

AMERICAN UNIVERSITY OF BEIRUT

EVIDENCE-INFORMED POLICYMAKING
IN THE LEBANESE WATER SECTOR:
THE CASE OF LAKE QARAOUN

by

SAMANTHA HASSIB ABI SAAB

A thesis

submitted in partial fulfillment of the requirements
for the degree of Master of Science in Environment Sciences
to the Interfaculty Graduate Environmental Sciences Program
(Environmental Policy Planning)
of the Faculty of Arts and Sciences
at the American University of Beirut

Beirut, Lebanon
January 2019

AMERICAN UNIVERSITY OF BEIRUT

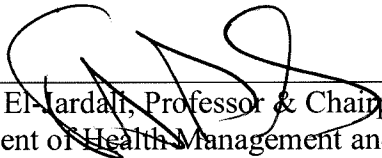
EVIDENCE-INFORMED POLICYMAKING IN THE LEBANESE
WATER SECTOR: THE CASE OF LAKE QARAOUN
BY
SAMANTHA H. ABI SAAB

Approved by:



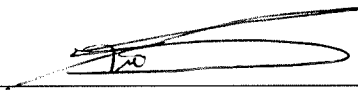
Dr. Hiba Khodr, Associate Professor
Department of Political Science and Public Administration

Advisor



Dr. Fadi El-Jardali, Professor & Chairperson
Department of Health Management and Policy

Member of Committee



Dr. Roland Riachi, Assistant Professor
Department of Political Science and Public Administration

Member of Committee

Date of thesis defense: January 22, 2019

AMERICAN UNIVERSITY OF BEIRUT

THESIS, DISSERTATION, PROJECT RELEASE FORM

Student Name: AbiSaab Samantha Hassib
Last First Middle

Master's Thesis Master's Project Doctoral Dissertation

I authorize the American University of Beirut to: (a) reproduce hard or electronic copies of my thesis, dissertation, or project; (b) include such copies in the archives and digital repositories of the University; and (c) make freely available such copies to third parties for research or educational purposes.

I authorize the American University of Beirut, to: (a) reproduce hard or electronic copies of it; (b) include such copies in the archives and digital repositories of the University; and (c) make freely available such copies to third parties for research or educational purposes after:

One ---- year from the date of submission of my thesis, dissertation, or project.

X Two ---- years from the date of submission of my thesis, dissertation, or project.

Three ---- years from the date of submission of my thesis, dissertation, or project.



Signature

February 7th, 2019

Date

ACKNOWLEDGMENTS

This thesis would not have been possible without the ongoing support, motivation, and love from many individuals.

First and foremost, my mother, who has been my role model since as early as I can remember. Her ongoing sacrifices, accomplishments, and passion for her career after decades of hard work made me feel like my career and academic struggles were nothing compared to hers. Equally as important, my father, who sacrificed a career in the United States to come to Lebanon. Both will always be an example of parents' dedication and love for their children. I only hope that my sisters, Julia and Hannah, will both go on to achieve greater things and accomplishments in life more so than I have.

To my husband: your ongoing support, love, and care have proven to me that a woman really cannot achieve her dreams without a partner that is willing to do literally everything. Within the last few years, you have constantly showed me and proven to me that positivity is really all that takes to achieve and overcome the biggest problems in life. I only hope that our son, Munir, is equally as determined, loving, caring, supportive, and amazing as you.

My recognition and gratitude also go to Dr. Hiba Khodr, who has been the most supportive, encouraging, patient, and motivational thesis advisor I have come across. Her recommendations, feedback, and support have made this study seem like a breeze. I am also thankful for the feedback and support given by my committee members, Dr. Fadi El-Jardali and Dr. Roland Riachi.

I would also like to thank my friends, coworkers, and extended family for their support and understanding throughout this long journey.

AN ABSTRACT OF THE THESIS OF

Samantha H. AbiSaab for Master of Science in Environmental Sciences
Major: Environmental Policy Planning

Title: Evidence-informed policymaking in the Lebanese water sector: The case of Lake Qaraoun

The longstanding quality and quantity problems in many Lebanese water resources are nothing new. Literature shows that approaches to solving these issues is normally under the terms set by funding bodies and international organizations, with coordination through local ministries. Many of these proposed solutions are short-term and rarely focus on long-term solutions involving different stakeholders.

Environmental issues in Lebanon are highly politicized. With hundreds of published works over the past few years providing grim evidence related to the water quality and quantity problems, the use of this evidence to impact policies on a government level is rarely touched upon in the Lebanon setting.

One of the alarming cases of water deterioration in terms of quality and quantity has been the situation in Lake Qaraoun, an artificial lake located in the Lebanese Bekaa Valley. This thesis is the first of its kind to understand how policies and decisions are taken surrounding Lake Qaraoun, with focus on the interplay between different stakeholders and how they influence (or fail to influence) evidence-informed policy making in the Lebanese water sector. The thesis uses a qualitative approach in which two complementary types of data sources are employed, semi-structured interviews and document review. Using the policy triangle framework, major findings were related to identifying the obstacles that exist to evidence-informed policymaking, which included the Lebanese political context, the influence of the funding bodies, lack of technical data, lack of communication between researchers and policymakers, and lack of data accessibility. The barriers identified were similar to studies conducted in the Lebanese health sector and energy sector regarding policymaking, with barriers identified as mainly political factors. Recommendations were directed towards the policymaking process, the culture surrounding laws and decrees, the need for citizen involvement, the nature of how research evidence is disseminated, and overcoming political limitations.

CONTENTS

ACKNOWLEDGEMENTS.....	v
ABSTRACT.....	vi
LIST OF ILLUSTRATIONS.....	xi
LIST OF TABLES.....	xii
ABBREVIATIONS.....	xiii
Chapter	
I. INTRODUCTION & METHODOLOGY.....	1
A. Introduction.....	1
B. Problem Statement.....	5
C. Methodology.....	8
1. Research design.....	8
2. Data Collection and Analysis.....	9
a. Document review and thematic analysis.....	9
b. Semi-structured Interviews.....	10
D. Purpose of the study	13
E. Structure of the study.....	14
II. THEORETICAL FRAMEWORK.....	16
A. Evidence-informed theories.....	16
B. Walt & Gilson’s Policy Triangle.....	17
C. Stakeholder Analysis.....	21
III. AN OVERVIEW OF EVIDENCE-INFORMED POLICYMAKING	22

A.	An overview of policymaking.....	22
B.	Implications and use of evidence.....	23
1.	Implications related to evidence.....	23
2.	The use of evidence in the public sector.....	24
a.	Systemic factors.....	25
b.	Organizational factors.....	26
c.	Individual factors.....	26
C.	Evidence-informed policymaking.....	26
1.	The benefits of evidence-informed policymaking.....	27
2.	Barriers facing evidence-informed policymaking.....	28
a.	The definitions, use and quality of evidence.....	28
b.	Policymaker attitudes and knowledge.....	29
c.	Limited access to research and lack of dissemination.....	30
d.	Lack of communication and collaboration between researchers and policymakers.....	31
e.	Political context.....	31
f.	Mixed priorities between International donor agencies, policymakers, and researchers... ..	32
g.	Barriers specific to evidence-informed conservation studies..	33
D.	Evidence-informed policymaking in developing countries.....	33
E.	Evidence-informed policymaking in the environmental sector.....	36
IV.	CASE STUDY: LAKE QARAOUN.....	39
A.	Setting the Context: An overview of the Lebanese water sector.....	39
1.	Current state and challenges being faced in the water sector.....	39
a.	Current situation.....	39
b.	Challenges related to man-made activities.....	39
c.	Challenges related to mismanagement and governance.....	40
2.	Actions taken by local and international bodies.....	41
3.	Research in the water sector.....	43
B.	Major actors in the Lebanese water sector.....	45
C.	Existing policies related to Lake Qaraoun.....	49
D.	Issues being faced in Lake Qaraoun.....	52
V.	FINDINGS AND DISCUSSION.....	59

A. Content.....	59
1. Content of existing policies in the Lebanese water sector.....	59
2. Content of policies that were drafted but not approved.....	61
3. Research that has the potential to impact water management policies in Lake Qaraoun.....	62
B. Context.....	64
1. Facilitator.....	65
a. National efforts.....	65
2. Barriers.....	66
a. Lebanese political context.....	66
b. Influence of the funding body.....	68
c. Lack of technical data.....	69
d. Lack of communication between policymakers and researchers.....	70
e. Lack of data accessibility.....	70
C. Process.....	71
1. Agenda setting.....	71
2. Policy formation.....	72
3. Use of evidence in policymaking in the water sector.....	73
D. Actors.....	74
1. Identification and analysis of the roles of major governmental and non-governmental actors.....	74
2. The role of media in portraying issues in Lake Qaraoun.....	76
E. Discussion.....	77

