

AMERICAN UNIVERSITY OF BEIRUT

FRAGMENTATION IN WASTEWATER GOVERNANCE:
THE CASE OF THE SOUTHERN BEIRUT WASTEWATER
NETWORK

by
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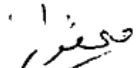
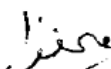
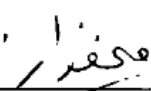
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This is dedicated to my parents.

ABSTRACT OF THE THESIS OF

Nabeeha Hussein Shokor

for

Master of Urban Planning and Policy

Title: Fragmentation in Wastewater Governance: The Case of the Southern Beirut Wastewater Network

This thesis seeks to explore one of the best known failures of the wastewater sector in Lebanon, the network in the area south of Beirut serviced by the Al-Ghadir wastewater treatment plant. Despite the fact that a pipe network has been set in place, two pumping stations have been executed, and a pre-treatment plant is built in Choueifat, the network is not operational. Instead, wastewater is immediately dumped into the sea through multiple sea outfalls, often used as alternative ad-hoc solutions set up by municipalities along the coastline. Looking specifically at this case study, I seek to unravel some of the factors that explain why this wastewater system has failed. By investigating the institutional framework and the spatial organization of the system, my thesis hypothesizes that several overlapping factors could have led to these conditions. First, I argue that the structure of governance is at the core of the wastewater network failure, whereby the lack of coordination across public institutions causes overlaps and gaps in responsibility and generates resistance to the implementation and operation of projects. Second, I argue that the spatial organization of the service area into multiple geographies, marked by the division into numerous municipal districts, political-sectarian territories, and formal-informal areas, creates fragmentation in governance, making it harder to coordinate across bodies. The circumstances of this failure may not be generalizable across the country and beyond. It will therefore be impossible to explain the failures of other networks by simply extrapolating from this case study. Yet, studying the specificity of a case, going deep into the circumstances and conditions that surround it, and unraveling what is common and could be studied for other cases is an important first step to understanding why Lebanon's planning agencies have failed to extend the sewer network within their urban areas. Another significance of this thesis is the direct association of the wastewater sector with issues relating to environmental preservation, public health, overall quality of life, and environmental justice.

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CHAPTER 1

INTRODUCTION

1.1. Research Problem

Similar to electricity, water, or other infrastructure systems, the wastewater sector in Lebanon is in a state of failure. Investments over the past three decades have yet to produce properly-functioning wastewater collection and treatment systems. Prior to the Syrian refugee crisis in 2011, reports estimated that only 60 to 70% of the population in Lebanon were connected to functioning sewer networks (World Bank, 2011). This number is considerably lower now, as a sizable percentage of refugees dwell in informal, and hence un-serviced, settlements. Furthermore, wastewater treatment levels are below 10% (NWSS, MEW, 2012), meaning that even if sewer is channeled, it is not being treated before it is dumped. Over the past few years, more areas have been serviced with physical infrastructure, but many of the newly constructed networks are still not connected to main collectors or to treatment plants, and overall treatment levels is still low (CDR, 2018). Untreated wastewater is discharged directly into water bodies, which poses threats on the environment and public health. With the impacts of climate change already being felt, wastewater systems are especially vulnerable, as they are prone to increased flooding episodes and odors, further deterioration of wastewater quality due to increased discharges, and infrastructure damage (Hughes et.al., 2021). Therefore, the severity of deterioration is bound to increase. Publicly documented incidents pointing towards failure have triggered rounds of accusations and an atmosphere of mutual blame, as no public or private institution has claimed responsibility for the dilapidated sewer infrastructure.

This thesis seeks to explore one of the best known failures of the wastewater sector in Lebanon, the network in the area south of Beirut serviced by the Al-Ghadir wastewater treatment plant. Despite the fact that a network has been set in place, two pumping stations have been executed, and a pre-treatment plant is operational in Choueifat, with over 250 million USD worth projects completed or under progress, the network is not operational. Instead, wastewater is immediately dumped into the sea through multiple sea outfalls, often used as alternative ad-hoc solutions set up by municipalities along the coastline.

Looking specifically at this case study, I seek to unravel some of the factors that explain why this wastewater system has failed. I explored in the thesis three possible considerations that I hypothesized needed to be considered. My hypotheses were built on earlier studies looking at infrastructure system failures in Lebanon (Farah and Verdeil, 2021) and those looking specifically on the water sector (Eid-Sabbagh and Ray, 2021), and refined according to the characteristics of the wastewater system. First, one should consider the fact that the networks spans across several municipal districts requiring territorial coordination. Second, the network is managed by multiple levels of public institutions (e.g., elected local authorities, service agencies) with potential jurisdiction overlaps, and the coordination channels across them seem to be absent. Third, the network includes within its area of coverage several informal settlements and public agencies disagree about the necessity or entitlement to provide services to these illegally developed and occupied areas. In Lebanon, service delivery failure is echoed throughout multiple sectors, a number of which are: electricity, transportation, solid waste management, and water supply and sanitation. Wastewater service delivery is one failing system among the rest, however, the conditions and

characteristics underlying its failure is not common across all sectors. Thus, the circumstances of the failure of the Ghadeer system may not be generalizable across the country and beyond. It will therefore be impossible to explain the failures of other networks by simply extrapolating from this case study. Yet, studying the specificity of a case, going deep into the circumstances and conditions that surround it, and unraveling what is common and could be studied for other cases is an important first step to understanding why Lebanon's planning agencies have failed to extend the sewer network within their urban areas. It can perhaps further inform us about failures in other infrastructure sectors.

1.2. Research Question and Findings

This thesis investigates the failure of one wastewater sector in Lebanon, the wastewater network linking administrative Beirut to its southern suburbs, serviced by Al-Ghadir plant, as an entry point to understanding some of the mechanisms that explain the failures of this and possibly other infrastructure systems in Lebanon and beyond.

I ask: How do we explain that despite the millions of dollars, over \$250 million worth already completed or in progress, invested in the wastewater network linking administrative Beirut to its southern suburbs, the system has failed to operate? What are the factors underlining this failure?

My thesis hypothesized that several overlapping factors could have led to this failure, all related to the difficulty of governing the infrastructure system. The thesis investigated two entry points: (i) the administrative and institutional frameworks and (ii) the spatial organization of the system.

My thesis findings center on two main arguments, each developed in a full chapter:

- i. First, I argue that the structure of governance is at the core of the wastewater network failure, whereby the lack of coordination and collaboration across public institutions, which include ministries, public service agencies, and municipal authorities causes overlaps and gaps in responsibility and generates resistance to the implementation and operation of projects.
- ii. Second, I argue that the spatial organization of the service area into multiple geographies, marked by the division into numerous municipal districts, political-sectarian territories, and formal-informal areas, creates fragmentation in governance, making it harder to coordinate across bodies.

1.3. Research Significance

The wastewater sector is directly concerned with efforts for environmental preservation, public health, overall quality of life, and issues pertaining to environmental justice. In Lebanon, water quality is at stake as it is threatened by pollutants, including untreated wastewater. Wastewater services are one of the basic precursors for proper livelihoods rightful to all communities. In addition, properly treated wastewater can bring important economic, environmental, and health benefits.

Several governmental agencies, some operating at different scales, are involved in the organization of the sewer treatment network in the studied case study. The multiplicity of actors makes it difficult to discern responsibilities and understand respective roles. Fragmentation across serviced areas and disagreements on service

delivery are the main challenges servicing the sector. One sees it clearly at the moment of failure, when stakeholders blame publicly each other.

Assessment of the wastewater sector could be carried out for other sectors in Lebanon, many of which are similarly failing. Such exercises help in understanding why governance is failing, the reason of which could be the same for multiple sectors at once.

Despite being context dependent, this research could also be significant to cases within and outside Lebanon, as divisions affecting service sectors could be reproduced on the bases of race, sect, or other economic factors.

1.4.Literature Review

In order to build the intellectual framework of my thesis, the literature review brings together two strands of literature that both contextualize the discussion of the thesis and provide a methodological framework for the analysis it seeks to conduct. These strands combine two elements of governance: its institutional and spatial organization. Governance, here, is defined as the combination of the relevant multiplicity of responsibilities and resources, instrumental strategies, goals, scales, and actor networks. This combination forms a context that, in some ways, restricts and, in other ways, enables actions and interactions (de Boer et.al, 2013). Thus, governance is seen as context-dependent and beyond merely the government.

In looking at governance, I expand on the study of informal service systems and/or hybrid systems which have added to the problematics of urban service delivery, especially in the context of Lebanon, where public services are crisis-stricken (Verdeil et.al., 2019). Despite possessing different specificities, the failure of the governance of

wastewater infrastructure falls within a broader study of urban service delivery failures, often analyzed as the result of “power struggles between representatives of different social groups, especially during elections, and the intervention of higher authorities” (Farah and Verdeil, 2021, p.4). Therefore, the literature review moves from a broader discussion of concepts in governance to a study of the socio-political forces that govern the territory, including the place of informal neighborhoods in access to services.

1.4.1. Wastewater Governance

Water governance refers to the multiple levels of strategies, goals, actors, and scales that intersect in the management of this complex system. Over the last few decades, almost all water systems have been managed through the interactions of public and private actors who operate at various levels, have different perceptions and objectives, and employ various strategies and instruments (Vinke-de Kruijf & Özerol, 2013, p.2). To understand the wastewater context, one has to not only study the government, but also the governance and interactions between actors.

Unfortunately, governance systems, especially in metropolitan contexts, suffer from institutional fragmentation caused by uncertainties in public administrations’ location and scope of intervention (Allen et.al, 2004, pp8). As certain areas, such as spaces in cities where poverty, forced population displacement, and economic failure, are faced with water service shortages, their residents are left on their own to secure these services and provide infrastructural networks. Therefore, in the wake of public entity and private stakeholder failure, it is not the extension of formal service provision, rather the emerging of informal and decentralized forms of service provision that covers the deficit in water services (Allen et.al, 2004, pp8). In Lebanon, self-help practices in

informal settlements have enabled residents to secure access to basic public services through negotiating access with service patrons, pooling resources, and community associations (Al-Khayat, 2008) . This has resulted in a hybrid system of service delivery for residents of informal settlements, “operated commercially and by self-help through both formal (municipal) and informal actors” (Makki, 2019).

Scholars have analyzed wastewater governance systems around the world and investigated their failure. Looking at a study of wastewater governance in New Delhi, India, I found important revisions of the traditional narratives of implementation failure (Karpouzoglou and Zimmer, 2012). As in Beirut, traditional narratives have explained the failure of the waste water system in New Delhi by the lack of political will among city authorities and lower level governmental bureaucrats, as well as the absence of sufficient funds to meet the growing population demand. The authors of this study question the current framework of the wastewater crisis and suggest that it stems not only from failures at the levels of implementation as previously thought, but from policy approaches, overlooked in light of the above narratives, particular to the New Delhi context. In that case, the authors advocate for taking “lay” knowledge, that of marginalized groups and the population experiencing the crisis, into consideration, as it captures practical, social, and health dimensions often overlooked by expert knowledge. In short, the authors call for “inclusive governance” and conclude by suggesting that the wastewater should have its own policy space in international debates, where it is currently at the intersection of several and sometimes competing sector-driven mandates. The authors, however, question the possibility for greater policy involvement within existing institutional and sectoral structures and channels (Karpouzoglou and Zimmer, 2012).

Other researchers have analyzed wastewater treatment policies adapting from broader governance assessment perspectives. In a research paper on wastewater treatment policy in central Mexico, Casiano Flores et. al (2019) investigate how the governance context affects the implementation of wastewater treatment policy. They use a governance assessment tool for three cases in central Mexico and assert that wastewater regulation and implementation are context-dependent, and therefore need context-specific solutions. They recall the failure of decentralization and river basin management efforts, concluding that sub-national analysis of wastewater management schemes is necessary. This requires an in-depth examination of the institutional architecture of wastewater policy. This examination requires the understanding of contextual factors and causal mechanisms across all actors and scales. Water governance is understood as a water governance regime, analyzed with a perspective that focuses on institutions and social structures (Casiano Flores et. al, 2019).

The Governance Assessment Tool (GAT) used is appropriate for multi-level settings with interdependency among actors, which is the case for wastewater management governance schemes (Bressers et al, 2015). Table 1 shows the governance assessment matrix employed in the GAT.

The GAT matrix involves two elements: dimensions and criteria. Dimensions are elements of the first column in Table 1 (levels and scales, actors and networks, problem perspectives and goal ambitions, strategies and instruments, and responsibilities and resources). Criteria are elements of the first row (coherence, extent, flexibility, and intensity). Assessment is made for each dimension of governance based on the four criteria. According to (Casiano Flores et. al, 2019, p. 31) answering the questions for each dimension “provides a systematic description of the governance

context. This systematization is a way of sorting through complexity that allows a reasonable framework for practitioners to consider the context and dynamics of their particular settings. The five dimensions can systematically describe a specific area concerning a specific issue, such as wastewater treatment”. The assessment allows deeper understanding of the governance context and how it impacts policy implementation.

After filling Table 1, each cell is labeled as low, moderate, or high according to the answer it holds. For example, coherence between actors and networks could be found out to be high. For low to moderate levels of criteria, characteristics are labeled as restrictive, and for moderate to high levels, they are of supportive quality. The four criteria are labeled as restrictive or supportive for each dimension, which gives an overall assessment of the governance context.

Table 1 Governance Assessment Matrix (Bressers et.al., 2015)

	Qualities of the Governance Regime			
	Extent	Coherence	Flexibility	Intensity
Levels & Scales	How many levels are involved and dealing with an issue? Are there any important gaps or missing levels?	Do these levels work together and do they trust each other between levels? To what degree is the mutual dependence recognized?	Is it possible to move up and down levels (upscaling and downscaling) given the issue at stake?	Is there a strong impact from a certain level towards behavioral change or management reform?
Actors & Networks	Are all relevant stakeholders involved? Who are excluded?	What is the strength of interactions between stakeholders? In what way are these interactions institutionalized in stable structures? Do the stakeholders have experience in working together? Do they trust and respect each other?	Is it possible that new actors are included or even that lead shifts from one actor to another when there are pragmatic reasons for this? Do the actors share in social capital allowing them to support each other's task?	Is there a strong impact from an actor or actor coalition towards behavioral change or management reform?
Problem Perspectives & Goal Ambitions	To what extent are the various problem perspectives taken into account?	To what extent do the various goals support each other, or are they in competition or conflict?	Are there opportunities to re-assess goals?	How different are the goal ambitions from the status quo?
Strategies & Instruments	What types of instruments are included in the policy strategy and are implemented and which are excluded?	To what extent is the resulting incentive system based on synergy? Are there any overlaps or conflicts of incentives created by the included policy instruments	Are there opportunities to combine or make use of different types of instrument? Is there a choice?	What is the implied behavioral deviation from current practice and how strongly do the instruments require and enforce this?
Responsibilities and Resources	Are responsibilities clearly assigned and sufficiently facilitated with resources?	To what extent do the assigned responsibilities create competence struggles or cooperation within or across institutions?	To what extent is it possible to pool the assigned responsibilities and resources as long as accountability and transparency are not compromised?	Is the amount of allocated resources sufficient to implement the measures needed for the intended change?

