to encroach on the bureaucratic organization of public services, creating a suitable environment for the proliferation of corruption. Water projects were exploited and targeted by politicians to their constituencies. Many politicians are simultaneously large landowners, real-estate developers, bankers, and owners of engineering companies, creating inherent conflicts of interest. Many politicians are also large landowners and industrialists, directly benefiting from easy access to groundwater for their businesses. The web of benefits of those elite spans from real-estate development to large water-intensive production destined to export, as well as crony contracts tied to large-scale water projects funded by international loans.

Lebanon's public water sector has been systematically impoverished, leading to widespread vacancies and understaffing, which severely hampered the authorities' ability to function and deliver the public service. This deliberate weakening of public administration, often stemming from political decisions and a lack of funds, has historically been exacerbated by donor demands. These demands insisted on hiring freezes in public administration and left civil servant positions empty as part of austerity measures required to acquire conditional loans. Consequently, the Ministry of Energy and Water (MoEW) and Regional Water Establishments (RWEs) consistently lack the necessary technical and management personnel, reaching more than 90% of vacant positions (MoEW, 2020 and 2024). This deliberate neglect creates a vacuum that private commissioned companies fill, further entrenching the idea of the privatization of water resources. Ultimately, improving the internal capacity of water establishments is crucial for effective management of the service and the enforcement of laws protecting the network and the resource.

In Lebanon's confessional political system, large-scale water projects have long served as vehicles for pork-barrel politics, enabling politicians to shore up legitimacy by directing contracts and investments to their sectarian constituencies. Many of these so-called "white elephant" schemes, nonfunctional dams and wastewater treat-

ment plants, were financed with international aid (85 % loans, 15 % grants), thereby inflating Lebanon's hard-currency debt and actively contributing to triggering the monetary crisis of October 2019. Beyond reinforcing the donor-recipient patronage network, donors deploy these water megaprojects to lock Lebanon into a broader neoliberal policy regime of indebtedness. By conditioning loans on public-private partnership frameworks, austerity measures, and "good governance" best practices, they not only reshape the country's legal and institutional landscape but also open space for their own firms and consultants to capture lucrative contracts, a situation known as "tied-aid". This conditionality entrenches Lebanon's dependency on external finance, while granting donors ongoing leverage over domestic decision‑making, such as austerity reforms to infrastructure priorities. In effect, water aid becomes both a market-creation tool for transnational corporations and a source of local governance failures.

To introduce a few governance failures examples where donors were being active authors, Law 221/2000, which re-centralized water authorities by merging 22 local water offices into four large regional establishments. The law overlooked the need to decentralize water administration, as water issues are inherently locally specific. The Polluter-Pays Principle under Law 444 and its Decree 8633 sought to introduce environmental accountability, but controversially placed environmental impact assessments (EIAs) under the control of the companies themselves rather than an independent regulatory body. The French-inspired Public-Private Partnerships (PPPs) water management model has culminated recently in issuing the Water Code Laws 77 (2018), and its amended version Law 192 (2020), which institutionalized water concession contracts and delegated management models, reflecting broader neoliberal trends, pushing towards water privatization. While the Water Code nominally recognizes citizens' right to access high-quality water and sanitation, it conditions this right on the ability to pay, effectively conditioning a universal entitlement to a financial transaction.

In addition to being private and market-leaning, these contemporary strategies have been transplanted into a century-old collection of dam project blueprints. Such a supply developmentalist vision finds its roots in the colonial French Mandate and Cold War foreign aid dynamics. Thus, increasing water supply in surface reservoirs became the principal objective of all contemporary policies, requiring mobilizing engineering solutions and investing in large-scale infrastructure projects; Decennial plan (2000-2010), National Water Sector Strategy (2010-2020), Blue Gold initiative (2013), and the revised National Water Sector Strategy (2020-2035). The focus on large-scale supply-side projects overlooked the fundamental need for comprehensive groundwater management and bottom-up approaches to water.

Lebanon's reliance on large-scale dam construction as a water-supply paradigm faces significant reconsideration due to several hydrological, economic, social, and ecological shortcomings. Firstly, Karst formation is a major hydrological challenge, as reservoirs sited on such geology suffer chronic seepage losses due to water migrating through extensive subsurface fissures. Examples like the Chabrouh dam leakage, Brissa reservoir, or Balaa or Mseilha failed to fill are all examples underscoring these reservoir tightness issues. Secondly, Climate factors, drop in rainfall, and high Mediterranean summer

temperatures, induce evaporation rates of up to one meter annually, undermining the very storage functions these structures are intended to provide in dry years. Thirdly, Seismic activity poses a latent threat to dam integrity, as Lebanon's active fault lines compromise embankment stability and may be a potential source of reservoir-induced seismicity (Nemer, 2019). Fourthly, high costs and public debt are a significant concern, with the combined burden of capital expenditure, debt servicing, driving unit water costs to an estimated USD 20–30 per cubic meter, and more, without accounting for operational expenses. Fifthly, ecological and biodiversity degradation is evident as impoundments fragment riverine ecosystems, inundate riparian habitats, and diminish downstream spring flows, precipitating biodiversity losses. Sixthly, these projects contribute to Cultural loss by severing longstanding cultural linkages to water sources like the archeological sites of Adonis or Echmoun valleys. Lastly, alternatives exist.