VI. CONCLUSION AND POLICY RECOMMENDATIONS.. 82

A. Policy Recommendations.....	83
1. Improving the existing policymaking process.....	84
2. Improving the existing regulatory framework.....	84
3. Enforcing environmental accountability and political transparency.....	85
4. Changing the way policymakers, researchers, and citizens ‘frame’ water sector issues.....	86
5. Creating networks for sharing research and evidence with policymakers.....	87
B. Study Limitations.....	87
C. Future Studies.....	89

APPENDIX.....	90
BIBLIOGRAPHY.....	93

ILLUSTRATIONS

Figure	Page
1. Interplay of factors influencing evidence-based policy.....	17
2. Walt and Gilson's Policy Triangle Framework.....	18
3. Individual and organizational factors that influence policymaking in government.....	23
4. Major elements of Evidence-informed policymaking.....	27
5. The proposed 4S Framework for organizing evidence.....	37
6. Actions taken by local vs. foreign actors to enhance the Lebanese water sector.....	42
7. The Qaraoun Lake and the boundaries of the Litani River Basin.....	54
8. Supporters and opponents regarding the need for evidence-informed policies to manage Lake Qaraoun	75
9. Major findings based on Walt & Gilson's Policy triangle framework	77

TABLES

Table	Page
4.1. Major institutions and organizations engaged in water research.....	43
4.2. Major actors in the Lebanese Water Sector.....	46
4.3. Laws, decrees, and strategies passed that directly impact Lake Qaraoun (2000-2018).....	51
5.1. Contextual factors (facilitators and barriers) specific to the use of evidence to impact policies for managing Lake Qaraoun	65

ABBREVIATIONS

AUB	American University of Beirut
BAU	Beirut Arab University
CDR	Council for Development and Reconstruction
CNRS	National Council for Scientific Research
DRC	Danish Refugee Council
EIPM	Evidence-informed Policymaking
ELARD	Earth Link and Advanced Resources Development
EMR	Eastern Mediterranean Region
ESCWA	Economic and Social Commission for Western Asia
EU	European Union
IDRC	International Development Research Center
IWRM	Integrated Water Resource Management
LAU	Lebanese American University
LIBNOR	Lebanese Standards Institute
LMICs	Low and middle-income countries
LRA	Litani River Authority
LRB	Litani River Basin
LU	Lebanese University
MDGs	Millennium Development Goals
MOA	Ministry of Agriculture
MOE	Ministry of Environment
MOEW	Ministry of Energy and Water
MOF	Ministry of Finance
MOPH	Ministry of Public Health
NGO	Non Governmental Organization
NWSS	National Water Sector Strategy
SDGs	Sustainable Development Goals
SIDA	Swedish International Development Cooperation Agency
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WHO	World Health Organization

CHAPTER I

INTRODUCTION & METHODOLOGY

A. Introduction

In recent years, the world has witnessed increasing demands on freshwater resources, specifically due to rapid urbanization, population growth, and growing stressors on the agricultural sector to meet these needs. The World Bank estimates that by 2030, countries will fall short of water demands vs. availability of water by an estimated 40% (The World Bank, 2017). The impact of climate change is also expected to make the water crisis even worse. Pressure on these resources is taking place in many countries, with governments and policymakers scrambling to find solutions and strategies to avoid ongoing water shortages in their countries and meet forecasted demands. Integrated Water Resource Management (IWRM) is an internationally accepted approach towards implementing practices across different sectors that ensure development and management of water resources given economic, political, legal, and environmental aspects. Effective implementation of IWRM can lead to promising results, but it also faces challenges regarding its implementation on different fronts. The availability and dissemination of evidence, especially in the water sector, plays a large role in the successful implementation of IWRM.

Effective IWRM strategies can be beneficial for developing countries like Lebanon, which is facing challenges in the water sector regarding incorrect management of existing water resources and the lack of capacity building being taken in

the country when it comes to adopting practices to safeguard water quality and quantity (Farajalla, Kerkezian, Farhat, El Hajj, & Matta, 2015). IWRM can assist Lebanon in meeting targets specified through the United Nations Sustainable Development Goals (SDGs), which Lebanon expressed commitment to in September 2015. The SDGs are vital in order to improve environmental conditions worldwide. Implementing an IWRM is specifically mentioned in target 5 under SDG 6 (referred to as 6.5), which calls for an IWRM regarding shared water resources at all levels (The United Nations, 2015). This will be a major challenge for Lebanon, especially having shared water resources with neighboring countries. It would also encourage governments that implement IWRM to ensure effective strategies are met across various sectors, and would provide policymakers with the ability to take decisions when it comes to different uses and implications regarding the use of water within different sectors (Smith & Clausen, 2018).

Although IWRM has promising implications for Lebanon, developing countries are challenged with finding solutions and effective practices (Doummar, Massoud, Khoury, & Khawlie, 2009). Lebanon specifically faces challenges when it comes to IWRM implementation on different fronts. IWRM calls for a strong institutional framework, clearly addressing bodies for decision making, in addition to laws and policies that address water management. It also calls for policymakers to be provided with evidence and effective tools to assist in decision making (Smith & Clausen, 2018). One of the major gaps relating to evidence in the Lebanese water sector is national water information and data. A National Water Integrity Risk Assessment pointed out that this is a growing issue, deducing that evidence and findings of research

studies are normally funded by international organizations, with results being left inaccessible to the public. The assessment also stated that the relationship between policymakers and researchers is weak in the Lebanese water sector, leading to a diminutive role of research evidence during the policymaking process (Farajalla et al., 2015).

Although hundreds of published works over the past few years provide grim evidence related to water quality and quantity problems, the uptake of evidence among policymakers in the Lebanese water sector is not explored within available literature. This is one of the major objectives of this study, which uses Walt & Gilson's policy triangle as a framework to explore facilitators and barriers present in the Lebanese water sector using Lake Qaraoun as a case study.

Definitions of what is considered evidence in the context of policymaking is subjective and studies exploring the use of evidence in policymaking normally provide narrow definitions for ease of analysis. The definition of evidence used within this study is any form of accurate information derived through research, historical experience, or from integrated monitoring and evaluation (Oxman, Lavis, Lewin, & Fretheim, 2009). Not only can evidence lead to effective water management strategies, or meeting SDG targets, but it can also lead to promising results in the realm of policymaking, shaping the regulatory framework of the Lebanese water sector in the long-term. Such examples have been seen in the Lebanese health sector through studies conducted by the AUB Knowledge to Policy Center (K2P). One such study influenced the passing of decree no. 1 /1199, calling for all salt factories in Lebanon to comply with the guideline of adding

60-80 milligrams of potassium iodate for every kg of salt (Safa, 2016). This law was a recommendation as a result of study findings by K2P, which showed that iodine deficiency among Lebanese individuals would lead to detrimental health effects. This is an example of how Lebanese ministries, particularly the Ministry of Public Health (MOPH), have been making efforts in using evidence from academic studies to reach policymakers and influence policymaking.

Policymaking is defined as an ongoing process, with no definitive beginning or end. The process of policymaking consists of several steps, identified as agenda setting, policy formation, adoption, implementation, and evaluation. Each of the identified stages of policymaking represents different opportunities for using evidence (National Collaborating Centre for Public Policy, 2013). Evidence-informed policymaking (EIPM) refers to the use of the best available evidence being used by policymakers, resulting in effective and accurate policy decisions (Bowen & Zwi, 2005). The benefits of using evidence in policymaking are ample. Literature suggests that benefits include making information available to the public, and strengthening a democratic setting in countries that may lack transparency. This will be further touched upon in Chapter Three.

Using evidence in policymaking internationally, regionally, and nationally is presented with a number of gaps. One major international gap is the presence of various interpretations and theories regarding what the exact role of evidence in policymaking is (Richards, 2017). Political, financial, and other social considerations can lead to reasons for rejecting evidence on behalf of policymakers. In terms of regional gaps, in many

middle and low-income countries, studies regarding the use of evidence are still evolving. This is also the case in the Eastern Mediterranean Region (EMR), with one study conducted in the health sector showing that there are increasing gaps between research evidence and policy (El-Jardali et al., 2011). Studies relating to the extent that policies are formed based on evidence are currently the trend in existing literature, however studies examining the value of forms of evidence on prospective policies are lacking. This is also the case in Lebanon.