Although it was developed in a different context, the GAT provides an interesting methodological framework for the analysis of waste water systems. Adapted to contexts where it can acknowledge informal and/or self-help system, as the above-cited India study or Beirut, this framework could allow for important insights to help understand the failure of the water system.

1.4.2. Scale and Metropolitan Governance

Wastewater actors often operate at various scales of governance, which justifies the need for a deeper understanding of issues of scale in governance. Geographic scale had been previously thought of as a fixed, unproblematic tool for studying bounded spaces in an organized hierarchal manner (Delaney 1997). However, scholars have put to light that the scale at which political and economic activities operate is constantly being transformed and is often shaped to serve political, economic, and even social agendas. Delaney explains that processes operating at different geographic scales produce incentives and motives for political action, and geographic scales themselves are socially constructed and in their turn contribute to the constitution of social, economic, and political processes. Delaney gives out examples from around the world that illustrate the dynamics of the ‘politics’ of scale, often involving both state and non-state actors. To narrate a few, Delaney talks about how in Italy, a case first showcased by John Agnew (1993), each of the different political parties in the country called for organizing power at a different political scale, which confirms that political parties are aware of notions and implications of scale and operate on ideologies closely tied to it. Another case was investigated by Helga Leitner (1997) who narrates conflicts within the European union over immigration policy of non-EU nationals. A point of

contestation there is the divergent conceptions of justice, democracy, and identity within each state government, which creates a “complex territorial structure of governance” affecting agreements on immigration policy characteristic to the whole European Union region. A case related to the municipal scale of governance is one in the 1980’s Massachusetts on the politics of defense investment and peace examined by Byron Miller (1994). A hierarchy of geographic scales ranging from the entire country to state level was freed from nuclear weapons stemming from peace movements at the municipal scale. Delaney ultimately shows how the construction of scale is attempted or accomplished by actors engaged in political transformations and may even help us understand dynamics of social change. He recalls the concept of “hidden geographies”, which we can discern as a result of the politics of scale setting power relations (Agnew 1993). Delaney concludes that power relations are structured and transformed over time and space, which highlights the constructionist perspective on scale also laid out by Gross (2018) in her book titled ‘Constructing Metropolitan Space’.

In ‘Constructing Metropolitan Space’, Gross lays out case studies that highlight the dynamics and contestations that redefine metropolitan space by presenting the underlying policy practices and discourses related to spatial-economic development objectives. Implications on metropolitan space are also tied to territoriality and related political-institutional practices. The authors try to understand these dynamics through looking at scale in a “social-constructivist” and “strategic-relational” perspective. A social-constructivist perspective examines how rescaling and reconstruction of state power and the reconfiguration of policy spaces create frameworks for regulating social relations, where rescaling happens through the emergence of a new spatial configuration of governance and regulations. Looking at metropolitan space from strategic-relational

perspective explores how the former is being redefined and re-signified as a strategic-relational outcome of interactions between state and non-state economic actors in the framework of economic development policies, which contributes to redefining metropolitan scales.

In a video lecture by Sue Parnell (AUB City Debates, 2016), the scholar examines issues of scale and development driven by international aid in Africa. She states that urban research, particularly in Africa, has changed to reflect a bigger picture that considers larger city and city-regional scales, giving attention to “spill-overs” beyond city boundaries. New donor, global funding foundations, and corporation trends have been emerging as a result, and they have had considerable effects on policy-making and the need for more deliberation among all actors (the donors and funders themselves, the government, and the residents). Parnell gave the example of a city in South Africa, Durban, where the donor funded local governments directly rather than the central and adapted the ‘city-region’ governance scheme to the local context. All actors in Durban were able to reach consensus on new spaces of service provision beyond previous boundaries. Despite certain criticisms, city-regionalism was used as a way to foster peace and local infrastructure and service improvement. This is in a time/place where competing and parallel systems of government were present along with problems of multiple actors also in conflict at vertical and horizontal levels, leading to ambiguity in finding ways to use limited resources and funding.

1.4.3. Servicing Informality

Aside from technical failures, scholars have shown that service provision may be complicated because of disagreement on the *right to service*, particularly when

service delivery reaches so-called informal settlements or areas where property rights are contested.

A growing consensus among planners and international organizations is to extend services to low-income neighborhoods, even when a settlement is in violation of property rights and/or urban regulations. The practice has been supported since the mid-1970s by international organizations and UN bodies, setting in place projects referred to as *informal settlement upgrading*. Despite this consensus, numerous city authorities have been reluctant to service these neighborhoods, seeing in the extension of services support to illegal practices. In other cases, however, progress has been made through ad-hoc nongovernmental and community-based projects. Scholars have documented such cases of service delivery, particularly that of wastewater infrastructure and management. Arif Hasan (2006) documents the work of a Pakistani NGO, the OPP-RTI, running a low-cost sanitation program that supports communities in informal settlements to develop their own sewer systems based on an “internal-external” concept, whereby residents work on infrastructure within and nearby their homes, which are then linked to external infrastructure ideally built by the local government. Initially, the wastewater sector suffered from lack of adequate maps and the unwillingness of the local government to invest in upgrading networks in informal settlements to integrate them into an overall city infrastructure. Through the mobilization of community-based mapping and project planning and implementation, not only have sewers been provided for houses, but a shift in governance has also occurred, as local government engineers and administration have realized the need to support the OPP-RTI work, rather than ignoring or duplicating it, and this has had important implications on how infrastructure is planned, financed and managed in Pakistan. Successful projects have proven that

communities can contribute to local development if provided with technical and managerial guidance. Local governments can support the process by building external development, provided they accept and work along the “internal-external” concept and in collaboration with communities (Hasan, 2006).

Hasan explains other repercussions of the OPP-RTI project. Members of the organization were able to learn about the various actors and factors that are involved in determining how development takes place, and regarding corruption and its relationship to inappropriate planning and construction through formal process in low-income settlements. An illustration of one of the learning opportunities was a 1990 upgrading project in Orangi area agreed on between the local government and private local and international firms, funded by the ADB under an urban development program. However, studies in that proposal were not extensive and not in line with what had already been done by the OPP-RTI project. The OPP-RTI maps and installed structures were better descriptive and of service for the area. After a series of negotiations, it was agreed that the OPP-RTI should have a role in the project, especially to review designs and modify them, and monitor the implementation with the help of the community. As a result, they were able to keep a limited role for private consultants decrease the cost of the ADB-funded project (\$21.6 million to \$0.6 million).

A positive impact was a ripple replication phenomenon, as other activists were able to apply the “internal-external” model to security, electricity, solid waste management, and parks. This has also had an effect on election results, where representatives of powerful commercial and political interest groups were defeated (Hasan, 2006).

In another paper on the Slum Sanitation Program (SSP) in Mumbai, India, McFarlane (2008) reflects on the progress of the program in regards to policy infrastructure, technical infrastructure, and cost recovery mechanisms. McFarlane highlights the program's shortcomings, as inadequacy of sanitation in informal settlements and inequalities in sanitation across Mumbai are still prevalent. The current situation is fostered by intense territoriality of informal settlements, divided along lines of ethnicity, religion, economic functioning, and time of and place of migration. This cultivates competition for resources, which in turn is exploited by politicians for electoral gain. McFarlane concludes that more flexible approaches should be adopted in terms of partnership and participation, technical infrastructure development, and discussions on cost recovery. For example, he argues for the need to adjust tendering processes to allow for smaller NGOs to contribute to sanitation projects, who might possess more local expertise and community involvement skills. McFarlane, however, asserts that despite the little progress made, 'slums' are still positioned as "hopeless urban melancholia", and people inhabiting them are still being blamed for their living conditions and portrayed as problems rather than citizens with rights (McFarlane, 2008).

Conversely, Ananya Roy (2009) revisits the recurring explanations of planning failure in India, where dilapidated physical infrastructure and inadequate electricity and water supply are common realities, especially among low-income neighborhoods. She argues that these failures are the outcome of the unwillingness of city authorities to extend services to poor areas, seeing instead advantages to maintaining them in precarious conditions. Harb (2003) provides a similar explanation for the suburbs of Beirut where she shows that the delegation of informal settlement management to

political parties is an integral element of public government. At the surface, absence of state-led regulation is the main issue. However, Roy presents an alternative explanation where state whose planning tactics are characterized by deregulation informality is the tool through which the state reinforces its authority and power structures by extending services as a temporary gift rather than a right. This is again similar to Beirut where Fawaz (2015) has shown the management of territories to be deliberately serviced and organized in ways that respond to the political entitlement of communities rather than a right. Through all these cases, service provision becomes a contested right, reversing earlier commitments of the welfare state.

1.4.4. Territorial Municipal Context and Fragmentation in Beirut Suburbs

Over the past decade, scholars have recognized the political nature of planning and how its interventions can be used to draw territories and divide cities, instead of connecting them.

Looking at Beirut's south-western suburbs, Hiba Bou Akar (2018) showed how spatial planning is intricately intertwined with a process of drawing political territorialities on the basis of sectarianism and real-estate market conquests. Bou Akar (2018) lays out tactics implemented by actors in the public and real-estate sectors that resulted in Beirut's peripheries fast becoming ever more intricately planned within a logic of sectarian order. This type of self-serving planning is context dependent and its tools could be different. In the suburbs of Beirut, as described by Bou Akar, municipalities, each backed a religious-political organization, are principal agents of conflict as they refuse to cooperate, creating fragmentation.

Exploring Beirut's southern suburbs, Farah and Teller (2012) studied fragmentation in Beirut's suburbs. In their paper, they use the Actor-Network Theory to show how planning brings necessary political dimensions in the age of the fragmented city. The authors describe how "municipal actor-networks", involving political parties and their affiliated NGOs, perform "bricolage planning" and experiment with urban planning tools such as various communication and marketing techniques, advocacy tools, physical planning tools, and place-making tools to challenge the government's influence on the municipality, and to enforce control over municipal territorial boundaries. The authors trace the history and formation of three municipalities in the suburbs of Beirut, Ghobeiry, Chiyah, and Furn El Chebbek. Each of the three is trying to construct its municipal actor-network through mobilizing the "locality's identity" and a series of projects and actions that constitute its municipal vision. To foster the stabilization of these networks upon threats from recent changes in central governance, scaling up of networks has taken place to reinforce territorialization. This has been achieved through the tool of unions of municipalities, where, as an example, the Dahiya Union of Municipalities encompassed a number of municipalities in the southern suburbs of Beirut excluding Chiah despite its proximity. These studies point out to the "territorial" nature of cities and their governance, showing that lack of coordination may well be the outcome of conflicting political interest rather than sheer technical failures.

1.5. Methodology

To analyze and assess the failure of the wastewater governance scheme in the case of the Al Ghadir-Carlton collector serviced area, meaning the Southern Beirut wastewater network, I begin by framing the research approach. In the next chapter, I

flesh out the case study adopted to apply this framework. My methodology consists of applying this framework to the case study.

1.5.1. Methodological Framework

I structured my analysis to build first on the governance context of wastewater treatment policies, and next on the spatial organization of the territory over which the system spans. For the first step, I adopted and adapted the framework used by C. Casiano Flores et. al (2019) to analyze the wastewater sector in central Mexico, as adapted from Bressers et. al (2015) in their governance assessment guide, and developed it to fit the specificity of my case study through adding questions concerning informal areas particular to Lebanese territories. The Governance Assessment Tool (GAT) is one of OECD's recognized tools for water governance assessment, and it is applicable in this case due to its relevance for cases where multi-level actors are involved with interdependencies among them (OECD 2015). In addition, it is among the more practice-oriented tools and has been applied for wastewater treatment policy (Bressers et.al., 2015; Casiano Flores et.al., 2019).

The premise behind using this tool is that understanding the governance context allows for the evaluation of collaboration between actors. According to De Boer et.al., "given that the governance context has an influence on the way that interactions take place, it is hypothesized that it also thus influences whether or not, and how, collaboration is used as part of the day to day water management processes" (2013).

The particularity of the wastewater governance system in the Southern Beirut wastewater network, mainly in regards to municipal territoriality, a characteristic fragmentation in governance, and complications in servicing areas labeled with

informality or self-help, the governance assessment matrix (Bressers et. Al, 2015) is adapted to reflect the context in hand. Table 2 is the GAT with minor adaptations.

Beyond the governance assessment tool, I mapped the wastewater network over geographic divisions that characterize the area to further understand how the governance context and the spatial organization of the system are intertwined.

Table 2 Governance Assessment Matrix (Bressers et.al, 2015), Adapted to the Thesis by Author

	Qualities of the Governance Regime			
	Extent	Coherence	Flexibility	Intensity
Levels & Scales	How many levels are involved and dealing with an issue? Are there any important gaps or missing levels?	Do these levels work together and do they trust each other between levels? To what degree is the mutual dependence recognized? <i>Specifically in relation to informal settlements, do they agree on the right of residents to be serviced?</i>	Is it possible to move up and down levels (upscaling and downscaling) given the issue at stake?	Is there a strong impact from a certain level towards behavioral change or management reform?
Actors & Networks	Are all relevant stakeholders involved? Does it include the voices of local authorities? Who is excluded?	What is the strength of interactions between stakeholders? In what way are these interactions institutionalized in stable structures? Do the stakeholders have experience in working together? Do they trust and respect each other? Do these stakeholders have the authority to coordinate? <i>Do they report to other levels of decision-making that may hijack their decisions to other ends? Are there any forces (political, economic) forces creating rifts between any of the stakeholders?</i>	Is it possible that new actors are included or even that lead shifts from one actor to another when there are pragmatic reasons for this? i.e. Is there an opportunity for new stakeholders to be included? <i>Especially representatives of residents of informal settlements and/or residents who are non-voters?</i> Do the actors share in social capital allowing them to support each other's task?	Is there a strong impact from an actor or actor coalition towards behavioral change or management reform?
Problem Perspectives & Goal Ambitions	What are the various problems that emerged during the process of planning and implementing the project? To what extent are the various problem perspectives taken into account? <i>Are legal considerations taken</i>	To what extent do the various goals support each other, or are they in competition or conflict? <i>Is servicing certain areas prioritized over servicing others?</i>	Are there opportunities to re-assess goals? Who are the actors who are able to do it?	How different are the goal ambitions from the status quo? <i>Are there goals for informal settlements?</i>

	<i>into account for informal settlements?</i>			
Strategies & Instruments	<p>What types of instruments are included in the policy strategy and are implemented and which are excluded?</p> <p><i>Also specifically for informal settlements?</i></p>	To what extent is the resulting incentive system based on synergy? Are there any overlaps or conflicts of incentives created by the included policy instruments	Are there opportunities to combine or make use of different types of instruments? Is there a choice?	What is the implied behavioral deviation from current practice and how strongly do the instruments require and enforce this?
Responsibilities and Resources	Are responsibilities clearly assigned and sufficiently facilitated with resources?	To what extent do the assigned responsibilities create competence struggles or cooperation within or across institutions?	To what extent is it possible to pool the assigned responsibilities and resources as long as accountability and transparency are not compromised?	Is the amount of allocated resources sufficient to implement the measures needed for the intended change?