06

ALTERNATIVE POLICY STEPS TOWARDS A RIGHT TO WATER

Effective solutions for Lebanon's water crisis require a paradigm shift away from supply-side megaprojects toward groundwater-based, demand-side, and community-centric strategies. Those steps include:

- **1. Set Groundwater as core**, with a Managed Aquifer Recharge (MAR) approach, installing recharge basins, infiltration galleries, and exfiltration trenches in karst recharge zones to boost subterranean storage. Coupled with real-time piezometric monitoring, MAR can stabilize groundwater levels and buffer seasonal deficits. Enact a unified groundwater law that obliges farmers and municipalities to register wells, phases out unregulated drilling, and demarcates legally protected recharge and discharge zones.
- **2. Water decommodification and amend the Water Code to enshrine a universal, unconditional right to water.** Providing a free basic water allocation, such as 50 liters per person per day, can be found in many global experiences. For instance, South Africa's Free Basic Water policy guarantees 6 cubic meters per household per month. In the MENA region, countries like Jordan and Tunisia apply progressive water tariffs, where the first consumption block is heavily subsidized to ensure almost free provisioning. To sustain such models financially, a "water solidarity fund" can be introduced, sourced from taxes on luxury water uses such as plastic bottles, private pools, or export-oriented intensive agriculture. Legislation should also prohibit the privatization of water services, resources, and infrastructure, safeguarding water as a public good and human right.
- **3. Deploy extensive Nature-based solutions** at different scales: Plant native deep-rooted species across degraded highland catchment areas, as well as wetlands and groundwater infiltration galleries. Urban nature-based solutions in Lebanon should prioritize green roofs, rainwater harvesting, permeable pavements, and city microforests, cooling dense cityscapes while enhancing public access to water.
- **4. Support small-scale agroecological farmers** by establishing community-managed irrigation systems, also using soil-enhancing practices like mulching, terracing, and agroforestry to reduce water demand and build preparedness to climate hazards.
- **5. Hire a new cohort of technically com-**

petent, socially engaged, and locally embedded civil servants committed to water justice in their localities, away from centralized, opaque, and confessional patronage.

- **6. Strengthen Water Monitoring and Open Data for accountability** by launching a national water data portal integrating remote sensing, citizen science, and IoT devices for live monitoring of flows, leakages, water quality, pollution incidents, and aquifer levels.
- **7. Scale up decentralized, grassroots community-owned systems** and formalize Water User Associations (WUAs). Empower municipalities and user associations with delegated management rights, transparent budgets, and participatory decision-making, shifting from top-down mandates to collective and local mandates.
- **8. Targeted leakage detection and pipe rehabilitation** to halve current Non-Revenue Water (NRW) rates, often exceeding 40%, could save an estimated 120 Mm^3/year. Aging network compounds the situation, with lead pipes made of toxic metals, and asbestos cement pipes that release carcinogenic compounds into the water. Replacing them improves safety, reliability, and long-term cost efficiency.
- **9. Expanding small-scale reservoirs** to enhance storage capacity and supply continuity. Functioning through gravity, water towers are low-energy, with low-maintenance and construction costs, and can be rapidly deployed, supporting fairer access across urban and rural areas.
- **10. Phase out rooftop plastic and metal water tanks** in areas with reliable public supply by replacing them with safer, network-integrated alternatives to provide continuous drinking water.
- **11. Deploy Plastic-Free Public Refill Infrastructure;** Install or rehabilitate collective drinking fountains and water-refill stations, fed by treated network water, across schools, hospitals, neighborhoods, and streets.

07

CONCLUSION

Lebanon's water crisis is not a matter of physical scarcity, but a symptom of systemic injustice that is rooted in legal pluralism, ecological extraction, elite capture, and a donor-driven development model that privileges infrastructure over people. The persistence of colonial-era property regimes, confessional fragmentation, and neoliberal technocratic interventions has undermined both equity and sustainability, commodifying a vital resource. Reclaiming the right to water in Lebanon requires more than technical fixes; it needs a structural political transformation. This means decommodifying water, centering groundwater within a legally protected jurisdiction, and dismantling top-down approaches in favor of participatory, citizens and community-owned models. It also means reviving Lebanon's rich hydro-social heritage by deploying nature-based solutions, rejecting commodification of the resource dependency, and reconfiguring the water sector around justice, solidarity, and ecological regeneration. Only by confronting entrenched power relations in its legal, institutional, and economic realms, Lebanon could aspire to secure an unconditional, universal right to water. In doing so, the country not only affirms water as a human right but also reclaims its rivers, aquifers, and commons as sources of collective good and acts locally in the face of global climate uncertainty.

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