It is important to note that evidence alone does not ensure a smooth process in terms of policymaking, since evidence is only one factor that impacts the process of knowledge translation. Many frameworks and theories exist, as mentioned within Chapter Two. Knowledge translation is defined as a process that includes: synthesis, dissemination/communication, exchange, and sound utilization of evidence to impact or strengthen a sector (Straus, Tetroe, & Graham, 2009). The definition was developed by the Canadian Institute of Health Research, and is also utilized by the World Health Organization (WHO). The use of a one framework for knowledge translation has been called for by international organizations, such as the WHO, encouraging national governments to ensure evidence is used to impact policy, especially in the health sector (Ward et al., 2009).

B. Problem Statement

As set forth by the Millennium Development Goals, Lebanon was expected to achieve environmental sustainability by the year 2015. Although progress has been made in terms of introducing environmental initiatives, these initiatives did not follow

through due to scarce resources (both economic and man-power), political constraints, and further contextual issues (United Nations, 2017). Lebanon, previously one of the most water-rich regions of the Eastern Mediterranean, is facing threats to water quality and quantity mainly due to mismanagement and prioritization issues over the years (MOE/UNDP/ECODIT, 2011). Threats include rapid decreases in snow cover and rain, with estimates over the past four decades ranging between 12-16%, decrease in river volumes, groundwater pollution, untreated wastewater, and uncontrolled use of groundwater resources (Riachi, 2016). Issues are only expected to get worse in coming years, with the average Lebanese population growth estimated at 6.0% in 2015 (The United Nations, 2016). The World Bank has also issued reports in the past that stated industrial and domestic water demands in the country would increase by 5% each year.

The Litani River Basin, located in Lebanon's Bekaa Region, is emerging as the country's most challenging and publicized examples of a water disaster. Lake Qaraoun, an artificial lake, is located in the Upper Litani River Basin. The Lake serves as a source of water for several Lebanese communities, mainly being used for hydropower, fishing, irrigation, and other touristic activities (Shaaban & Hamzeh, 2018). Extensive media coverage has been centered on the pollution infiltrating Lake Qaraoun, which receives its major source of water input from the Litani River, Lebanon's largest river, which was once the "lifeline" in the Bekaa Region (Shaban & Hamze, 2018). Today, people are leaving neighboring villages due to the intolerable situation, which is also characterized as a national crisis. Due to years of dumping untreated wastes into the Lake, in addition to overusing polluted water as a source of irrigation for crops in around 30% of Lebanon, the Lake has been left in a deteriorating state (The World

Bank, 2016). A study conducted in 2012 found that the remediation of the Upper Litani River Basin would cost around 0.5% of the total country's GDP (Riachi, 2016).

In 2016, the Lebanese government applied for a \$ 55 million dollar loan from the World Bank in hopes to solve the crisis surrounding the lake. According to the World Bank, costs will go towards building sewage networks that would feed into wastewater treatment plans before the water is discharged back into the lake (The World Bank, 2016). In addition, the loan will also fund solid waste management campaigns in the area and work with farmers in the area to discourage the use of harmful pesticides (The World Bank, 2016). This loan is part of the bigger plan by the Lebanese government, which calls for \$ 730 million dollars to establish wastewater treatment plants, manage solid wastes, and educate neighboring villages and industries with correct agricultural practices in the Litani River basin (The Daily Star, 2014).

As seen in the case of Lake Qaraoun, although there are actions being taken in the form of individual projects in the water sector being funded through loans, water quality issues are quickly increasing. Since the early 2000s, numerous academic studies, and studies conducted by international organizations such as the USAID, have both shown that nearby communities are threatened. In recent years, the Litani Basin Management Advisory Services (BAMAS) project sponsored by the USAID has showed prevalence of waterborne disease due to degrading water quality in the Litani river basin, reported especially during the summer months (Assaf & Saadeh, 2008). Furthermore, there were sampling locations that showed to have very high counts of Fecal Coliform as a result of irrigation activities and dumping of wastes near the river

channel (Assaf & Saadeh, 2008). Unfortunately, there has been limited action taken on a government-level to manage the prevalence of disease through the use bottom-down approaches to initiate policies that forbid pollution. Although research evidence is present and indicators have been developed, the use of this evidence towards finding long-term solutions in the realm of policymaking needs to be further explored. There is no evidence that knowledge translation practices are being used among Lebanese policymakers to make evidence-informed policymaking possible, especially in the water sector.

This study is the first of its kind to understand how policies and decisions are taken surrounding Lake Qaraoun, with focus on the interplay between different stakeholders and how they influence (or fail to influence) evidence-informed policymaking in the Lebanese water sector. This was done through using various forms of data collection and analysis techniques described within the following section.

C. Methodology

1. *Research design*

This study is an explanatory study, using the case study approach. This approach is used across different fields, especially in the social sciences. The case study approach serves to investigate a certain situation (being the case) in the context, and is used especially when the research question attempts to answer how or why a certain situation is taking place (Yin, 2013). The approach can also be used to help understand links resulting from a new policy development (Crowe et al., 2011). It can also offer a

glimpse into existing gaps and why certain actions were chosen over others. A case study can effectively identify areas of attention, in addition to close interactions among different stakeholders (Flyvbjerg, 2006). The findings of a case study can also be used for theory development.

2. Data Collection and Analysis

a. Document review and thematic analysis

A wide range of primary and secondary sources of data were used throughout study. Sources of data used included research conducted by academic experts in the the Lebanese water and public health sectors, studies conducted by different Lebanese ministries and Lebanese water authorities, policy briefs, press releases, local news headlines, and reports released by international organizations that have focused on the Lake Qaraoun water quality and quantity problems. Major primary sources of data the study, and these included Lebanese laws and decrees were also used within focusing on water resource management. These sources served as a starting point for understanding how these policies are being implemented today and how they impact or fail to impact the overall management of Lake Qaraoun. The documents reviewed were .analyzed through a thematic analysis

Thematic analysis is a method that can be used to answer a wide range of research questions in qualitative studies. It is one of the major methods used for identifying, analyzing, and representing major themes found within data collected (Braun & Clarke, 2006). When performed in a detailed and organized manner, it can offer rich findings that quantitative studies cannot express, and findings can be easily

understood among researchers in different domains (ibid). These are just some of the reasons why it was selected as a method study. Other advantages to using a thematic analysis is that it clearly expresses the opinions of research participants, with stress on differentiating the similarities and differences in insights (King, 2004).

One of the major disadvantages of this tool, however, is that there is little literature that exists on how to conduct a thematic review, with too much flexibility being involved (Holloway & Todres, 2003). Due to such identified issues, the phases of conducting a thematic analysis proposed by Braun and Clarke (2006) through a six-step method was used as a guideline within the study. These phases ranged from engaging with the data, documenting potential themes for coding, generating the codes, searching for related themes, testing the themes, and reporting the reasons for theoretical and methodological choices within the study.

b. Semi-structured Interviews

In addition to a thematic review of the above-mentioned sources, semi-structured interviews were conducted with various stakeholders involved in the Lake Qaraoun. Semi-structured interviews were used since they enable data collection without the researcher putting direct pressure on the participant for certain answers, unlike surveys, which present questions with a limited number of options (Nichols, 1991). These types of interviews are recommended in studies that involve opinions of community members, or stakeholders (ibid). For these reasons, semi-structured interviews were chosen as a mode of data collection in order to fill in the gaps presented during the analysis of the above-mentioned documents, studies, and press releases. They

were used to obtain insights from different stakeholders regarding questions that documents and media sources cannot answer related to the policymaking process.

The interviews took place from February 2018 through September 2018. They were conducted by the co-investigator and were face-to-face. The location of the interviews was determined by the interview participants to ensure they were in an environment that they were comfortable with. Data was collected from nine stakeholders, including project managers/consultants from different Lebanese ministries, national committee members, senior staff at international organizations, officials at local water establishments, municipalities, university professors, members of local non-governmental organizations (NGOs), and other major stakeholders. Studies have shown that there is no need for a scale when conducting interviews for qualitative studies, since such investigations are in-depth and a large number of interviews may obstruct the researcher's ability to analyze the interviews conducted (Wilmot, 2005).