1.5.2. Case Study Selection

I apply my case study to the network linking administrative Beirut to the southern surrounding municipalities. This is a revealing case study because it encompasses several municipal districts and political territories. The full details of the case study will be fleshed out in the next chapter.

1.5.3. Data Collection

To carry out my data collection, and given limitations imposed by the COVID19 crisis, I have shifted and adapted my methodology to rely on content analysis and online data more heavily while limiting interviews to a few targeted individuals. The data collected was essential for filling the GAT as well as the production and analysis of maps.

I have collected data from the following sources:

i. Available Data:

I went through data available from governmental agency websites and publications such as the concerned ministries, the CDR, and water establishments.

a. Technical reports and project briefs and proposals

Technical data allows the identification of gaps in service supply and management. The technical and physical field is where problems are reflected. It also allows understanding the history of the sector and its development. The CDR website includes yearly progress reports that each include a section on wastewater management. The World Bank website lists project proposals and reports as well as public and private entities involved in them. Comparison and analysis allowed evaluation and identification of gaps in implementation rooted in planning issues.

b. Press releases and social media publications by journalists:

Over the course of the past decade, numerous TV appearances, newspaper reports, and social media outbursts have reported on the “scandals” of the waste water system. My research has thoroughly covered these reports as a way to identify the points of convergence -or divergence- in the narrative of stakeholders.

c. Interviews:

A limited number of interviews with key public officials was held between October 2020 and March 2021. Given the context of the COVID pandemic, all interviews were held over the phone, through voice calls, video calls, and sometimes audio voice notes. I conducted interviews with representatives of three public entities (CDR, Beirut municipality, and SSMF) involved in the process. All in all, I conducted eight interviews (representatives were interviewed at least twice each). I also interviewed three engineers from the private sector knowledgeable about the wastewater system (private sector interviewees asked not to be identified) who helped me understand the circumstances.

Interviews with public sector agents are vital for understanding wastewater governance. Questions tackled decision making schemes, state structures, and relationships and links between them, in line with questions in the GAT. Institutional and administrative issues must be identified. Public agencies are:

- Service agencies: Beirut and Mount Lebanon Water & Wastewater Establishment
- Planning agencies: Council for Development and Reconstruction

- Local elected representatives and regional governments:
Municipalities of Beirut, Choueifat, and the Southern Suburb
Municipalities Federation

Analysis of the GAT, ultimately the institutional setting, in addition to the spatial organization of the wastewater network allowed me to identify causes of failure in the wastewater sector and its particularities.

1.6. Thesis Outline

The thesis is structured in five chapters, each of which contributes towards understanding the factors underlying the failure of the wastewater system of the Southern Greater Beirut area, building up to the last chapter where policy recommendations are given. The introductory chapter introduces key concepts in the analysis of such governance settings: wastewater governance, issues of scale, territoriality, and service provision in informal settings. The second chapter presents the case study area upon which analysis is performed. The core chapters of the thesis are the third and the fourth. Chapter three explores the institutional setting of wastewater services, through applying the governance assessment tool presented in the methodology section. The fourth chapter looks at the spatial organization of the terrain over which the wastewater system is placed, unraveling the underlying complexities that affect the functioning of the system. Finally, the last chapter builds on the previous chapters and re-affirms the findings, ending with context-dependent policy recommendations.

CHAPTER 2

CASE STUDY PROFILE

This chapter defines the case study area at which the analysis of the associated wastewater governance system is carried out. First, the area to be studied is delineated, followed by an explanation of how the wastewater system was laid out and its current condition. A preliminary explanation of the particularities of the sub-zones comprising this system are presented, followed by a listing of stakeholders involved and regulations and strategies in the sector. Although characteristics and circumstances of this specific area are not generalizable across the country, understanding them and going a step further to analyze the failure of the sewer network is an exercise that could be copied to other cases, even across other sectors.

2.1. The Wastewater Network: Failure Despite the Investments

2.1.1. Layout of the Case Study Area Network

Wastewater from Beirut as well as parts of districts of Metn, Baabda and Aley is transported through networks that converge to two outfalls, one northern of Beirut at the Dora wastewater pre-treatment plant (WWTP), one south of Beirut at the Al-Ghadir wastewater pre-treatment plant. This division of the water network through Beirut is based on the topographic characteristics of the area that facilitate water flow from each section of Beirut and its surrounding to the corresponding treatment plant.

This thesis studies the governance of the wastewater network servicing one of the two sections: that of southern municipal Beirut and a number of municipal areas surrounding it. The Al-Ghadir treatment plant also services other parts of Baabda and Aley, but for the purpose of this thesis, territories along the coastline linking Beirut to

the treatment plant are considered. As shown in Figure 1 below, the case study area includes territories under the jurisdiction of the municipalities of Beirut, Ghobeiry, Bourj El Barajneh (including Tahwitat Al-Ghadir, T.Ghadir in the figure), and Choueifat (including Haret El Omara is a smaller jurisdiction linked to Choueifat municipality). This specific area was chosen as it is planned as a continuous network discharging to one final point, the Al-Ghadir treatment plant.

The Al-Ghadir plant is a preliminary wastewater treatment facility, about 7 Km south of Beirut, at the shores adjacent to the Beirut International Airport, and it falls mainly under the jurisdiction of the Choueifat municipality.

The WWTP was put to service in 1997, after years of construction interrupted by wars. At the time, it was considered distant from residential areas and subject to expansion and upgrades. However, the rapid proliferation of residential zones and proximity to the airport has caused a series of limitations on its extension due land availability and airport security issues. Under the official master plan for the airport extension, it is confirmed that this area is not planned for any extra development projects (Lebanese Republic, Ministry of Environment, 2012). At the moment, the plant operates only as a pre-treatment plant, i.e. it only filters out large solid waste and dumps polluted wastewater directly to the sea.

The functionality of the wastewater system also largely depends on the sewer network linked to the plant. According to plans, wastewater coming from municipal Beirut is diverted to a pumping station (PS1) located at the southern shore of administrative Beirut (Movenpick hotel). A second pumping station (PS2) located at the northern shores of Ghobeiry municipality (Saint Michel- Sultan Ibrahim), collects wastewater from PS1 as well as that coming from other areas of administrative Beirut

and Ghobeiry. Both pumps are currently un-operational, and wastewater is being dumped to the sea through ad-hoc outfalls. The locations of pumping stations and sea outfalls are shown in Figure 1. Furthermore, according to municipality representatives throughout the interview process, the existing network is under capacity pressure as in many areas it disposes both sewer discharge and stormwater. Only in some zones of administrative Beirut sewer and rainwater drainage systems are separated, somewhat easing the load on the already dilapidated wastewater pipes.

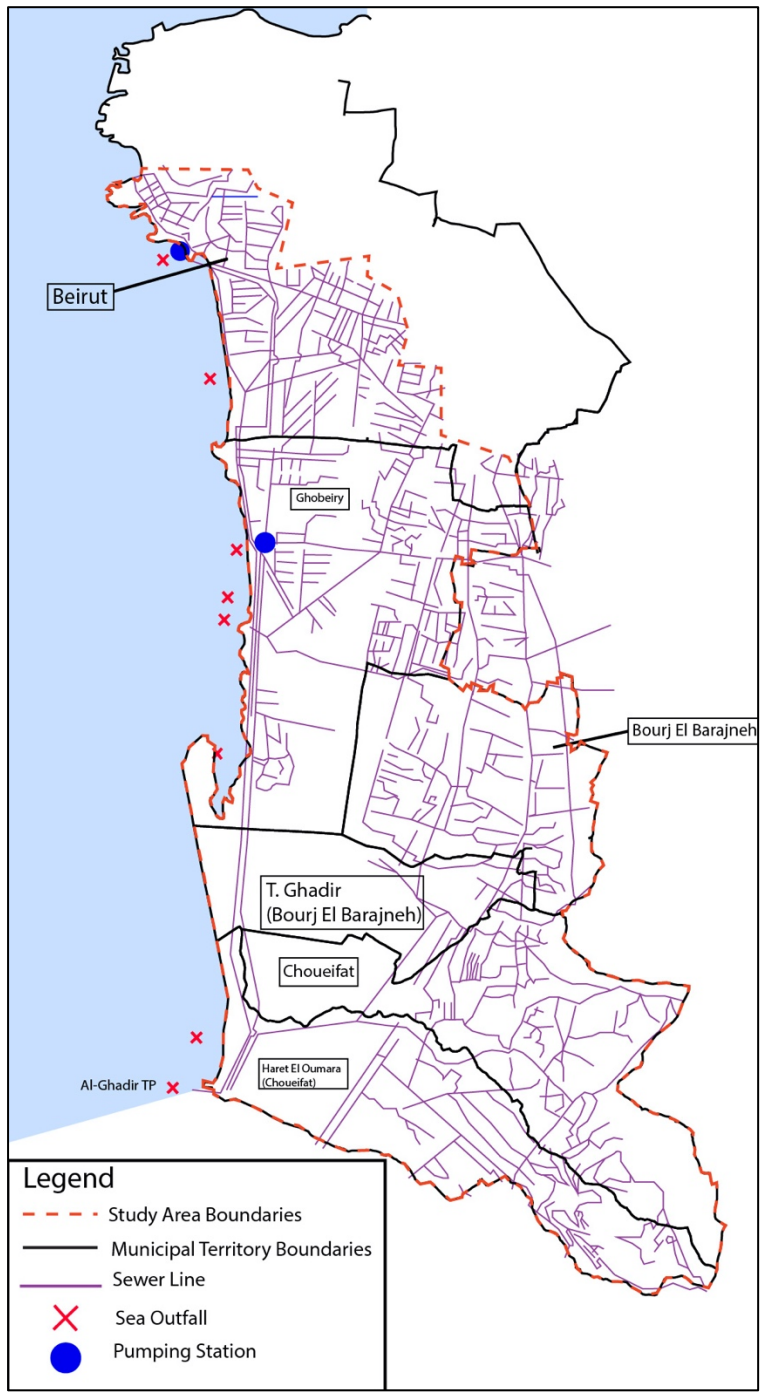


Figure 1 Wastewater Network within Case Study Area

Source: Author, based on wastewater network map from CDR (2013)

2.1.2. Wastewater Network Projects, Upgrades, and Plans

Since the plant was put to service in 1997 up until now, the Al-Ghadir treatment plant and connecting network have undergone several upgrades. As it will be discussed in subsequent sections, the Council for Development and Reconstruction (CDR) is the authority currently managing large scale project planning and implementation for wastewater networks. According to the latest CDR progress report (2018), containing all projects to date of report, the following projects and upgrades were assigned for the Al-Ghadir plant and the network linked to it:

The CDR arranged funding for completing the construction and equipping of the plant and rehabilitated its associated sea outfall with a total budget of US\$ 10 million (CDR, 2018).

Under the Beirut coastal wastewater collector project, all sea outfalls discharging directly to the sea without passing through the plant were eliminated and the Carlton-Al Ghadir collector was constructed, with a total budget of US\$ 15 million. The Damour-Al Ghadir line, with an approximate budget of US\$ 9.5 million, was also constructed (CDR, 2018).

Under rehabilitation of Beirut infrastructure projects, including the wastewater network, a new independent stormwater network was installed. Projects for the whole Greater Beirut area were funded by the Islamic Bank for Development and the Arab Fund for Economic and Social Development with total budgets of over US\$ 50 million (CDR, 2018).

The CDR has secured funding for the construction of complementary wastewater networks and the upgrade of the existing pretreatment plant with a total

budget of US\$ 173 million negotiated with the European Investment Bank and the Islamic Development Bank (CDR, 2018).

At the present, the CDR is launching the study for the extension of the Al-Ghadir wastewater pre-treatment plant drainage area, which aims at servicing more areas in Baabda, Aley, and Chouf with wastewater networks and linking them to the plant. Extension works should have been completed by 2020, but delays due to the current political and economic climate have occurred. As for the next phases, the treatment plant is planned to be upgraded to perform secondary and tertiary treatment of incoming wastewater (ESIA, 2012). As part of the extension and upgrade of Al-Ghadir treatment plant and network, current works are at the tendering phase where contractors are presenting proposals for implementation, as stated by CDR interviewees.

CDR progress reports reveal numerous projects and budgets invested in this particular wastewater network. This would ideally lead to a proper functioning wastewater system that discharges treated wastewater at one final discharge point. However, the current situation does not reflect the above investments.

2.1.3. Evidence of Failure: Dysfunctionalities and Mutual Blame

In 2018, following periods of heavy rainfall, residents of metropolitan Beirut witnessed unprecedented flooding of streets with sewer discharge water. Such incidents had been occurring for several years, but recently increased in severity and damage inflicted on roads and private property (Aljoumhouria, 2018). Additionally, wastewater has been increasingly being discharged across the seashore, contaminating beaches and disrupting residents' activities (Berjawi, 2016). What marks this situation, however, is

one point in common across the majority of news releases reporting the incidents: whenever interviewed, every single representative of public authority or body related to wastewater services, blames the other (Berjawi, 2016 and NAHNOO, 2018). This atmosphere of mutual blame harshly characterizes public communications surrounding inquiries on the wastewater crises occurring across Beirut and its suburbs. Tracking the plethora of accusations communicated throughout the years nothing but increases confusion and questions on who to blame.

2.2. A Zoom into the Network: Multiple Municipal Zones and Legal Statuses

2.2.1. Network Profile across Municipal Administrative Zones

The wastewater network spans three main municipal administrative zones: Beirut, Beirut southern suburbs, and Choueifat.

In municipal Beirut, the sewer network serves a population estimated at over 200,000 inhabitants, which includes the neighborhoods of Raoucheh, Mazraa, and Ramlet El Bayda (ESIA, 2012). These neighborhoods are relatively dense middle-income districts that have witnessed important development activities over the past decades. As high-rises have replaced the smaller apartment buildings and/or empty lands, urban density has increased the necessity of installing an infrastructure that can serve the districts appropriately. All these neighborhoods are developed legally and follow the guidelines of zoning and building regulations. Storm water pipes here are in the process of being separated from those of the sewer network, a project which has been gradually executed by the municipality of Beirut over the last ten years, according to the mayor of Beirut.¹ The revised project, the storm water discharge, has its own pipe system linked directly

¹ Interview held with a Beirut municipality representative in March 2021.

to the sea. Meanwhile, the sewer network is to be linked to the pumps and sent to the treatment plant in Choueifat.

In the southern suburbs of Beirut, according to the Impact Assessment study, the population amounts to over 310,000 inhabitants in the areas of Ghobeiry, Bourj El Barajneh, and Mreijeh-Tahwitah Al-Ghadir (ESIA, 2012). Here, building development is however considerably denser and building illegalities more common. Although municipalities have intended to separate the networks of sewer and storm water, the project has been slower in progress than that within municipal Beirut. The Southern Suburbs Municipalities Federation, SSMF, (the Beirut Southern Suburbs union of municipalities) has been working on separating stormwater from sewer pipes in a limited number of areas, according to a representative via interview.