The target population for the interviews was stakeholders that have the potential to impact policy and are familiar with the situation in Lake Qaraoun. The list of potential participants was developed based on the literature. Participants were selected through purposive sampling, which incorporates the selection of participants through the researcher based on his/her judgment of whom is relevant to the study. Snowball sampling was also used for selecting specific participants that have (or could have) an influence in the water policy field. After interview completion, participants were provided with a flyer for circulation, which can be seen in Appendix I. The flyer was given to participants upon their approval through e-mail and included contact

information of the research team in case someone they know would be willing to contact researchers for study participation. The length of each interview was between 40 and 60 minutes, and interviews were given in English since the co-investigator is not fluent in Arabic.

The interview questions were divided into four sections and were based on answering the study's research questions with guidance from the Policy Triangle Framework. The interview questions were divided into the following categories: process, context, actors, and content. The questions focused on the general themes in the Lebanese water sector, in addition to questions specific to the situation in Lake Qaraoun. Major themes included: the use of research evidence in the Lebanese water sector, the policymaking process, stakeholder roles and perceptions of the situation in Lake Qaraoun (what the identified issues are and how the identified issues are framed), and gaps within the current institutional situation. The interview guide can be found under Appendix II.

Although semi-structured interviews can cover a large range of subjects as seen necessary by the interviewer with minimal pre-planning, they also encompass a time-consuming form of documentation (DiCicco-Bloom & Crabtree, 2006). Eight out of the nine interviews conducted for this study were tape recorded and consequently transcribed. One of the interviews was conducted in the National Council for Scientific Research, Lebanon, Beirut (CNRS), where use of electronics inside the building was not allowed. Axial coding was used within the study to group interview responses into major themes and categories. The major themes that were identified within the coding

sheet were based on the interview guide. Major themes included: role of research in the Lebanese water sector, the policymaking process, recommendations to improve the policymaking process, facilitators in evidence-informed policymaking, political factors as barriers in evidence-informed policymaking, cultural factors as barriers in evidence-informed policymaking, major stakeholders in the Lebanese water sector, role of the Lebanese media, challenges faced in managing Lake Qaraoun, and policy gaps.

The study was initially submitted to the Institutional Review Board (IRB) at the American University of Beirut (AUB) for expedited review and approval was obtained in June 2017. The research study received continuing approval in June 2018, with validity up until June 2019.

D. Purpose of the study

The goal of this study was to investigate the use of evidence in policymaking in the Lebanese water sector, using Lake Qaraoun as a case study. The study investigated interactions among different stakeholders, the uptake of evidence in informing policy, and explored the factors that act as facilitators, or barriers, to evidence-informed policymaking. The research questions this study strived to answer were the following:

- What are the political, social, cultural, administrative, and economic factors that enable the use of research evidence in policymaking in the Lebanese water sector?

- What are the political, social, cultural, administrative, and economic factors that inhibit the use of research evidence in policymaking in the Lebanese water sector?
- To what extent are the findings relating to the use of evidence in policymaking similar to those in other Lebanese sectors?

Contributions of this study include, but are not limited to, offering insight into the policymaking process surrounding water resource management in Lebanon and exploring policy recommendations to any identified barriers in the policymaking process. This study also sheds light on the Lebanese political context, through presenting findings that have the potential to contribute to local and even regional studies. It also has the potential to set the tone for future studies directed at bridging the gap among government and non-government officials when it comes to the use of evidence.

E. Structure of the study

This study is organized into several chapters, with Chapter one serving as an overall introduction, including the problem statement, methodology, objectives, research questions, and study contributions. Chapter two presents the theoretical framework used, and explores why the Walt & Gilson's policy triangle framework took precedence over others, and also outlines evidence-informed theories. Chapter three discusses the overall role, benefits, and challenges of evidence-informed policy. This is followed by Chapter four, which focuses on background information regarding our case

study of Lake Qaraoun. Chapter five outlines major study findings and discusses these findings into separate sections based on the framework. Finally, Chapter six serves as the conclusion and a discussion of possible policy recommendations.

CHAPTER II

THEORETICAL FRAMEWORK

A. Evidence-informed theories

Evidence-informed policymaking has been explained through models of the policymaking process and knowledge translation (Punton, 2016). A number of conceptual theories have been developed in order to understand evidence-informed policymaking and the different factors that lead to positive outcomes regarding the intake of evidence. Theories involve different variables and relationships that are ever changing, many being far from simple linear relationships (Brownson, Chiqui, & Stamatakis, 2009).

One theory conceptualizes evidence-informed policy into three different domains, being process, content, and outcomes. This theory is especially applicable to evidence-based health policy, and is based on the idea that “most effective” type of evidence is non-existent. Process refers to identifying the factors that impact the process of policymaking, especially the national mood and the political context (ibid). Content refers to identifying constituents within a specific policy that have the potential to be effective (qualitative or quantitative evidence), whereas the outcome refers to the impact of the policy. These domains are at the center of the model. The model emphasizes that the policymaking process is highly impacted by evidence through a continuous process. The importance of feedback between the different domains and increased communication among the different actors is also emphasized on through this model (ibid). The interplay of the factors is depicted in Figure 1.

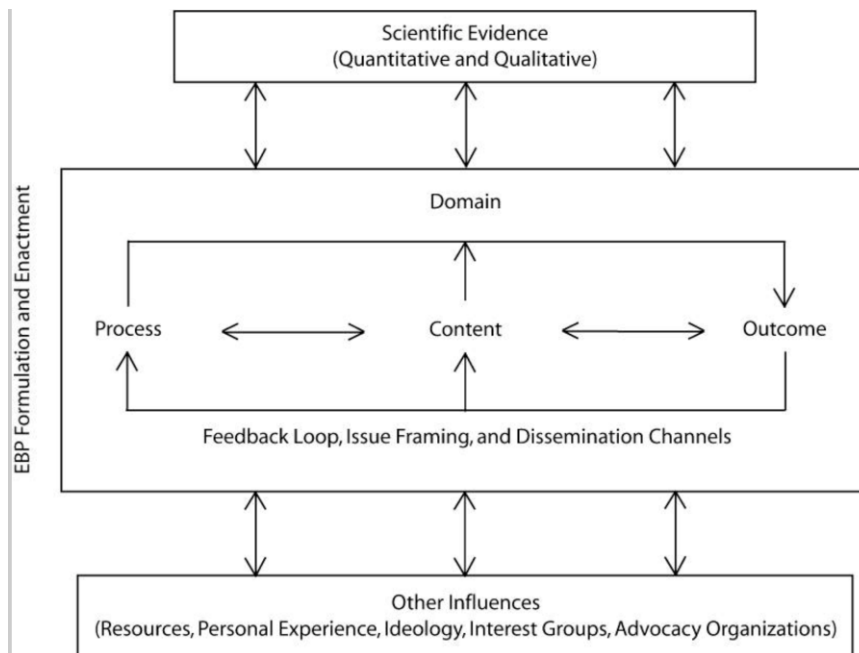


Figure 1: Interplay of factors influencing evidence-based policy. Reprinted from “Understanding Evidence-Based Public Health Policy”, by R. Brownson, J. Chriqui, & K. Stamatakis, 2009, *Am J Public Health*, 99(9), 1576-1583. Copyright 2009 by NCBI.

The variables identified within the above model are similar to those identified within the policy triangle framework, which was used within the study.

B. Walt & Gilson’s Policy Triangle

The policy triangle framework developed by Walt and Gilson (1994) is one of the major frameworks used for policy analysis. The framework, seen in Figure 2, is built on the foundation that different elements (content, context, process and actors) are interrelated and interact together in order for the policymaking process to take place (Buse et al., 2005). Actors are at the center of the triangle to emphasize the fact that policy is shaped by actors, their influences, actions, and power. The framework stresses on the importance of studying the policymaking process through not only studying the

content of the policy, but also studying the elements that have the potential to shape the policy process (ibid). It is based on the inter-relationship between the following components:

- Content: refers to the content of each policy and the constituents of the policy,
- Context: refers to political, economic, social, administrative, and cultural aspects on national, regional, and international levels that influence policy (includes factors that promoted/served as barriers to the use of research, i.e. the stability of the government),
- Process: refers to how policies are initiated, and then developed (includes communication channels),
- Actors: at the center: Refers to individuals, groups, or organizations (local, regional, national) that influence policy and their actions/power.