As for Choueifat, population is estimated to be around 300,000. Stormwater and sewer networks are not separated (ESIA, 2012). The Al-Ghadir treatment plan is within the jurisdiction of this municipality, and wastewater from all zones is supposed to be directed towards it.

2.2.2. Informal Zones

Within the above jurisdictions, several informal areas exist marked by lack of proper wastewater network service provision. The informal settlements, or slums, are either refugee camps, mainly Palestinian camps, or informal squatted areas. Figure 2 shows the locations of the informal zones across the case study area.

According to Fawaz and Peillen (2002), urban slums in Beirut are classified as either:

(i) Slums that began as international refugee camps or low-income housing areas for international refugees (1920-1955), (ii) Slums that began as housing areas for rural-

urban migrants (1950s-1960s), or (iii) Slums that began as squatter settlements during the period of the civil war (1975-1990). Palestinian camps shown on the map belong to the first category, instituted around 1948 and recognized by the United Nations. The Palestinian camp within municipal Beirut is Mar Elias, while that in Ghobeiry is Sabra-Shatila, and the third one is the Bourj El Barajneh camp. Generally, sewer networks in these camps were installed by the residents in the 1960s, but are no longer sufficient and have been poorly maintained since the 80s (Fawaz and Peillen 2002). International organizations have intervened to improve wastewater infrastructure conditions and connections, but its state remains dilapidated (UNDP, 2014).

Among the slums that began as housing areas for rural-urban migrants are Wata El-Musaytbeh (within municipal Beirut), Ouzaii, Jnah, and Horsh El-Qateel (Ghobeiry), Bourj El Barajneh, Raml/Raml A'li (Bourj), and Hayy El Sellom/Laylaki (Choeuifat). Many of these slums have also extended to host migrants at the onset of the civil war, becoming third category, such as Ouzaii and Raml. These areas at first mostly hosted migrants from South Lebanon and Bekaa, but now also host Palestinian and Syrian refugees, as well as migrant workers from other nationalities. No official population count has been carried out for the areas, but the Ouzaii holds around 43,000 inhabitants and the Sabra area between 20,000 to 25,000 inhabitants (Yassine et al., 2021; Baaklini, 2020). Inhabitants have constructed their own sewer systems and linked them to main municipal wastewater collection lines (UNDP, 2014). Parts of Ouzaii residences discharge directly to the sea also through self-built pipes (Lebanese Republic, Ministry of Environment, 2020).

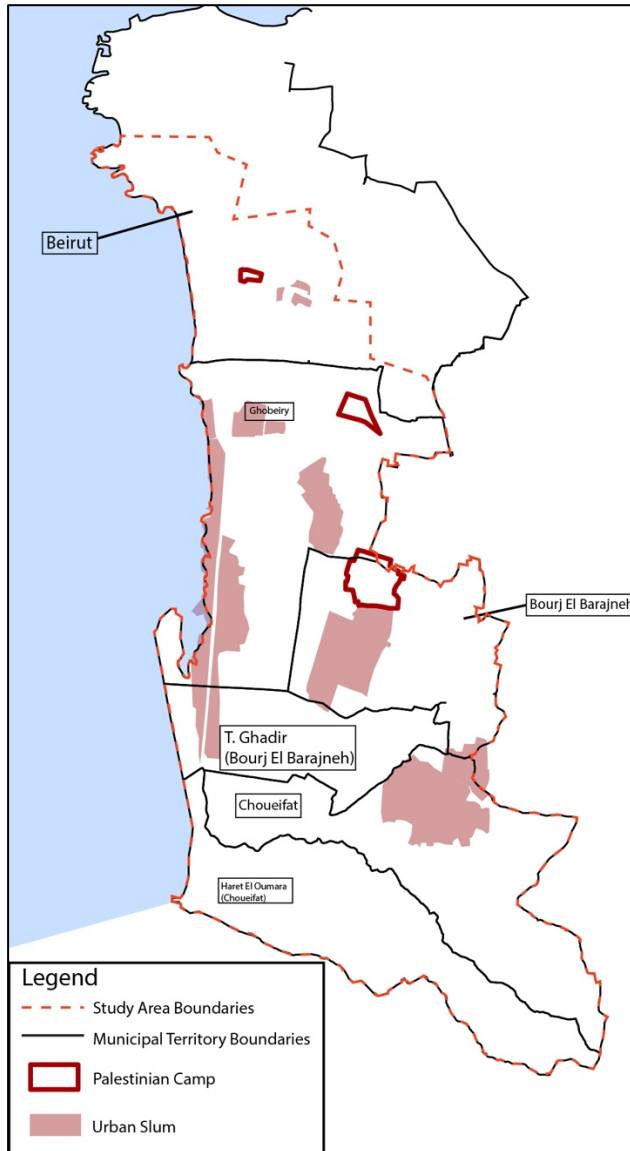


Figure 2 Informal Areas within Case Study Area

Source: Author, with elements adapted from Beirut Urban Lab, AUB

2.3. Multiple Stakeholders Involved in Governance

There is a cluster of public institutions whose authorities overlap and intersect, also with private and international actors, in the design and management of the waste water network under study.

The CDR is the main public agency entrusted with the procurement, design follow-up, and implementation of the project. Prior to 1992, there was no official legislation concerned with defining responsibility of the management of wastewater activities, as municipalities, along with the Ministry of Energy and Water and the Ministry of the Environment, the latter being responsible for setting standards, were in charge of handling wastewater discharge (CDR, 2018). In 1992, the Council for Development and Reconstruction (CDR) was assigned as the institution in charge of the wastewater sector instead of the two ministries, according to CDR publications (CDR, 2018). The CDR has been the entity responsible for the implementation of public infrastructure projects, mainly through securing funds, most of which are loans from international banks such as the European Investment Bank and the Japan Bank for International Cooperation. Funding is also provided by the Lebanese government or donated by international aid agencies and governments.

Also involved are service agencies. In 2001, four regional water establishments (RWEs) were assigned under the guidance of the Ministry of Energy and Water, each to operate with financial and administrative autonomy in a different geographical region in the country. The RWEs are concerned with setting tariffs for water services and providing technical support for water projects (ESIA, 2012). The Al-Ghadir wastewater treatment plant (WWTP) falls within the boundaries of Beirut and its suburbs water service areas. The Beirut and Mount Lebanon Water Establishment (BMLWE) is therefore the regional water establishment in charge of the Al-Ghadir wastewater network.

Other actors involved are local municipal authorities who have jurisdiction over the territories in which the services are provided. These include elected representatives,

namely the municipalities who can operate either on their own or in unions. At the sub-national level, each municipality is in charge of all projects benefiting the community within its area of jurisdiction, mainly the combined drainage and sewer network in the wastewater sector (World Bank, 2011). In addition, municipalities report to governors, which in the case of Beirut hold exceptionally all executive power over the city.

Therefore, for the case study area on hand, the following institutions, organized in an organigram, are involved in governing the system:

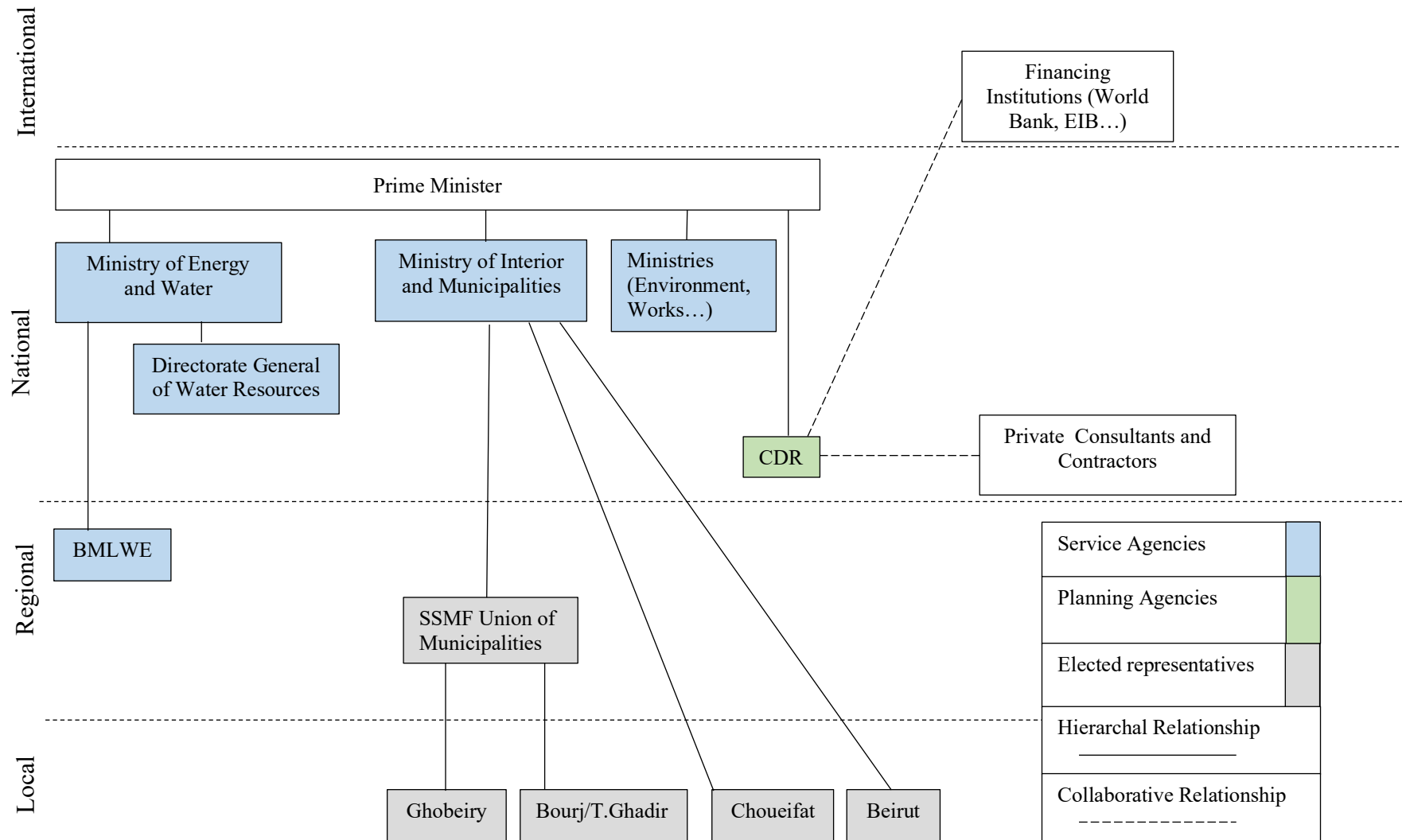


Figure 3 Stakeholders Governing the Wastewater Network

Source: Author

2.4. Regulations Organizing the Work of Public Institutions

In this section, I outline the regulations dictating the authority of the above institutions. Regulations are formulated through laws defining the jurisdiction, responsibilities, and authorities of various institutions. This section lists the influential laws and highlights, within their texts, what is relevant to wastewater service delivery. It is noteworthy that rather than an integrated regulatory framework that approaches the wastewater sector as one system, the regulations typically define each the authority and jurisdiction of one agency. Only one regulation seeks to coordinate among them, and as seen below, it remains unclear.

2.4.1. Law 221/2000: Jurisdictions in the Water Sector

Today, the main law directly concerned with the water sector is Law 221, enacted in the year 2000, which, despite being a sector-regulating law, defines the roles and responsibilities of mainly two actors within the sector, and has not been applied to date. The goals of this law, as dictated in its text, is twofold: (i) environmental preservation through protection and (ii) proper management of water resources.

Law 221/2000 assigns duties for the management and preservation of water resources to two public bodies: the Ministry of Energy and Water (MEW) and the regional water establishments (WEs). The MEW is a central government authority operative on the state as a whole, the regional the water establishment concerned with the study area is the Beirut and Mount Lebanon Water Establishment (BMLWE). The law clearly separates between policy-making and service provision, evident through the responsibilities of the two public institutions. Particularly related to wastewater sector functions, the MEW is responsible for all planning of wastewater related projects. The

ministry is assigned the role of drafting and updating the masterplan for wastewater management activities. This plan is championed by the MEW and approved by the Council of Ministers as a national policy.

Each regional water establishment is responsible for the planning, implementation, and maintenance of wastewater projects according to the masterplan set by the ministry within its geographic area. It is also responsible for setting tariffs for wastewater discharge services and quality control on outfalls.

2.4.2. Decree 14597/2005: The BMLWE and Users

Following up on the water law, decree 14597/ 2005 defines the relationship between BMLWE and the users of water and wastewater networks. In terms of wastewater functions, the establishment specifies and classifies zones that will be connected to the wastewater network and those that will not according to the masterplan and standards set by the MEW. In zones that will be connected, the establishment connects discharge pipes to collector pipes and onto treatment and final discharge locations. The decree sets the necessary administrative procedures for users to connect to the wastewater grid and tariffing mechanism. The main necessary document a potential user needs to connect to the wastewater network is a property ownership or rental document. Being connected to the public wastewater network is a precursor for access to the public potable water network.

2.4.3. CDR Decree 5/1977: The Council for Development and Reconstruction

The CDR, established through a 1977 decree (and later enacted in a 1991 law, the Council for Development and Reconstruction is an independent entity which

communicates directly with the council of ministers through the prime minister. The CDR enjoys financial and administrative autonomy and authority. It is responsible for development projects and large scale public works, through creating general plans, suggesting draft laws and studies, consultancy and liaison between the government and international entities, especially international funding agencies, and communicating project information to public entities, municipalities, and other concerned private or public entities. The CDR also has within its powers and responsibilities the preparation of feasibility studies and project execution through any public or private entity that it chooses. All these activities are to be held out with the approval of the Council of Ministers and through correspondence with all concerned public parties such as ministries and municipalities. The CDR is funded directly through the state and through loans, which the CDR has the right to take from any public or private institution it chooses, with approval from the prime minister.

2.4.4. Municipal Act 118/1977

Also in 1977, the municipal act was first introduced through decree-law 118. The law recognizes a municipality as a local administration within each village or city, which enjoys financial and administrative independence. The document details establishment mechanisms, organization structures, and municipalities' scope of work, as well as those of unions of municipalities. In terms of public works such as wastewater services, the text briefly mentions within municipalities' scope of work, "establishing... sewers, waste drainage and others", without detailing specific functions or elements of the wastewater system. The text also mentions supervision of public works and reporting on work progress to concerned administrations. The municipal

council's decisions are controlled by the district commissioner (Kaemakam), the governor (Mohafez), and the minister of interior, except for the case of the municipality of Beirut where it is only the minister of interior. Municipalities and municipal unions are funded through fees directly collected and others collected by the state on behalf of municipalities, as well as through financial aids, loans, and revenues of properties.