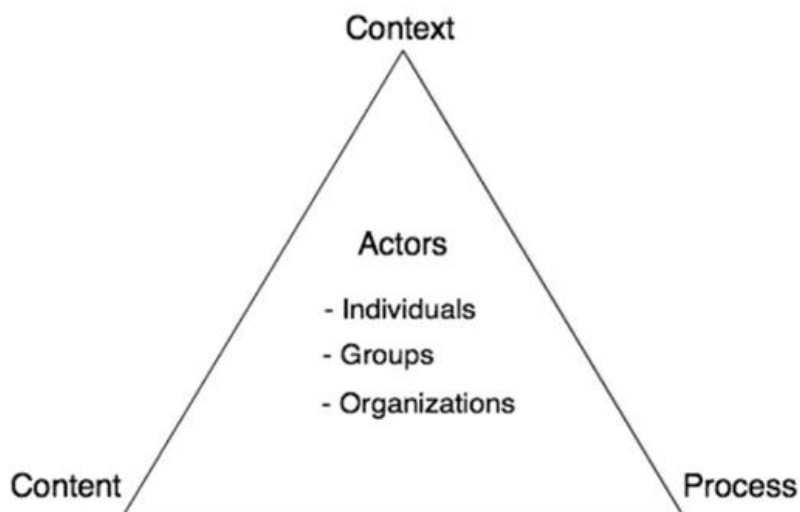


Figure 2: Walt and Gilson's Policy Triangle Framework

The framework was chosen for a number of reasons. Primarily, the framework enables users to discover how stakeholders involved in the policymaking process treat evidence, in addition to discovering why certain factors influence policy and take precedence over other issues (Buse, Mays, & Walt, 2005). These reasons are two core objectives of this study, and therefore this is why the framework took precedence over others.

It should be noted that the Kingdon's multiple streams framework is also a popular framework used for examining policymaking across a spectrum of sectors. The framework originally developed to study the policymaking process in the United States, consists of independent "streams" that determine how an issue lands on a government agenda. The framework focuses on problem, policy, and political streams of equal significance and only when a policy window (or opportunity) opens, do the streams intersect. One of the major limitations of this framework however is that it is deeply grounded in Western assumptions of political thought, law, and policy. In developing countries especially, the political context may take precedence over the other streams (Arabloo, Tourani, & Ravaghi, 2018). In addition, the framework overlooks the influence of the media, and does not clearly explain relationships between different stakeholders and their roles in helping an issue reach the policy agenda (Chow, 2014). These are other reasons why the policy triangle framework was chosen over other frameworks, such as the multiple streams framework.

The policy triangle framework has been recommended for use in low and middle income countries (LMICs) (Walt, Shiffman, Schneider, Murray, Brugha, &

Gilson, 2008). Unlike this study, which is prospective, and will recommend policies, the existing literature using this framework is mostly retrospective. The framework can also be used to understand how political, historical, and contextual factors impact the possibility of policy formation (Brugha, Bruen, & Tangcharoensathien, 2014). This is the way it was used within this study, unlike the way the framework has been used in past studies.

There have been a number of studies that have used the policy triangle framework for examining the development of evidence-informed policies, especially in developing countries such as Nigeria. The framework, mostly used for health policy, was used in Nigeria to investigate the contributing factors that lead to the development of an Oral Health Policy in the country. The major finding of the study was that the policy was developed due to the personal desires of all stakeholders involved in the formation of the policy for the emergence of a policy, since there were several failed attempts in previous years (Etiaba, Uguru, Ebenso, Russo, Ezumah, Uzochukwu, & Onwujekwe, 2015).

The framework assisted in identifying major actors, groups, networks, and the way their influence over the implementation of policies takes place. It also assisted in discovering the different ways a problem is framed and how it impedes the formation of evidence-informed policies. Most importantly, it assisted in focusing on the current situation in Lake Qaraoun and identifying facilitators and barriers.

C. Stakeholder Analysis

The stakeholder analysis framework was also used within this study to clearly express the positions of the actors. It was selected since it assists in portraying the interactions, interests, relationships, and influences of different stakeholders (Varvasovsky & Brugha, 2000). More specifically, the use of a stakeholder analysis within this study served as a tool for not only identifying major stakeholders involved in the Lake Qaraoun crisis, but also predicting whether or not these stakeholders were open to the implementation of evidence-informed policies as a solution for solving the management issues in Qaraoun. The analysis was used alongside the policy triangle framework within the section related to actors under the findings part of the study. The stakeholder analysis was summarized in a table.

CHAPTER III

AN OVERVIEW OF EVIDENCE-INFORMED POLICYMAKING (EIPM)

A. An overview of Policymaking

As outlined within the introduction of the study, policymaking is a non-linear process and when an evidence-informed approach to policymaking is adopted in developing countries, it could lead to positive outcomes. The policymaking process consists of several stages, and although evidence can influence the process within each stage, it is important to note that different types of evidence may be needed within specific stages. For example, in terms of agenda setting, the evidence that would be ideal at this stage should express the magnitude of a certain issue, engage policymakers, and be communicated effectively (Sutcliffe and Court, 2005). In addition, within the evaluation phase, monitoring systems that have been proven previously effective and relevant would be ideal.

Although evidence-informed approaches to policymaking focus on the “evidence” factor that influences government decisions, it should be noted that a number of other factors influence the policymaking process. Although evidence is at the center of the policymaking process, evidence has a large role to play in terms of limiting the influence of the other factors identified. The factors are normally at the individual level of a policymaker, such as values and one’s political beliefs, also influencing policy decisions (ibid). These factors are displayed within Figure 3. It should be noted that many of the individual factors seen in Figure 3 are integrated within the policy triangle

framework used within the study. Resources could also be considered organizational factors in the sense of budget considerations.



Figure 3: Individual and organizational factors that influence policymaking in government

B. Implications and use of evidence

1. Implications related to evidence

Oxman, Lavis, Lewin & Fretheim (2009) found that evidence in the context of evidence-informed policymaking has different implications, being the following:

- Decisions are not solely based on evidence, and expert opinions are not only based on evidence itself. Decisions also consist of facts, opinions, and interpretations.

- The content and format in which evidence is presented play a role in convincing individuals.
- Evidence is ‘context-sensitive’, meaning that the setting in which evidence is presented in depends on a policymakers’ judgment regarding if it fits the context or situation.
- Global evidence is the starting point for opinions related to specific policies and programs.
- Local evidence, however, specific to the setting in which evidence can be used to inform policy, is necessary to inform opinions, address problems, and form solutions. Local evidence includes local-specific factors, for example the prevalence of disease, values, and resources.

It is difficult to separate the evaluation of scientific evidence from social, political, cultural, and economic factors (Horton & Brown, 2018). The challenge would be whether or not there are solutions for overcoming these barriers when the uptake of evidence is studied.

2. The use of evidence in the Public Sector

In the public sector specifically, factors that are involved in the utilization of research evidence are categorized into systemic, organizational, and individual factors (International Network for the Availability of Scientific Publications, 2016). Systemic factors are characterized as those related to a specific context, whereas organizational are those that are related to how evidence is used within a specific sector, and individual

factors are those impacting the policymaker on a personal level, such as his/her knowledge, bias, and attitudes (ibid). The factors are further explained as follows:

a. Systemic Factors (Context)

Examples of systemic factors include, but are not limited to communication between stakeholders, government structures and systems, roles of different stakeholders and their relationships with policymakers, timing and urgency of the issue at hand, in addition to the sector impacted (International Network for the Availability of Scientific Publications, 2016). Today, the media and forms of social media can also have a large impact on what is considered ‘valid’ evidence and should be considered among the actors. Grassegger & Krogerus (2016) stated that the internet in itself creates an ‘echo chamber’ that sometimes limits the thinking capacity of an individual, and increases the adherence to an idea based on ‘group thinking’, rather than the use of individual reasoning.

The quality of the research evidence also plays a large role. The timeliness, clearness, and consistency of the methodology used, in addition to powerful and advocated for research findings, and the inability of the evidence to be argued against are all factors (Nutley, Davies, & Walter, 2002). Better yet, it has also been stated that the research should have the intent to inform policy in order to reach the policymaker (ibid). However, this would mean that the researcher would develop research based on what would attract a policymaker, rather than what is applicable. It can be argued that the intention of policymakers to use evidence would better impact the use of evidence to inform policy.

b. Organizational Factors

Examples of organizational factors include, but are not limited to, practices within the institution (for example, how evidence is normally treated), resources (financial and IT resources), in addition to mediums for knowledge transfer.

c. Individual Factors

Examples of individual factors (on the level of the policymaker) include but are not limited to leadership characteristics, judgment, bias, and his/her knowledge and the ability to evaluate/communicate the evidence (International Network for the Availability of Scientific Publications, 2016).