2.4.5. Decree 8633/2016: The Ministry of Environment

Decree 8633/2016 on environmental impact assessments requires approval from the Ministry of Environment for any project that could have adverse effects on the surrounding natural environment and the population. The execution of wastewater networks, in all cases, requires an initial environmental examination report to be submitted to the ministry, while the execution of treatment plants and sea outfalls for discharged wastewaters, by default, require an environmental impact assessment. The processes, for both documents, requires developers of projects to inform all concerned public entities of the project, including municipalities whose jurisdiction the project falls within. The municipality has to immediately inform residents of the intent to execute this project through proper clear and proper means of correspondence, and the public can give feedback to the Ministry of Environment, which in its turn communicates them to the project developer and takes them into consideration in the environmental impact assessment process necessary for granting approval for execution.

2.5. Strategies and Programs guiding Wastewater Projects in the Area

Through rehabilitation and development efforts throughout the years, several strategies and programs have been launched by the central government and international

entities to build and extend wastewater networks and treatment plants. Most of the programs to build new infrastructure were delegated to the CDR. These include the National Emergency Reconstruction Plan (NERP), a five-year plan focused on infrastructure projects launched by the Lebanese government at the end of the Lebanese civil war in 1990, which includes the rehabilitation of wastewater pipes (World Bank Group, 2013). Another national program was the Horizon 2000, later followed by Horizon 2005, under which multiple wastewater projects were introduced. The CDR also manages wastewater projects under two main programs it houses, the Coastal Pollution Protection Program, and the Water Resources Protection Program. For the wastewater network discharging to Al-Ghadir treatment plant, projects fall under the Coastal Pollution Protection Program (CDR, 2018).

Aside from developing this new infrastructure, the Lebanese government has developed a vision for how and where infrastructure should be developed. This was conducted through the Lebanese National masterplan (NPMPLT), approved in 2009. In its text, the Master Plan does not lay out detailed plans for wastewater networks nor specifically tackles wastewater projects. Rather, it recognizes challenges faced by the wastewater sector, and mainly pushes for prioritizing the completion of treatment plants close to groundwater over those on the coastline.

The Ministry of Energy and Water introduced the national water sector strategy first in 2010, then an updated document in 2020. Both plans push towards the MEW and RWE's taking control over wastewater service project planning and implementation.

As for international programs, the most notable is the Mediterranean Hot Spots Investment Programme (MeHSIP) which, funded by the EIB, provides technical and

financial support for projects in the environmental sector in the southern Mediterranean countries. The project falls within the large-scale Mediterranean de-pollution initiative by the European Union Horizon 2020 Program (EIB, 2021). The MeHSIP currently oversees the extension project of the Al-Ghadir drainage area.

CHAPTER 3

STRUCTURE OF GOVERNANCE: LACK OF COORDINATION ACROSS INSTITUTIONS

This chapter dissects the governance structure of network spanning the case study area. With the understanding that the governance context requires an understanding of the actors and the interaction between them, I use the Governance Assessment Tool developed by Bressers et.al. to study the governance context affecting the wastewater treatment policy. Building on the argument by de Boer (2013) that the governance context influences interactions between actors, and therefore is an indicator of the presence or absence of collaboration between them, I use the tool to uncover the dynamics of collaboration and coordination between the multiple institutions that govern the network. At the end of this chapter, the multiple facets of the governance structure explaining the failure of the governance of the wastewater network are revealed.

3.1. Application of the Governance Assessment Tool

This section shows the results generated from answering the questions organized in the GAT table I adapted for the case study area. To fill out the table, I used evidence from the data I acquired as outlined in the methodology section.

3.1.1. Results: The Five Dimensions

3.1.1.1. Levels and Scales:

Four scales of governance are concerned with wastewater projects: (i) international, (ii) national, (iii) regional, and (iv) local. As will be fleshed out in the ‘actors and networks’ section, the international and national levels are involved with planning and decisions, contrary to regional and local levels. As for coherence among them, the international level works mostly with the national, with low trust especially between national and local scales². The four levels do not agree on the issue of serving informal settlements, as institutions at the national scale criminalize it. Is it not possible to move up and down levels, as there is a lack of communication between the international/national and the regional/local³. In terms of management reform, not all levels are working towards it, as the international and national levels have continuously moved according to the same strategies, and other scales have responded to them, despite the continuous failure of service provision.

3.1.1.2. Actors and Networks:

As gathered from previous sections and throughout the interviews I held, a minority of public institutions are involved with wastewater service provision. For larger scale projects such as planning networks and treatment plants, the most involved is the CDR and international entities. The CDR is handling the planning and execution of wastewater system elements temporarily, according to its head of planning unit, as it

² As revealed throughout interviews I conducted with municipal representatives

³ This will be discussed in detail in subsequent sections.

is rather the responsibility of the regional water establishment⁴. BMLWE is not currently carrying substantial tasks related to service. A BMLWE representative stated that the CDR go ahead with projects without consulting with them (NAHNOO, 2018). Municipalities also feel they are not involved, as they often, according to them, have to work in an ad-hoc manner to serve issues in their localities. All municipalities complain that the central government is not doing its duties, the reason which they are obliged to implement temporary solutions, to which they are not receiving enough funds for from the central government itself, the Ministry of Interior and Municipalities specifically. Thus, it appears that despite the willingness of BMLWE to carry out its tasks as dictated by legal texts, the CDR still takes hold of planning and implementation projects.

The majority of actors report low interaction with other institutions. In addition to BMLWE complaints, both municipality of Beirut and SSMF representatives reported asking for additional funds from ministries to carry out repair projects but with no replies. A representative of the municipality of Choueifat reported that the CDR does not even agree to use maps of the area generated by municipality personnel, despite them being more accurate than the ones the CDR has⁵. He further complained about suggesting projects to the government and the CDR, but with no replies. Even municipalities within themselves, there is lack of coordination and communication on problem areas linking both. The representative of the municipality of Beirut reported the municipality having to separate stormwater from wastewater in many areas of Beirut, that of the SSMF reported it is still a problem in many areas that still needs to be solved⁶. Each of municipality representatives report working on their own areas and

⁴ Via an interview I conducted with a CDR representative in early 2021

⁵ NAHNOO press conference, 2018

⁶ through interviews conducted with both municipal representatives from October 2020 to March 2021

having nothing to do with the other. The CDR only communicates with the central government during project planning phases and with international consulting and funding agencies. Thus, there appears to be rifts between different actors and lack of stable structures for organization.

For this institutional arrangement, there is little way for institutions other than the CDR to be involved in the decision-making process. Decision makers often plan for development projects without consulting with residents nor regional or local public institutions, who are left to deal with flooding incidences and day-to-day failures by themselves. Actors are unable to form a coalition to push for reform, as each is working according to their own. The central government (MEW) has set a comprehensive water sector strategy (2020) that includes sections on legal and institutional reforms, mainly strengthening regional water establishments and communication between CDR and RWE's, and with municipalities. However, actions have not yet been taken to change the current situation. Municipalities have low impact on reform, as they try to communicate with residents and the central government, but oftentimes with little or no results.

3.1.1.3. Problem Perspectives and Goal Ambitions:

This dimension looks at how different entities perceive the problems the sector is facing, and what they envision what they are working for. According to the MEW, the main challenge facing the implementation of reform in the water sector, which encompasses wastewater services, is the lack of implementation of law 221. The main issue is the transfer of functions to regional water establishments. According to the national water sector strategy, water establishments are not yet empowered to act with full administrative and financial autonomy, as the legal text to organize the work of

MEW, has not been developed yet. In addition, it is also mentioned that they suffer from a shortage of funds and technical staff (MEW, 2020). According to the CDR, the main problems are incompetence of BMLWE, caused by shortages of staff and their inability to take on their roles, combined stormwater and sewer networks, and the need for more funding⁷. BMLWE's complaints are their lack of involvement and inability to form strong communication networks with ministries and the CDR⁸. Representatives of municipalities mentions combined sewer networks, but mostly lack of sufficient funding to fix failure issues and network upgrade demands . As we can see, problems are not unified across all actors.

None acknowledges servicing informal settlements, except for Dergham (Southern Suburbs Union of municipalities; SSMF), who claimed the union is working on projects to service them, during an interview I conducted. The representative of the municipality of Beirut mentioned it is not within their scope of work. There exists to be coherence between problem perspectives between the government and CDR, but not between them and local level municipalities. This appears to be an issue of scale, and the former institutions look at broader governance issues, while municipalities are concerned with local level performance issues.

As for goals, each institution is concerned within its scale and scope of work, for municipalities are each concerned with their respective areas of jurisdiction, with neither the willingness or ability for collaboration. In addition, no public institution talks about the importance of treatment; the ultimate goal is to get rid of wastewater, not to treat it, according to current courses of action, a sole goal which appears to be common between multiple actors.

⁷ Via an interview conducted with a CDR representative in early 2021

⁸ Via an interview conducted with a BMLWE representative in early 2021

3.1.1.4. Strategies and Instruments:

Looking at the strategies and instruments element and assessing it provides another pathway for better understanding the governance context. If tools used by the different actors are conflicting in any way, it is a clear indicator of lack of coordination across institutions. The central government, i.e. concerned ministries, work on the legal framework and publish strategies to guide the work of lower-tier public institutions. The CDR employs consultants and contractors through public private partnerships to plan for and execute projects. As the main project developer, the CDR is responsible for conducting initial and final environmental impact assessments, and also liaise with international entities, who in their turn also hire with private consultants and contractors as conditions for project funding approval. Water establishments rely on short term strategies that include broad provisions concerned with the wastewater system (BMLWE 2025 vision). Municipalities mostly work on small-scale projects, often ad-hoc practices to solve urgent issues in specific areas. According to the law and actors, instruments and strategies are missing, especially those that the BMLWE should acquire to be able to carry out its responsibilities.

The resulting system is not based on synergy, as there are overlaps in responsibilities, namely between those assigned to the CDR and those assigned to the BMLWE. The institutional arrangement provides the opportunity to combine and use different tools and policies but the actors do not do it or they do not have those choices.

3.1.1.5. Responsibilities and Resources:

Responsibilities are clearly assigned to each stakeholder as mandated by regulations, but overlaps in function and the improper application of the 221 law creates weakness in the implementation of the legal texts. The main hindrance, as proven

before, is the CDR taking responsibilities which should otherwise be assigned to the BMLWE, creating competence struggles.

In addition, institutions suffer from weak human and financial resources. Each of BMLWE and municipalities suffer from understaffing and underfunding, as it is the main complaint communicated during interviews and even in problems addressed by the National Water Sector Strategy (NWSS, 2020). In contrast, the CDR appears to be well funded both through government and international agencies and often works with private consultants and technical advisors to carry out projects. In terms of resources assigned, the BMLWE and municipalities, especially the former, are unable to step up to practice their responsibilities. Law 221, as well as the national water sector strategy, push for pooling the assigned responsibilities and resources, but the current practices go against them.

3.1.2. Assessment of the Qualities of the Governance Context

The table below, adapted from C. Casiano Flores et al. (2019), summarizes the evaluations of each of the qualities of the dimensions of the governance context. For each element, I based my conclusion on the answers to the questions in the GAT above, and labeled as restrictive, supportive, or neutral.

Table 3 Assessment of the Qualities of the Governance Regime

	Qualities of the Governance Regime			
	Extent	Coherence	Flexibility	Intensity
Levels & Scales	Neutral: Some of the levels feel involved	Neutral: The levels consider few multi-level issues exist, they report some trust issues	Restrictive: It is not possible to move up and down levels	Restrictive: The minority of levels are working to bring behavioral change or management reform
Actors & Networks	Restrictive: Few stakeholders feel involved	Restrictive: Institutions that promote interactions among actors are not operating. Actors report trust issues	Restrictive: The institutional arrangement restricts the inclusion of new actors, shift leadership and social capital creation	Restrictive: There is only one actor or none collision trying to create an impact in behavioral change or management reform
Problem Perspectives & Goal Ambitions	Restrictive: The actors consider that a minority of the perspectives are involved	Neutral: Most goals of the actors involved support each other ⁹	Neutral: It is possible that some aspects of the goals can be reassessed during the implementation process	Restrictive: The actors consider that major changes are required to achieve the intended goals
Strategies & Instruments	Neutral: According to the actors and the law some instruments or strategies are missing ¹⁰	Restrictive: The system does not allow the creation of synergy among the policy instruments and there are overlaps or conflicts among the instruments ¹¹	Restrictive: The institutional arrangement provides the opportunity to combine and use different instruments but the actors do not do it or they do not have those choices	Restrictive: The actors report that there is a major need of behavioral deviation from current practice and the instruments are facing important challenges during their implementation
Responsibilities and Resources	Neutral: Responsibilities are clearly assigned but not all have resources	Restrictive: The institutional arrangements do not promote cooperation within and across institutions.	Neutral: It is possible to pool partially some of the assigned responsibilities with effective accountability mechanisms in a pragmatic manner	Restrictive: The actors consider there is a lack of resources to comply the responsibilities to achieve the intended changes ⁹

As the table shows, the dominant assessment is the restrictiveness of the governance context towards the proper implementation of wastewater treatment policy.

Although this is already verified in the literature, this exercise uncovered the specific

⁹ Evident through strategies and programs

¹⁰ Specifically BMLWE and municipalities

¹¹ Especially between CDR and municipalities (discussed in previous section)

governance conditions underlying this failure. Therefore, looking at multiple elements in the table, it is verified that the governance structure prevents collaboration and cooperation between actors, leading to failure of wastewater treatment practices.

3.2. Building on the Results: A Governance Structure Impeding Service Delivery

3.2.1. Overlaps in Functions Generating Gaps in Delivery

The ‘actors and networks’ and ‘responsibilities’ and resources dimensions, also verified by regulations organizing wastewater management activities, reveal gaps and overlaps in functions of actors. Based on general knowledge of project processes, I extracted the main phases that lead to the completion and functioning of a wastewater system. Under each phase, the institution delegated this task is placed, shown in figure 4.

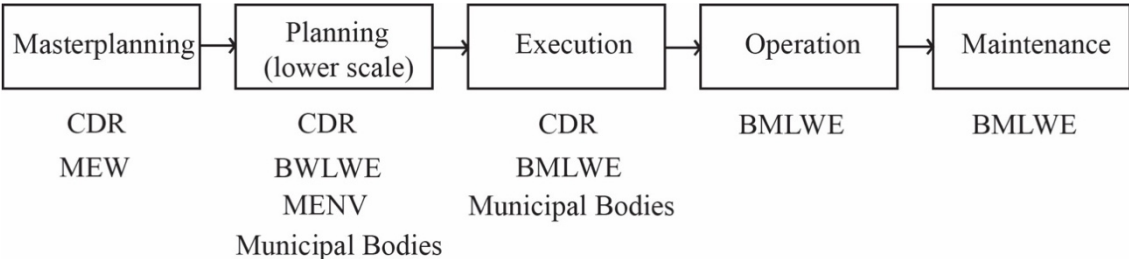


Figure 4 Institutions and Project Phases

Source: Author

As the whole process and the actors involved are visualized, several complications appear. First, there is an evident overlap in functions between institutions, especially during the planning and execution phases. This causes institutions taking over others’ responsibilities, weakening the latter, which in turn jeopardizes accountability and transparency (Bressers et.al., 2015). In this case, the

CDR is the institution taking hold of the planning and execution phases. Other institutions, namely the BMLWE and municipalities, are often left in the dark concerning project components, a situation confirmed throughout interviews with BMLWE and municipality representatives¹² (NAHNOO, 2018).

The resulting challenge is gaps generated in the functioning of certain phases due to overlaps in earlier phases. The overlaps mentioned earlier lead to the BMLWE being oblivious of the technical characteristics of certain projects, and when expected to take care of operation and maintenance (as shown in the figure), since it is a continuous process, falls short, and is often blamed¹³. It is also the case for municipalities who complain of the lack of access to project information from the CDR, information often needed for quick-fixes whenever a disasters occur¹⁴.

3.2.2. The CDR: A Tool for Political-Economic Power Sharing

Previous sections prove that the CDR enjoys access to resources and control over planning and execution of infrastructure projects, specifically wastewater. This is argued to be part of a power-sharing arrangement that dominant sectarian elites have created in order to balance the access to gains, or “rents” generated from public infrastructure projects (Atallah et.al., 2021). The weakening of other public institutions in favor of the CDR is argued to be intentional, as the CDR becomes the entity replacing the state and dominating the governance structure.

¹² This was mentioned by a representative in a press conference (2018) and later confirmed through an interview I conducted (2021).

¹³ As confirmed by interviews I held with a BMLWE representative and a CDR representative who stated that the BMLWE are “incapable” of doing the work

¹⁴ Via interviews I held with municipal representatives

Therefore, the functioning of wastewater projects is further impeded by power-sharing dynamics that manipulate institutions to serve political elites, turning wastewater projects and the citizens who should be serviced into the victims of practices that further create fragmentation and lack of collaboration.

3.3. Conclusion

Throughout this chapter, the evaluation of the institutional structure of the wastewater system was carried out through the governance assessment tool (GAT) developed by Bressers et.al. The main goal behind using that tool was to prove the lack of collaboration and coordination among the different actors governing the system. In addition, the facets underlying this lack coordination were examined. Therefore, the structure of governance is at the core of the wastewater network failure, evident through the lack of coordination across public institutions, which ultimately generates resistance to the implementation of wastewater projects.

CHAPTER 4

GEOGRAPHIES OF THE NETWORK: DIVISIONS IMPEDING SERVICE DELIVERY

In attempting to understand the difficulty and challenges that underlie the functioning of the wastewater system, I dive in this chapter into the multiple geographical units of the terrain over which the system spans. I unravel four different modes of spatial organization, each of which generates distinct geographic areas that the sewer system passes through. These four geographies are: (i) designed drainage zones, (ii) municipal administrative boundaries, (iii) political territories, and (iv) formal and informal urban areas. I outline each of these geographies and show how they constitute multiple overlapping ways of reading territorial divisions. At the end of the chapter, a complete picture illustrating the governance of the wastewater system is revealed, and the different divides characterizing the study area are proven to be precursors to service delivery failure.

4.1. Geographic Drainage Zones

A first set of geographic divisions organizes the study areas into drainage zones, units in which sewer is collected and channeled to the main line along the coast and then towards the treatment plants. These drainage zones were defined by the consulting offices (BTD, Bureau Technique pour le Développement), a Lebanese private consulting firm hired by the Council for Development and Reconstruction, and WS Atkins/LDK, an international firm, hired by the European Investment Bank in 2009. These firms were hired as expert consultants for projects under the Mediterranean Hot Spots Investment Program , which includes projects developing wastewater treatment

plants and sewer networks connecting to them, one of which is the Al-Ghadir plant. The project falls within the large-scale Mediterranean de-pollution initiative by the European Union Horizon 2020 Program, funded by the European Investment Bank (MeHSIP-PPIF, 2009).

Historically, wastewater networks are built whenever there is a sufficient concentration of population and/or economic activity in an area to require wastewater to be directed to a point of discharge or treatment (EC, 2007). Conventional wastewater sewer lines are set to transfer discharge along the force of gravity (EUREAU, 2020), which means that topography plays a big role in how the network is built. Pumping sewer lines are also integrated within the system to help combat gravity when needed.

Wastewater systems are divided into drainage zones, areas or units in which wastewater is collected and channeled to treatment plants. Several technical aspects determine these zones, such as the size and density of the population, but topography is a critical factor as drainage relies mostly on topography. Wastewater is collected in a corresponding area, at one point or line, and directed to another.

4.1.1. Study Area Network and Flow Lines

The map in **Error! Reference source not found.** is adapted from a map published by CDR. The map shows the wastewater network that spans across southern Beirut and the city's southern suburbs', as bounded by the Al-Ghadir pre-treatment plant service area (CDR et al, 2013). The Al-Ghadir pre-treatment service area limits were delineated following the extension plan for the plant and service area as part of the Horizon 2020 Mediterranean Hotspots program. The map also shows the case study

area and the network lines as surveyed in 2013¹⁵. It includes the pumping stations and the locations of sea overflows. I counted a minimum of 8 sea overflows along the study area, part of the 54 that span across the Lebanese coast (Lebanese Republic, 2020). The network includes gravity lines and a number of pumping lines that transfer the wastewater first to the coast and then drain it along the coast to channel it to the Al-Ghadir Treatment Plant.



Figure 5 Study Area Existing Wastewater Network, Source: Author

¹⁵ The 2020 water sector strategy by the MEW includes a limited number of proposed sewer lines for the study area (NWSS, 2020).

The second map (Figure 6) shows the drainage zones dividing the study area. Drainage zones were defined according to topography within the larger service area.



Figure 6 Study Area Wastewater Network with Drainage Zones , Source: Author

As for the following map (figure 7), it shows the directions of sewer flow within the study area. I drafted these flow lines according to drainage zone placement and the sewer line drainage directions shown within the project report map. The vertical flow line in bold along the coastline is not currently fully operational, as most of the

wastewater is discharged through the multiple sea outfalls shown in figures 5 and 6 (arrowhead locations in figure 7).



Figure 7 Drainage Zones and Generated Flow Lines, Source: Author

4.1.2. Dysfunctionalities within the System

The maps show the directions along which sewer drainage flows throughout the study area. The way the system currently functions is characterized by the discharge of untreated wastewater through the multiple sea outfalls, with a fraction of wastewater directed to the Al-Ghadir treatment plant. The way it was designed, however, was to direct all service area wastewater along the coast towards the treatment plant. The functioning of this system as designed has been impeded by several dysfunctionalities. One is the fact that the two pumping stations (see figure 1) are un-operational¹⁶. In addition, while the sewer lines are designed to carry only wastewater, they currently also carry storm water, overloading the system during heavy rainfall (NAHNOO, 2019). The maps, therefore, show us how the system was designed and how it is currently operational. They reveal the first layer of disruption to the system caused by technical failures and noncompliance to the original design.

Subsequent sections show how this system, as produced, is further challenged through the presence of additional ruptured spatial organization systems, the first of which is municipal administrative boundaries.

4.2. Municipal Administrative Boundaries

A second set of geographic divisions organizes the area in municipal districts. These divisions reflect the administrative organization of the area into municipal districts discussed in previous chapters. These are: Municipal Beirut, several municipalities in the Southern Suburbs of Beirut, also forming the Southern Suburb

¹⁶ Works for building the stations were never completed.

Municipalities Federation (SSMF), a union of municipalities, and the Municipality of Choueifat. Each of these bodies reports separately to an appointed district governor ((in Arabic, Muhafiz), and there are three governors who don't necessarily coordinate their jurisdiction. Rather, each reports again to the Ministry of Interior, a step that centralizes the process of decision-making.

4.2.1. Wastewater Network within Municipal Boundaries

The maps below (figures 8& 9) show the wastewater system and elements as presented in the previous section vis-à-vis municipal administrative boundaries¹⁷. The first map (Figure 8) shows municipal limits encompassing the existing wastewater network, while the second (Figure 9) shows municipal limits alongside drainage zone limits. The third map (figure 10) shows the boundaries layered with the schematization of wastewater flow. This map is particularly revealing because it shows that municipal districts and drainage zones are not aligned. Instead, following the topography and density, drainage zones span areas that go over two municipal districts although these zones are administered by different municipalities. Given that it is municipal authorities that are tasked with the maintenance and operation of the sewer network, this division may generate unforeseen problems.

¹⁷ Ghobeiry, Bourj El Barajneh, and T. Ghadir (Bourj) are part of the Southern Suburb Municipalities Federation (SSMF).

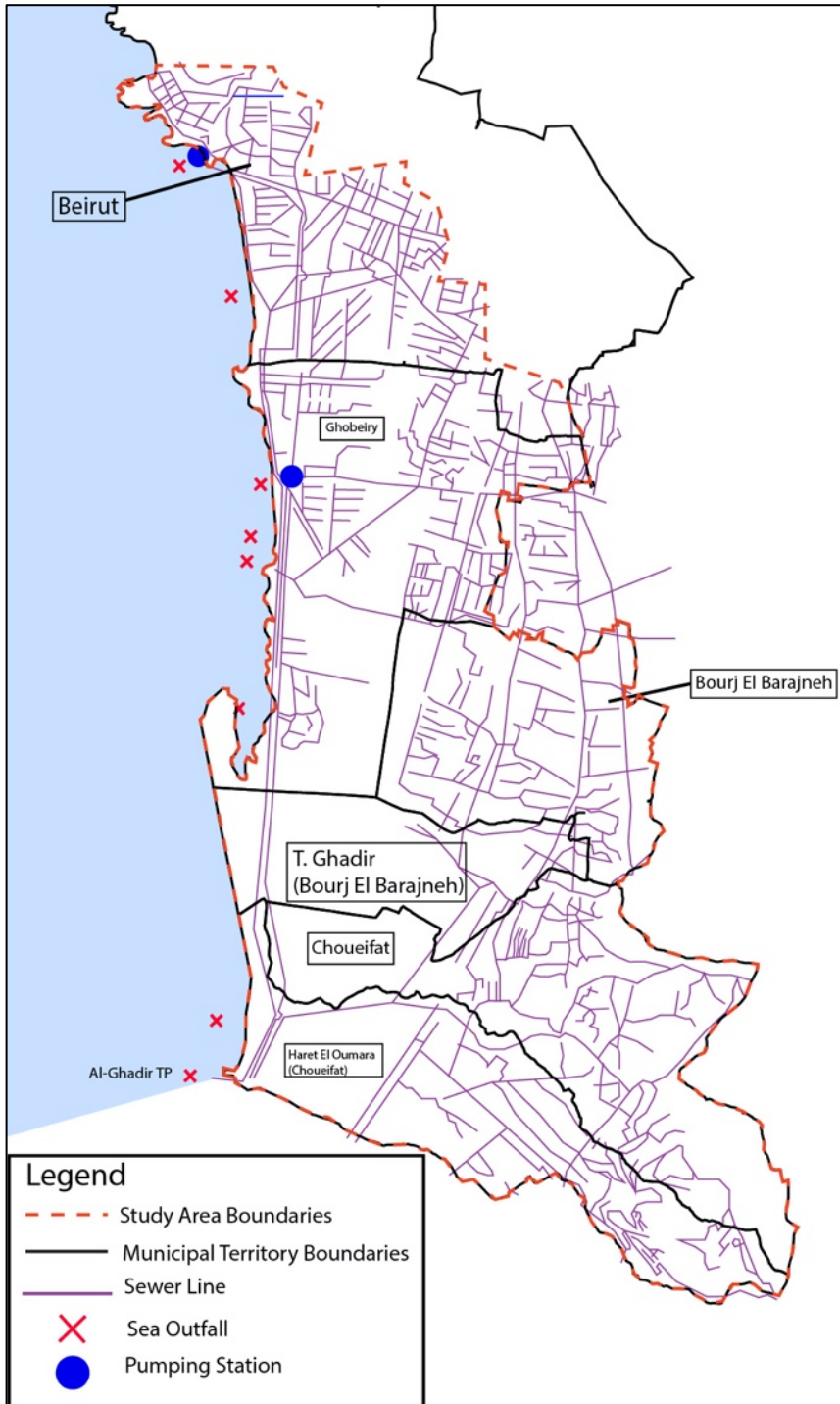


Figure 8 Wastewater Network and Municipal Administrative Boundaries
Source: Author