C. Evidence-informed Policymaking (EIPM)

The process of evidence-informed policymaking is not systemic and transparent, but it contains steps that ensure that evidence from relevant research is identified and used. The major elements of evidence-informed policymaking and the components of the elements relating to EIPM are depicted in Figure 4.



Figure 4: Major Elements of Evidence-informed policymaking

1. *The benefits of Evidence-informed policymaking*

In the health sector specifically, the World Health Organization (WHO) affirms that effective utilization of research evidence has the potential to form effective policies that can save lives, meet the needs of citizens, and respond to issues in a scientific manner (The World Health Organization, 2004).

Another major potential benefit of evidence-informed policymaking is that it materializes project findings and studies set forth by international organizations. This is especially a major benefit for developing countries. Such an achievement would enable countries to go forth with the basic principles of the Paris Declaration, which calls for better coordination between donor and national countries to work together and utilize evidence from donor projects (Segone, 2008). Not all national governments, however,

take this type of evidence into consideration. The Swedish International Development Cooperation Agency (SIDA), which operates in 35 developing countries in Africa, Asia, and the Middle East, is a government agency that conducts projects around the world focused on technical and financial assistance (SIDA, 2018). In a study conducted by SIDA, it was shown that the majority of findings of development studies conducted in developing countries were overlooked, blaming the credibility set forth by government evaluation bodies (Picciotto, 2002). This shows that the role of national governments and local policymakers is necessary.

2. Barriers facing Evidence-informed policymaking

Several studies have been conducted over the past few decades regarding the challenges and barriers of evidence-informed policymaking, or using evidence during the policy formation process. A literature review was conducted to identify the barriers across different sectors in different countries. The major barriers included the following:

a. Definitions, use and quality of evidence

One of the major issues related to studying evidence-informed policymaking itself is the difference in what evidence is defined as by policymakers and researchers (Sohn, 2018). Researchers and scholars across different schools of thought generally agree that research evidence is developed through scientific methods that are proven to be systemic and sound (ibid). On the other hand, policymakers tend to consider evidence as information not based only based on scientific methods, but also based on opinions.

Studies have shown that this may be the case due to the way that policymakers think of the whole policymaking process rather than just the evidence component that researchers are inclined to only focus on. Policymakers would also be concerned with the financial implications of a decision, in addition to public opinion and potential consequences (ibid). In one study, policymakers were asked to group what they considered evidence, and common responses dwindled down to three major components being empirical data, experiences, and primary data (Nelson, Leffler, & Hansen, 2009). This barrier in views regarding evidence was investigated within the study to see if past study contributions were applicable since both researchers and policymakers were interviewed.

The misuse of evidence also may present setbacks. This can be done through using parts of evidence without interpreting the whole picture, or even, being uncertain about research evidence (Oxman et al., 2009). The effects of misuse range from the implementation of projects, unnecessary use of resources, unnecessary policies, and misguided agendas (ibid). It is also of importance to ensure that the evidence is portrayed in a way that is easier for all individuals involved in the policymaking process to understand, leaving little room for the misuse or misinterpretation of information.

b. Policymakers attitudes and knowledge

Hennik & Stephenson (2006) stated that in developing countries, the missing evidence-informed culture in policymaking was a major barrier that impacted the attitudes of policymakers towards research. Findings have shown that research has little to no influence for policymakers, and that they lack the skills and tools needed to

comprehend how evidence can be used to influence policy (ibid). Furthermore, some policymakers do not have the willingness to use evidence and are resistant to changing the culture of policymaking (Uzochukwu et al., 2016). Such setbacks lead to lack of the policymaker's ability in differentiating between good, bad, and even useful research. Further supporting such barriers is a study conducted by Hyder et al. (2011) in which policymakers stated that they lack technical capacity related to a specific policy, and that lack of training or consultations from those trained leads to wrong policy decisions being taken.

c. Limited access to research and lack of dissemination

Hennik & Stephenson (2006) stated that limited access to research on behalf of policymakers is another common barrier. At times, research findings are retained among academic institutions, journals, or donor bodies, and rarely reach ministries or government committees (ibid). This is especially evident in countries that lack a central medium for research outputs.

Under the umbrella of limited access to research, Hennik & Stephenson (2006) also stated that researchers sometimes lack the training or skills required for disseminating research results. In one of the developing countries the study covered, Malawi, researchers stated that it is somewhat difficult since they are not trained to communicate with policymakers. In some countries, a lack of resources could be to blame in terms of reasons why researchers do not receive correct training in communicating their results.

d. Lack of communication and collaboration between researchers and policymakers

The lack of mediums for communication between researchers and policymakers is a major barrier, since it prevents the distribution and use of research. Such mediums make it possible for contacts to be established among both parties, meaning policymakers would know which researchers to contact when in need for specific research, and vice versa (Hennik & Stephenson, 2006). In addition to the lack of mediums for communication between researchers and policymakers, there is also a major lack of collaboration in some cases. In some studies, researchers have expressed that they are rarely involved in local studies, and this presents a major gap in the dissemination and use of research. Findings have showed that when policymakers are involved in the research process, the outputs have the potential to be used for policy development and lead to more effective implementation of research recommendations (Uzochukwu et al., 2016).

e. Political Context

The political context in lieu of evidence-informed policymaking is also a major challenge. Studies have shown that agenda setting is influenced by priorities set by policymakers, and that priorities are political (Hennik & Stephenson, 2006). If research findings that have the potential to impact policy are presented to policymakers in lieu of an unsuitable political climate, research will not have any impact. In one study, researchers were aware of this barrier, and expressed that research findings not consistent with national politics were not disseminated (ibid). Furthermore, political issues sometimes influence the development of policies. Uzochukwu et al. (2016) stated that researchers need to have a political mindset in order to produce evidence in an

appealing way and at the right time, making their findings relevant to the policymakers. This may be impossible since the political context of a country and political beliefs of policymakers are hard to change.

f. Mixed Priorities between International donor agencies, policymakers, and researchers

In developing countries especially, the presence of international donor agencies further leads to complications when it comes to using evidence during the formation of policies. In local contexts where these donors are operating, the donor bodies normally set the tone and decide on the type of research that is conducted, rather than focusing on the needs of the country (Mukuni & Price, 2014). Researchers sometimes receive funding based on these targeted areas and sometimes even act as consultants, rather than stakeholders in such projects.

The studies conducted with funding are not only limited in terms of scope, need, and resources, but also in terms of time. In some cases, this leaves the donor body with little time to explore cultural and contextual factors that may surround research and recommendations are normally short-term (ibid). Policy implications based on the completed research study or project are rarely focused on or followed through due to the limited project time frame. In some cases, dissemination of these research findings is carried out through international journals, or retained, and even inaccessible to local stakeholders (ibid). This shows that there is a lack of research communication on behalf of donor bodies as well.

g. Barriers specific to evidence-informed conservation policies

Rose et al. (2018) identified major barriers when it comes to the formation of evidence-informed conservation policies. Although many of these barriers are similar to those identified above, there were a few barriers specific to conservation or environmental studies. These are worth mentioning since they are relevant to the study. The barriers are summarized below and will be further explored within the results chapter of this study:

- Lack of policy-relevant research,
- Little to no priority being given to environmental or conservational issues,
- Little to no funding being given to environmental or conservational issues.

D. Evidence-informed policymaking in developing countries

Specifically in the health sector, evidence-informed policymaking has been the focus of literature and academic studies in the past decade. Health systems of developing countries are currently facing challenges in the use of evidence in policymaking (Onwujekwe et al., 2015). Furthermore, Green and Bennett (2007) noted that more evidence is needed about how constraints in countries inhibit evidence-informed policies, in addition to stressing which strategies can be adopted to relinquish these obstacles. Such calls were addressed in studies conducted in a few developing countries, commonly in the health sector. Studies have specifically shown that there is a large gap between research and policy, with studies on knowledge translation limited in the Eastern-Mediterranean Region (El-Jardali et al., 2011). African countries have taken the initiative in the region to attempt to explore these gaps, however.

Although the use of evidence in policymaking is still an emerging concept in developing countries, countries such as Nigeria have explored the concepts of evidence-informed policymaking in the health sector. In Nigeria, a study was conducted to explore the presence of evidence-informed agriculture policymaking. Findings showed that policy makers were unable to use evidence to impact policymaking mainly due to the cost barred by researchers when transferring evidence to concerned policymakers, the availability of the evidence, as well as the nature of the evidence (Elueze, 2016). The recommendations included evaluating a proper budget for studies in the sector, in addition to the establishment of training and focus groups for researchers and policymakers to encourage them to use knowledge translation practices. Such recommendations for a similar study in a developing country could perhaps be made in the case of developing countries in the Eastern Mediterranean Region (EMR), such as Lebanon.

With that said, international organizations, such as The World Bank (WHO) have established platforms for knowledge translation with the objective of promoting the use of research evidence in the health sector to impact policy. The platform, EVIPNet, focuses specifically on low and middle income countries (LMICs) by bringing together various stakeholders, providing medium for knowledge translation and facilitating and coordinating policymaking through the use of the best available evidence (The World Health Organization, 2018). Divisions of the EVIPNet even exist on a continent basis, with notable impacts in countries such as Nigeria and Burkina Faso. However, EVIPNet mainly focuses on the health sector.

In Nigeria, a project sponsored by the World Health Organization was implemented in 2009, titled ‘Sponsoring National Processes for evidence-informed policy in the health sector of developing countries’ (The World Health Organization, 2018). This project, sponsored by a local university in the country, aimed at identifying the constraints and improving the capacity between institutions and employees when it comes to the use of research evidence in the health sector. Through focus groups, workshops, discussions among national policymakers and academics, a Health Policy Advisory Committee was established to correct for major challenges, found to be communication gaps among different stakeholders, capacity constraints, and the absence of the opinions and needs of individuals receiving healthcare in policy activities (Uneke, Ezeoha, Ndukw, Oyibo, & Onwe, 2010). Following the project, Nigerian interests in evidence-informed policy has increased, and most recently, the promotion of evidence-informed policymaking in the realm of maternal health was explored (Uneke et al., 2017). Similarly, in Burkina Faso, a policy brief developed by EVIPNet positively impacted knowledge translation and established a medium for communication among researchers and policymakers through national workshops (Lavis and Panniset, 2010). Furthermore, it led to the establishment of regional meetings and action during the Global Fund to Fight Aids, Tuberculosis, and Malaria in Africa (Lavis and Panniset, 2010). With that said, the use of evidence in the water sector, or better yet the environmental sector, has not been frequently touched upon as within the health sector in developing countries.

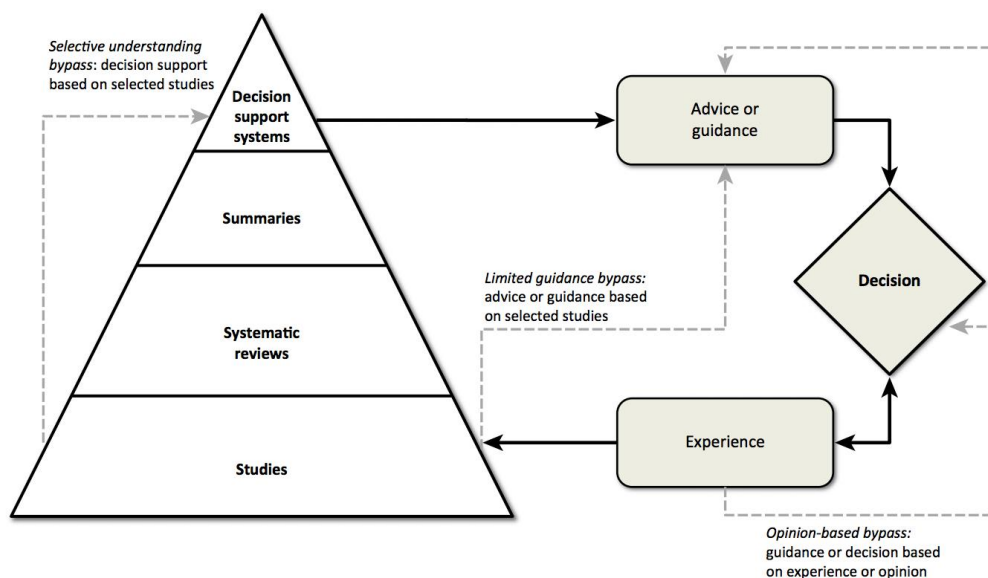
E. Evidence-informed policymaking in the environmental sector

In the environmental sector, ‘evidence-based policy’ and ‘evidence-based conservation’ have been touched upon in the past decade, however studies have shown that scientific evidence is not widely used to impact environmental policy and practice (Dicks, Walsh, & Sutherland, 2014). Bayliss, Wilcox, Stewart, & Randall (2012) attribute this to the accessibility policymakers have to scientific evidence, in addition to the lack of evidence use within decision frameworks. In addition, the way in which scientific evidence is organized, or even framed, is also a barrier to evidence reaching policymakers. Other identified reasons include the lack of communication and networks between decision makers and researchers; in addition to the issue of researchers recommending solutions that are financially, politically, and institutionally unacceptable in the eyes of decision makers (Dicks et al., 2009).

The lack of environmental studies and the use of evidence may lie in the fact that environmental problems are complex and may be categorized under the umbrella of ‘different’ scientific and socio-economic disciplines (Juntti et al., 2009). For example, issues with water quality can be classified as ‘health’ issues since they can lead to waterborne illnesses. With that said, Juntti, Russel, & Turnpenny (2009) stated that a technique in studying evidence in environmental policy is to bring literature together, and to better evaluate and draw conclusions regarding evidence–policy relationships.

There has been literature that has focused on potential solutions regarding the use of evidence in the environmental sector. Dicks, Walsh, & Sutherland (2014) argued that a method for organizing evidence is needed in ensuring that unbiased evidence

reaches science-policy platforms. This method is referred to as the 4S framework for environmental science, and serves to organize ‘unbiased’ scientific evidence with hopes that it will reach policymakers. The proposed framework is based on the idea that evidence from studies, systemic reviews, and summaries reach decision support systems, feeding into advice and decisions (Dicks et al., 2009). The decision support system is an integral component of this framework, and once evidence reaches this system, it has the potential to be used by decision makers. The proposed framework can be seen in Figure 5.



*Figure 5: The proposed ‘4S Framework’ for organizing evidence. Reprinted from “Organizing evidence for environmental management decisions: A 4S hierarchy”, by L. Dicks, J. Walsh, and W. Sutherland, 2014, *Trends in Ecology & Evolution*, 29(11). Copyright 2014 by Elsevier Ltd.*

Recent literature has linked deteriorating land conditions and land use practices to illness and deaths in developing countries. Furthermore, the World Health

Organization estimated that around 24% of the global health burden could be linked to deteriorating urban environments (Romano and Knechtges, 2014).

CHAPTER IV

CASE STUDY: LAKE QARAOUN

A. Setting the context: An overview of the Lebanese water sector

1. Current State and challenges being faced in the water sector

a. Current Situation

Independent of human activities, in 2005 the Director General of the Lebanese Ministry of Energy and Water estimated that around 50% of the annual precipitation in the country was lost through evapo-transpiration and another 11% is lost due to shared water sources (Makidisi, 2007). This leaves Lebanon with a little over 30% of estimated water sources to manage. As the years go by and the world is feeling the effects of global climate change, Lebanon witnessed one of the driest seasons in 2013, receiving around less than the seasonal average of rainfall (Riachi, 2014). Furthermore, it has been reported that there has been a decrease in snow coverage, and consequently a decrease in groundwater and river supplies (MOE/UNDP/ECODIT, 2011). More specifically, these findings have been evident in Lake Qaraoun, which was reported to have experienced a 15% drop in surface area over the span of 15 years, from 1990-2005 (Shaban, 2009).

b. Challenges related to man-made activities

Lebanon's problems in the water sector are not only limited to the management of surface and fresh water resources, but also to groundwater aquifers and wastewater

(Gears, 2010). This is especially the case for coastal cities, where around 60% of the population lives. In these areas, studies have shown that groundwater aquifers are suffering from seawater intrusion and uncontrolled drilling is leading to rapid depletion (ibid). Rural villages are also suffering from the depletion of surface water since agricultural practices in these areas use the majority of water for crops. In 2014, it was estimated that in the Bekaa Valley alone, a decrease of around 70 million m³ is lost annually in terms of groundwater supplies (Riachi, 2016). In addition, wastewater connection networks are only evident in 30% of households outside of the Greater Beirut Area (The World Bank, 2016). This leads to households and industries discharging their wastewater to close by surface water using primitive ways and minimal costs incurred. Raw sewage is deposited in seas and rivers, polluting groundwater aquifers that populations depend on (Gears, 2010). No long term solutions have been proposed by government bodies or Lebanese ministries, with the exception of building wastewater plants, which are funded by donor bodies and operate within limited time spans. Publications have gone to mention that poor water quality is a serious threat to public health in specific areas in Lebanon. As stated by Shaban (2016), increased pollution of surface and groundwater resources is leading the waterborne illnesses in many Lebanese communities.

c. Challenges related to mismanagement and governance

One major issue in governance lies in overlapping duties spread across different ministries, as well as the lack of coordination among these ministries (Shaban, 2016). One such example of lack of coordination in the Lebanese water sector is that between the CDR and the Ministry of Energy and Water (MOEW). Both entities are

constantly at heads when it comes to planning and monitoring of projects in the water sector (Riachi, 2016). Furthermore, ministries such as the Ministry of Environment and Ministry of Agriculture are viewed as being secondary to the CDR and MOEW.