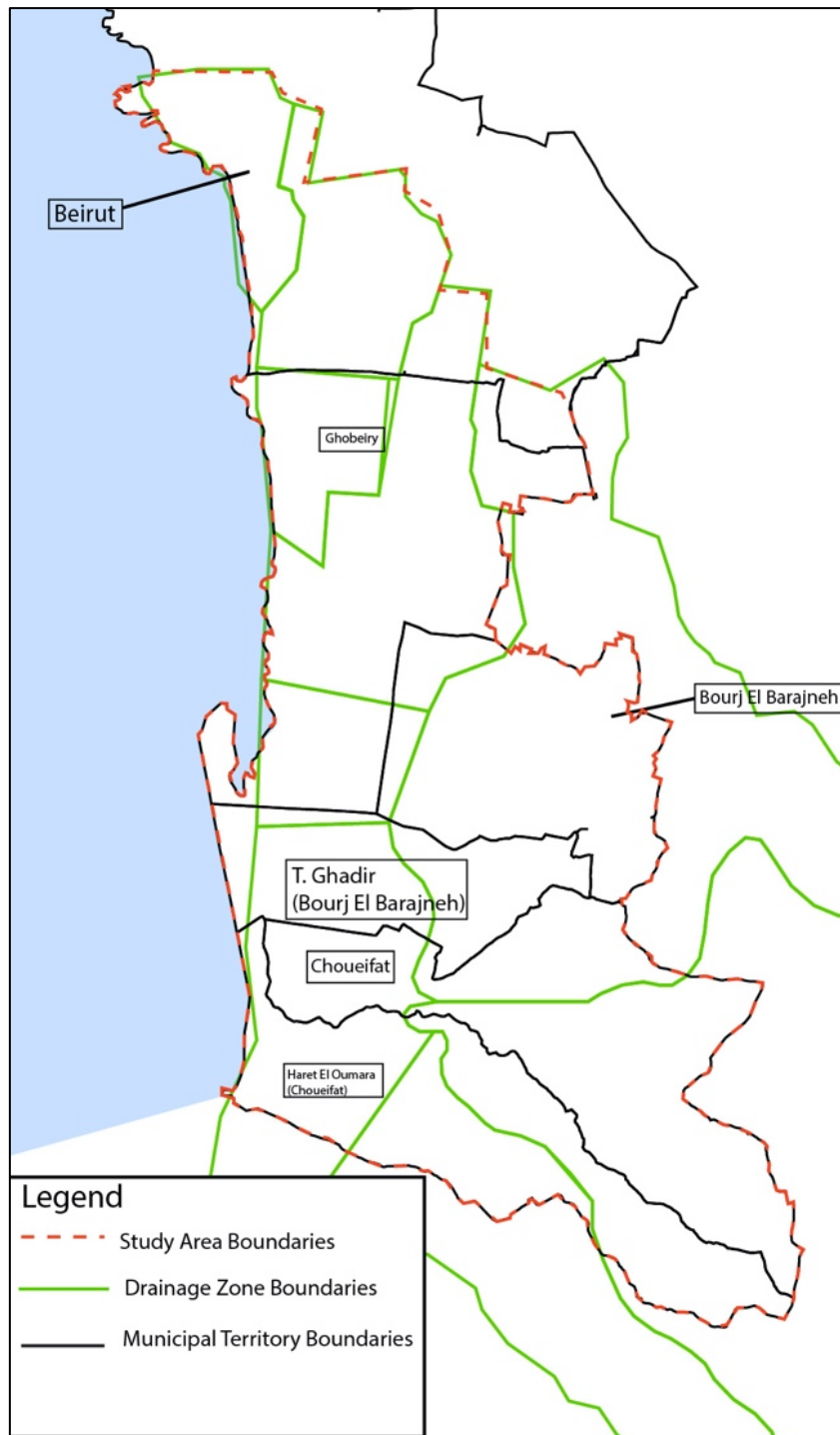


Figure 9 Drainage Zones and Municipal Administrative Boundaries
Source: Author

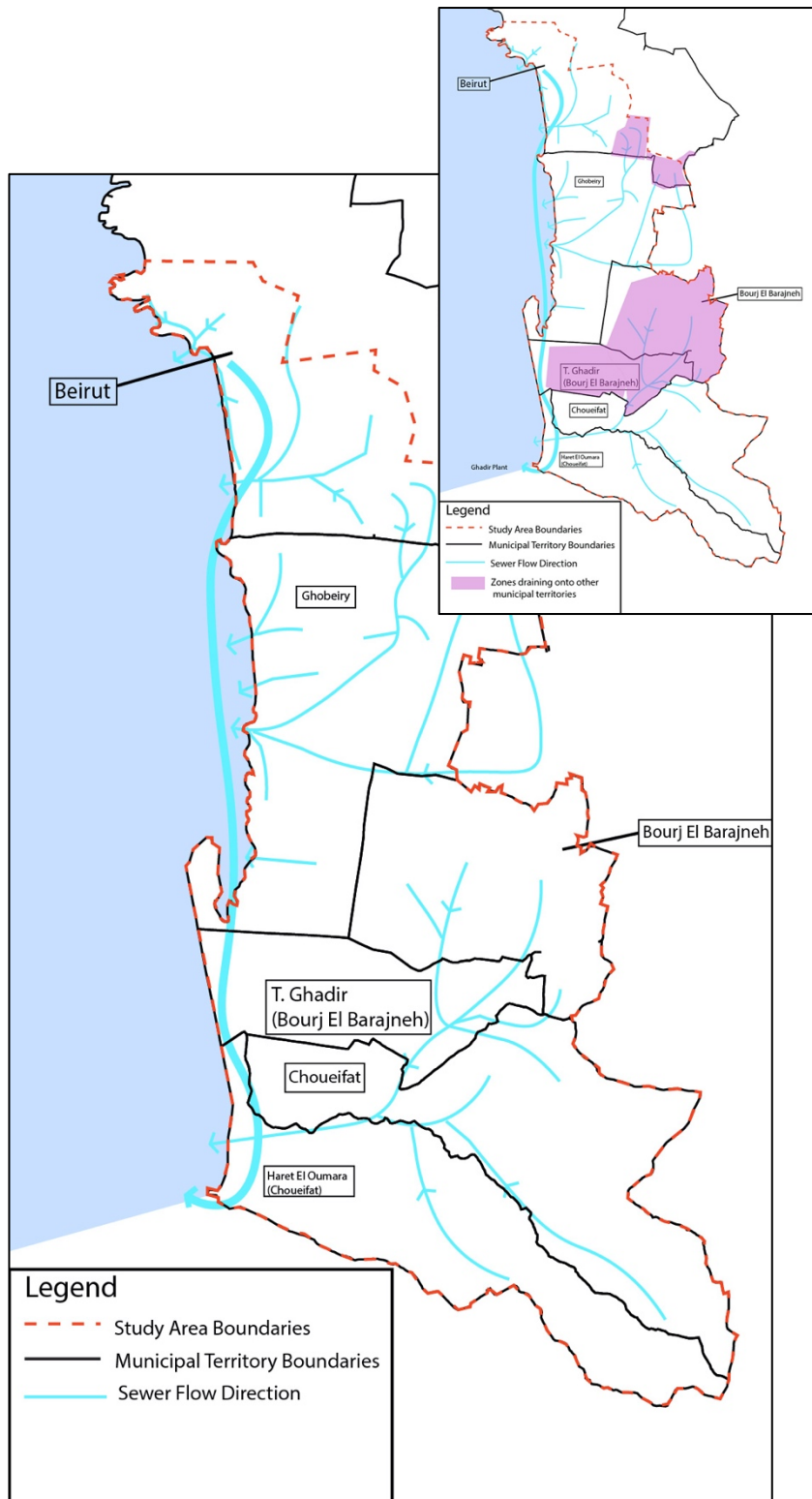


Figure 10 Sewer Flow between Municipal Districts

Source: Author

Looking closely at the maps, we find that areas that fall within the municipality of Beirut drain onto areas of Ghobeiry. Similarly, sewers effluent from areas in Bourj El Barajneh pass through Choueifat. These areas-draining onto areas of other municipalities- are highlighted in the adjoining figure (figure 10).

This flow of sewer into other municipal districts is clearly a concern to interviewed public representatives, as reflected in their public discourse and in the interviews I conducted. Southern Suburb Municipalities Federation Municipalities (SSMF) representatives (also representing the Ghobeiry Municipality) repeatedly mention how pipes within the Dahiya jurisdiction are taking in sewers from areas within the Beirut municipality. The head of the SSMF had also mentioned how the “problem is being moved from one place to another” through the connected wastewater network, alluding to municipal Beirut (interview, 2021; NAHNOO, 2019). Similarly, in another 2018 press release at the sight of flooding pipes within Beirut and throughout interviews I held, the head of the Beirut municipality blamed the disfunction of the Al-Ghadir TP, stressing that it is not within the boundaries of Beirut and therefore not his responsibility (NAHNOO, 2018) . Likewise, representatives from the Municipality of Choueifat also blamed wastewater coming in from “other areas”, although they mentioned having problems within their areas too (NAHNOO, 2019). Both municipal entities have also complained about the CDR withholding data concerning wastewater networks in their areas from them. This raises questions about the feasibility of letting each municipality take hold of its own area, given the tendencies for wastewater systems to overflow, especially during early winter rainfall and the presence of combined system overflows that hold both sewer and rainwater (EPA, 2017), within an already dilapidating system.

4.2.2. Weakened Municipalities Governing the Network

The current functioning of the wastewater network is reliant on ad-hoc practices by municipalities, each governing the part of the system falling under its jurisdiction. For example, as I have gathered throughout the interviews, the municipality of Beirut had installed sea outfalls to direct wastewater to its seashores due to the failure of pumping stations that direct to the treatment plant. The municipality of Ghobeiry is drawing up its own plans of the wastewater network to try to solve some of the issues it is facing. At the same time, the CDR, backed up by international and private consulting entities, is publishing plans and projects that do not completely come to fruition. As the previous section has shown, the physical characteristics of the wastewater network, and the fact that wastewater from the whole area is supposed to discharge to one point, the Al-Ghadir plant, require a unified –or at least closely coordinated- management approach. The fragmentation in operation of the network according to municipal districts, each devising its own quick-fixes, is a major factor causing wastewater network dysfunctionality.

This fragmentation is the result of multiple municipalities trying to manage one unified system without an integrated framework. The multiplicity of municipal administrative actors is argued to be an excessive form of decentralization, closer to “fragmentation”, where the multiple actors- municipalities- are forced to act on their own and mobilize their limited resources to cover up for shortcomings of the central state (DRI, 2017). Therefore, municipalities suffer from fragmentation as well as insufficient resources and administrative power to handle the tasks they are obliged with. As a result, the municipality is weakened as an administrative entity, in a place where, in the case of the wastewater network, a more regional entity (BMLWE) or even

the central government should take action. This weakening of the functioning of municipalities is argued to be intentional (DRI, 2017), a way to instead strengthen the central government and its political parties through rendering municipalities reliant on their links to these parties. This brings us to the next section of its chapter, which highlights the political territorialities that govern the wastewater network in the case study area.

4.3. The Political Territorial Divide

A third set of geographic divisions recognizes the area as divided into political territories. Elected through the municipal electoral system and process, municipalities in Lebanon are politically affiliated, as elected municipal representatives are members of political parties (DRI, 2017) and run on their tickets. The Dahiya Union of Municipalities, encompassing the municipalities of Ghobeiry and Bourj El Barajneh in this case study, is closely linked to Hezbollah's institutions, and often uses ties through the political parties' ministers to facilitate its work (LCPS, 2015). Similarly, the current municipalities of Beirut and Choueifat are tied to the Future Movement and PSP respectively.

4.3.1. Wastewater Flow between Political Territories

Figure 11 shows the electoral forces behind municipalities, indicating the respective political party affiliations. It also builds on the flow map generated earlier to show dynamics between territories controlled by different political parties.

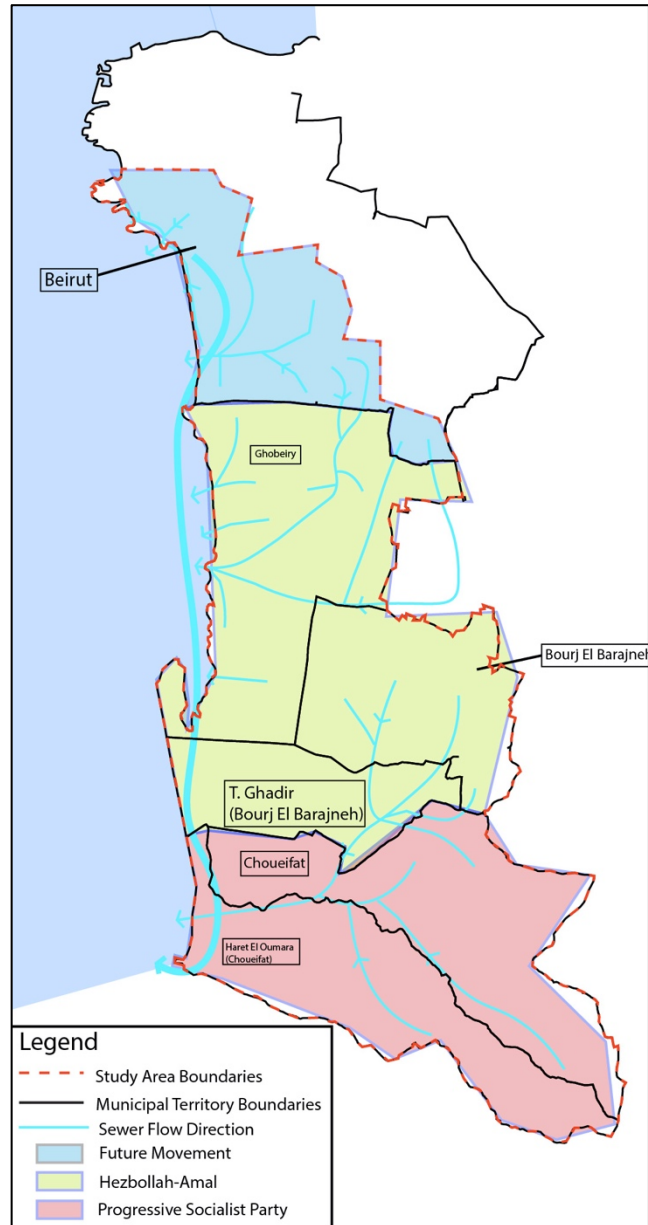


Figure 11 Political Parties Areas of Influence

As Figure 11 shows, the wastewater system requires wastewater to be directed from areas under administrations affiliated with the Future Movement onto those under administrations affiliated with Hezbollah-Amal. It is evident that the tensions discussed above, when describing the overlap of municipal and drainage zones, hence reflect political tensions where the continuity of the network becomes a forced cooperation

among actors who are otherwise political rivals. Conversely, overlaps within the Southern Suburbs of Beirut, albeit across municipal districts, would not generate similar problems. The same situation goes between the latter political affiliation and the Progressive Socialist Party. The tensions are reflected, first, in the narratives communicated by officials, and eventually in the functioning of the wastewater system. Between actors involved in wastewater services, evidence of political-sectarian tensions extend from those relating to tensions between municipal representatives and communicated in a similar manner, through a series of mutual blame and lack of coordination.

4.3.2. Reproduction of Political Territorial Divides

Hiba Bou Akar argues that infrastructure projects are a tool that political parties use in Lebanon for territorial conquest (Bou Akar, 2018). Bou Akar shows political parties negotiating the extension of roads and highways as a strategy to expand their political territory. In doing so, Bou Akar extends several studies that have looked at the territorialization of Beirut (Harb, 2013), showing that the geography of the city is largely marked by the efforts of various political forces to hold and control populations. It is thus safe to assume that wastewater projects, advertised by the CDR and promised to municipalities and the public, are also the subject of political negotiation powerful political actors. As such, where the system flows, who is included/not, is not only a response to need but also the outcome of a delicate balance of power that the CDR, technically “outside” the game and yet negotiating with all actors, navigates in order to see through its projects. Conversely, the failure to execute these infrastructure projects creates an atmosphere of mutual blame among stakeholders within the wastewater

service system, dragging the service to the same dynamics that have characterized other projects in the post-civil war period. It renders the execution of projects impossible when each of the actors sees in the implementation of the project either a potential success story for a political rival, or an opportunity to capitalize and gain for its own constituency. Ultimately, projects require the collaboration of several political rivals, as in this case, when the rivals are unlikely to cooperate.

In sum, the sectarian-political tensions, evident throughout narratives shared by municipal representatives, impede proper service delivery as they undermine the possibility of cooperation. In turn, interrupted services and failed systems further fuel sectarian-political tensions, reinforcing the territorial divides.

4.4. The Formal and Informal Divide

The final layer added to the analysis reorganizes this territory into formal and informal areas. I classify under informal areas refugee camps (Palestinian), as well as numerous squatter settlements and areas of illegal land development along the city's south-western coast. These informal areas, like many scattered across the Lebanese territory, are a combination of low-income dilapidated neighborhoods that began as international refugee camps and migrant workers, starting with Palestinians in 1948, and others hosting rural-urban migrants fleeing poverty and violent conflicts during periods of civil war and Israeli wars, between 1975 and 1990 (Fawaz and Peillen, 2003). Nowadays, these neighborhoods host several groups of vulnerable populations including Palestinian and Syrian refugees, migrant workers, and low-income Lebanese households.

4.4.1. Informal Areas within the Wastewater Network

The map below (figure 12) shows the sites of “informality” within the study area wastewater network. Those within municipal Beirut’s jurisdiction are the Mar Elias Palestinian refugee Camp and the Wata Mouseitbeh informal settlement. Those under the SSMF’s are: in Ghobeiry, the Sabra-Shatila Palestinian Camp and the Jnah and Ouzai informalities along the coastline, Jnah-Hay El Zahra, Bir Hassan, and Horsh El Qateel, in Bourj El Barajneh, the Bourj Palestinian camp and Raml, Raml ElAli informal areas. The Choueifat municipal territories host the Hayy El Sellom and Laylaki settlements. The map makes it clear that the sewer system spans across both formal and informal areas. As it also shows, these areas are linked to the wastewater network, although this has happened progressively over time, through the combination of residents’ self-help practiced, international organization aid, and municipal decisions. However, sewer

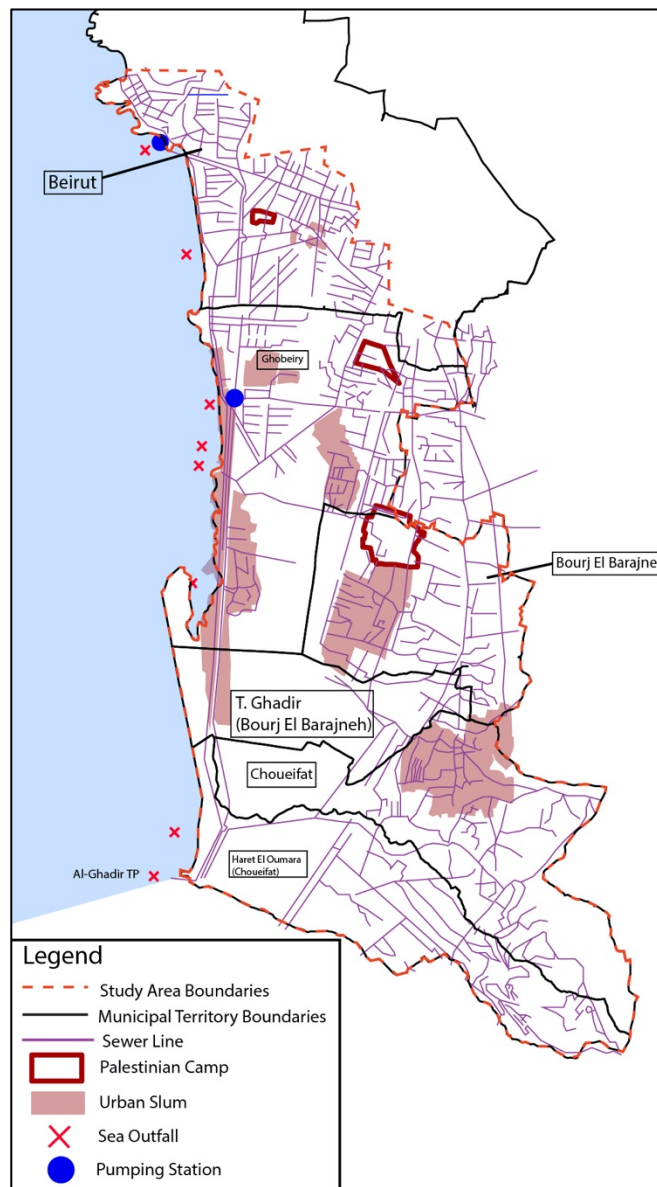


Figure 12 Informal Areas within Wastewater Network

network conditions in these areas are substandard, as residents often rely on their personal or collective efforts to repair damage in service infrastructure (UNDP, 2014).

There are important legal distinctions between the neighborhoods and the authority of municipal authorities to hook them up if they wish to do so. Palestinian refugee camps are considered “extra-territorial” and outside the jurisdiction of municipal authorities. Furthermore, neighborhoods that have developed through illegal land subdivisions are able to receive services through legal exceptions while those with illegal land occupation cannot. These challenges create important hurdles for public authorities and prevent them from hooking up neighborhoods and collecting service fees. Worse, consultants hired to design systems are often instructed to only serve “legal areas”, given the criminalization of others. Such decisions, however, are ill-thought since the combination of natural topography and illegal hook-ups eventually creates overflows.

Thus, municipal authorities recurrently point to these areas as “illegal” and consequently the source of the challenge –particularly when the challenge overlaps with topography. Representatives of the SSMF, when listing problems they are facing with the wastewater system, often mention the “Rihab” point (near the Sabra-Shatila Camp). This low point within Municipal Beirut collects the overflows of nearby areas, including refugee camps and informal settlements, and triggers regularly severe drainage problems in the area (NAHNOO conference, 2018 and interview, 2021). The area is being portrayed as a problem point, or a cause of problems. It is in fact a low area topographically, as the flow map (Figure 13) shows, but it also receives wastewater from other areas outside the informalities. Similarly, members of the Choueifat municipality also talk about capacity problems, given that the pipes and the system were

designed to cover only legal areas. At the forefront of their narrative, they mention informal settlements, describing “people who came from everywhere without planning”, and how the presence of these informal residents strains the system. However, they later mention how the same problems are being faced in other areas of Choueifat. Many of the narratives shared by local government actors appear to be a singling out informal settlements in their narratives as the main source of the problem.

4.4.2. Informal Areas: Victims on Multiple Levels

The reality is that all areas suffer from wastewater network failure problems. Wastewater network major mishaps faced at points near informal settlements are not caused only by wastewater effluent from these settlements, but from that effluent from other areas as well, under the jurisdictions of all municipalities

involved. Problems surface more clearly in these areas because of the lack of maintenance and rehabilitation of networks in them (UNDP, 2014). In fact, residents of informal settlements are among the most vulnerable population in terms of harm generated from wastewater discharges.

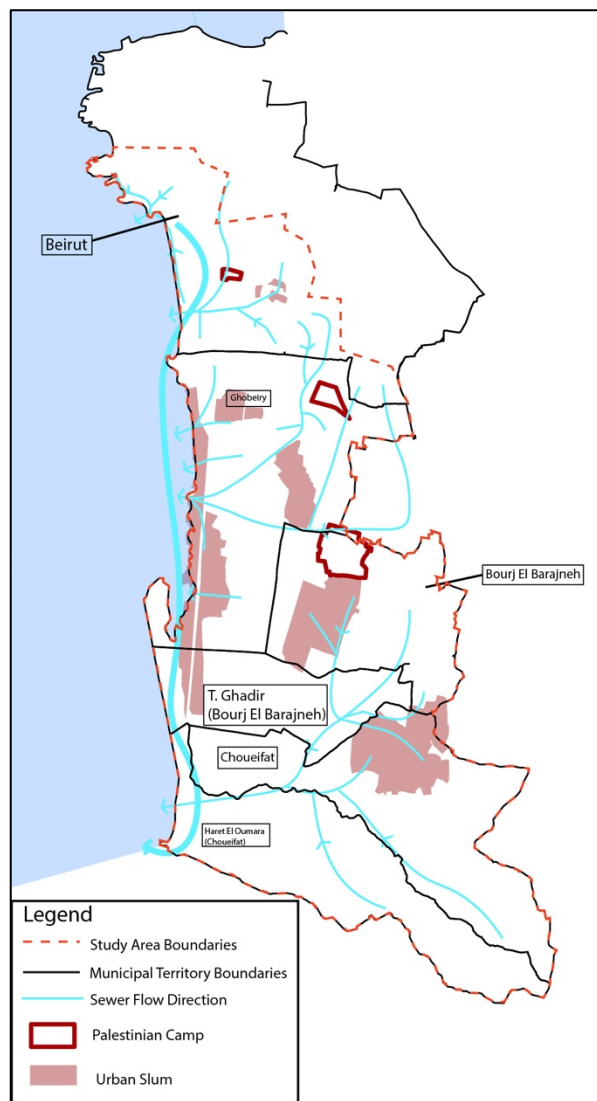


Figure 13 Informal Areas and Wastewater Flow Lines

Four of the eight sea outfall pipes (see figure 13) along the coastline, discharge wastewater through pipes which, according to the 2020 State of Environment Report produced by the UNHCR, UNDP, UNICEF, and the Lebanese Ministry of Environment, are not long enough through the sea to discharge wastes away from the nearby population.

This exposes these communities to major risks related to public health and proper livelihoods. In sum, not only do residents of informal settlements suffer from poor service delivery and risks to public health, but they are also the ones taking the blame -being criminalized-for adding pressure to the network while being constantly reminded that they should be glad to be connected to municipal sewer networks.

4.5. Conclusion

Each of the four geographies discussed presents a set of complexities challenging the proper functioning of the wastewater network. Looking at these geographies against one another, there appears to be dissonances between the technical design of the network-how it is supposed to be built- and the other spatial divisions that characterize the area. Therefore, we can assert that the fragmentation of the capital city into numerous municipal districts makes it harder to govern the wastewater network. Divisions into municipal districts, that also ties with political-sectarian divides, produces conflicts that impede service delivery across territories, especially where informal settlements are present.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This chapter briefly reiterates the findings discussed throughout the previous chapters, then presents policy recommendations that respond to these findings. In developing my recommendations, I prioritize the right of all residents for an equitable access to urban services, as well as the importance of environmental preservation and the effects it has on public health.

5.1. Findings on the Failure of the Wastewater System

The wastewater network spanning the Southern Beirut area is a host for a series of urban service delivery failures affecting people's livelihoods, public health, and the natural environment. In this thesis, I aimed at uncovering the specific causes that explain why the wastewater system is failing despite massive investments. Employing the Governance Assessment Tool developed and presented by Bressers et.al. (2015) and mapping the network, I studied the governance context and the spatial organization of the wastewater network spanning the territory. My study revealed two main factors underlying the failure of the wastewater network: (i) the structure of governance, evident through the lack of coordination and collaboration across public institutions, and (ii) the spatial distribution of the service area into multiple geographies, marked by the division into numerous municipal districts, political-sectarian territories, and formal-informal areas, which also creates fragmentation in governance and defies coordination. Each of

these two factors results in a set of challenges that prevent the proper operation of the sector.

In many ways, this failure mirrors other infrastructure sectors. As discussed above, Verdeil (2019) has shown that the electricity sector has also received substantial investments but failed to improve its performance. Both sectors also generate alarming levels of pollution as a result their poor performance. One has triggered severe air pollution, the other pollutes directly underground water tables and the sea, rendering them unusable. There are however specificities to the sewer network that should be pointed out. First, while electricity can rely (even in urban contexts) on informal generation and individual solutions, the sewer network in urban areas requires a coordinated central solution and cannot operate outside it. Second, and more puzzling, the infrastructure for channeling the sewer was in place, unlike electricity, but the network was not operated. Given these circumstances, the thesis concludes with a set of recommendations for articulating a strategy to improve the performance of the sector. The thesis falls short of proposing that structure, given the limited time, and will only suggest broad lines that should be set in place.

5.2. Policy Recommendations: Towards a Wastewater System that Prioritizes Effective Service Delivery

Below are context-dependent policy recommendations that would combat the current challenges facing wastewater service delivery. These recommendations are supportive to each other and should be applied collectively in order to achieve targets. It is important to note that wastewater sector policies in urban areas requires a centrally coordinated infrastructure and cannot be solved through local interventions. Indeed, water sector systems are tied to natural land use restrictions that require operation at

more regional scales, which necessitates pushing towards multi-scalar modes of governance that balance between top-down and bottom-up approaches.

5.2.1. Identify a Single Public Agency to Strategize, Develop, Implement and Operate the Wastewater System

The chapter on governance revealed coordination issues resulting from multiple agencies handling different wastewater project phases. In the landscape of current agencies, I recommend that, as the agency reporting directly to the Ministry, the BMLWE be entrusted with the wastewater projects. This is a first step towards the proper application of law 221, and more importantly, eliminating gaps of knowledge the BMLWE suffers from. This would allow the water establishment to properly operate and maintain facilities. During first stages of policy reform, the ‘knowledge’ resource and involvement in discussions is as important than financial and human resources that are being focused on in current communications¹⁸.

5.2.2. Involve Municipalities to Make Use of Local Knowledge

Similarly, municipalities should be involved in discussions, especially that municipal entities possess local knowledge of the wastewater system and the problems it is facing. Municipalities should be allowed to weigh-in on neighborhood level needs, estimation of demand, and accurate as-built plans. This would result in data-driven solutions and projects in wastewater management. Also, this would create an environment where different municipalities operating at territories of project would meet and discuss simultaneously the issues they are facing, perhaps resulting in better communication and collaboration. Lat but not least, municipalities are aware, each

¹⁸ The national water sector strategy (NWSS, 2020)

within its jurisdiction, of the particularities of informal settlements and slums, and can therefore share this information throughout project planning phases. This would also provide an opportunity for involving residents themselves, as municipalities have opportunities to communicate with them, to bring in “lay knowledge”, which brings us to the next recommendation.

5.2.3. Reconsider Legal Restrictions Imposed on Residents of Informal Settlements

The law organizing the work of the BMLWE (Decree 14597/2005) excludes illegal settlements from the right to access wastewater services, as it specifies the need for an ownership or rental document. As showcased in the literature review, residents of informal settlements are using hybrid modes of formal and informal measures to secure access to wastewater networks. However, informal settlements are still not considered when large projects are planned for and executed, responding to the existing legal texts, which ultimately creates capacity problems as explained in chapter 4. I suggest a reconsideration of the “illegality” label of informal settlements when planning for urban service projects, especially water and wastewater, as including them would result in realistic calculations of demand and capacity.

5.2.4. Prioritize the Operation of Pumping Stations

The two pumping stations along the coastline are the main element of the system preventing wastewater from reaching the pre-treatment plant. Therefore, it is necessary that they operate. The BMLWE should mobilize the resources it has, and ask for assistance from the MEW, to assess and treat the issues preventing the stations from operating. This is of paramount importance, as redirecting wastewater from sea outfalls

towards the treatment plant would reduce the adversities borne by residents living and working near the seashores.

5.2.5. Push towards the Upgrade to Low-Emission, Fully-Functioning Treatment Plants

With the impacts of climate change threatening our environment, carbon neutral or low-emission treatment plants should be prioritized, as they are one of the major emitters of green house gases (Hughes et.al., 2021). This falls slightly behind the priority to install treatment plants that actually treat wastewater before discharging into the sea, but this suggestion is based on the current condition of the Al-Ghadir treatment plant. Since the plant is still a primary treatment plant, with a potential for functioning as a more advanced plant, development efforts should focus on simultaneously increasing the level of treatment while reducing harmful gas emissions.

5.3. Conclusion

This chapter presented context-dependent policy recommendations for wastewater service delivery. It is, however, important to note that the viability of any policy recommendation is reliant on the willingness of decision makers to undertake reform. Given Lebanon's political climate, and the intentional weakening of public institutions aimed at amassing political and economic capital, it is difficult to predict whether urban service delivery could be freed from the political-sectarian dynamics weighing it down.

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