The problems also lie in the policies governing the management of these sources (Riachi, 2014). Laws passed in the sector further complicate the distribution of these different roles ministries and government stakeholders play. One such example is Law 221/2000, which fails to lay out the government entity with the role of policymaking, and yet states that the Ministry of Energy and Water can form policies and provides policy advice to government officials (Farajalla, Kerkezian, Farhat, El Hajj, & Matta, 2015). In addition, there are a large number of stressors on the Lebanese water sector that are deteriorating the situation further. Major stressors to the sector include, but are not limited to, activities in the agricultural, industrial, transportation, energy, and domestic sectors (MOE/UNDP/ECODIT, 2011).

2. Actions taken by local and international bodies

Shaban (2016) stated that although there are a large number of projects, studies, briefs, conferences, and publications related to the Lebanese water that took place over the last three decades, progress in the water sector has not been made. With that said, initiatives being taken to improve the overall state of the water sector has been taken primarily by international donors, followed by regional ones, and lastly local (ibid). Figure 6 shows a comparison of the actions taken by local, foreign, and regional bodies to enhance the Lebanese water sector. Actions were divided into the following major categories: studies/research, data streaming, awareness, institutional coordination,

joint implementation, strategies/policies, and financial support. The figure also shows that action taken by international bodies surpasses that of regional and national actions. This can be attributed to a number of factors, but financial resources in the hands of international actors is the primary reason for this (ibid).

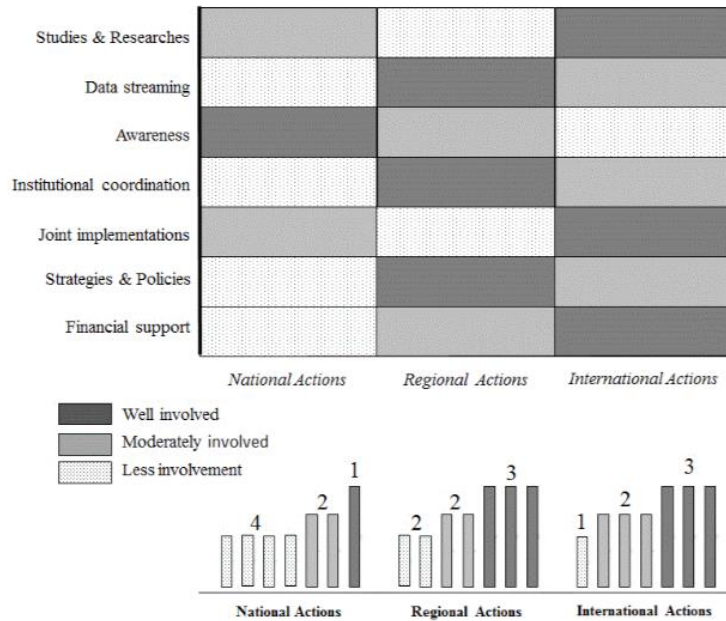


Figure 6: Actions taken by local vs. foreign actors to enhance the Lebanese water sector. Reprinted from “New Economic Policies: Instruments for Water Management in Lebanon”, by A. Shaban, 2016, *Hydrology Current Research*, 7(1). Copyright 2016 by OMICS Publishing Group.

Although millions of dollars are injected into the Lebanese water sector, be it in the form of loans, grants, or funding from international organizations, there has been little focus on what to do in order to preserve water supplies and manage them in the long term (MOE/UNDP/ECODIT, 2011). The Lebanese government, through different ministries, governmental organizations, and committees, has taken action but this action is characterized as shortsighted and costly, voiding any aspect of evidence-informed decisions.

3. Research in the water sector

On the research front, different types of institutions, including government and non-governmental organizations, universities and NGOs, are engaged in water research in the country to a certain extent.

A list of the main identified institutions engaged in water research is presented in Table 4.1. The major ministries, institutions and organizations are mainly divided into the following categories: international organizations, universities, donor bodies, local ministries, government bodies, and non-governmental organizations. It should be noted that the majority of those identified that are engaged in water research have covered aspects related to the Lake Qaraoun case study.

Table 4.1: Major institutions and organizations engaged in water research in Lebanon

Major Organization/Institution	Research related to Lake Qaraoun?
American University of Beirut (AUB)	✓
Arab Center for Research and Policy Studies	
Arab Fund and Kuwait Fund for Development	✓
Beirut Arab University (BAU)	✓
Bekaa Water Establishment	
Council for Development and Reconstruction (CDR)	✓
Danish Refugee Council (DRC)	
ECODIT	✓
Economic and Social Commission for Western Asia (ESCWA)	✓
El Ard Lebanon	✓
European Union (EU)	✓
Food and Agriculture Organization of the United Nations	
Global Environmental Facility	✓
International Development Research Center (IDRC)	✓
Lebanese American University (LAU)	✓

Lebanese Standards Institute (LIBNOR)	
Lebanese University (LU)	✓
OXFAM	✓
Society for the Protection of Nature in Lebanon (SPNL)	✓
Swiss International Cooperation	✓
The Association of the Friends of Ibrahim Abd El Al	✓
The Lebanese Agriculture Research Institute (LARI)	✓
The Litani River Authority (LRA)	✓
The Ministry of Agriculture (MoA)	✓
The Ministry of Finance (MoF)	
The Ministry of Energy and Water (MoEW)	✓
The Ministry of Environment (MoE)	✓
The Ministry of Public Works (MoPW)	✓
The National Council for Scientific Research (CNRS)	✓
The World Bank	✓
United Nations Development Program (UNDP)	✓
United States Agency for International Development (USAID)	✓

The development of research through the presence of the above organizations and institutions rarely reaches the policy level in Lebanon, however. One of the major recommendations in an attempt to bridge this gap between research and policy is the establishment of a uniform database between institutions, universities, and government agencies (El Amine, Farajalla, Chehadeh, & Acaf, 2018). This database would ensure that research is easily accessible, accurate, and presents reliable findings that would push for positive outcomes in the Lebanese water sector. The presence of such a database would also be one step towards achieving water security in the country.

Many of the institutions and organizations mentioned in Table 4.1 are major actors in the Lebanese water sector as well. The roles and descriptions of many of these actors are further described in detail in Part B.

B. Major Actors in the Lebanese Water Sector

As put by one expert, “little will change in the Lebanese water sector as long as the government of Lebanon and international donors fail to shape their message in a way that takes into account beliefs based on existing knowledge and political tensions.” (Kunigk, 1999). This shows that perhaps the most challenging obstacle towards proper management of the Lebanese water sector is the activity and opinions of government stakeholders. A policy brief released in 2016 stated that overlapping of responsibilities was one challenge to maintaining water integrity in Lebanon, in addition to government corruption, lack of government budgeting, haphazardly selecting employees not based on technical knowledge, and no proper source of data (Kerkezian & Farhat, 2016). One such example is the responsibility of policymaking. Policymaking is solely the responsibility of the MOEW, although the MOE also plays a role in influencing policymaking through publication of reports and press releases. For example, decision 8/1 dated 1/30/2011, called for the implementation of standards for discharging treated wastewater into sewers on behalf of the Ministry of Environment (ECODIT, 2015). Such a decision is an example of the role played by the MOE in the water sector. Table 4.2 represents a table of major actors involved in the water sector and their main duties, many of which are seen as overlapping.

Table 4.2: Major actors in the Lebanese Water sector

Stakeholder	Type (Governmental/ Non-Governmental)	Role of the stakeholder
Ministry of Energy and Water	Governmental	<ul style="list-style-type: none"> -Considered the main body in water management on a national level -Develop studies -Oversee national water establishments -Develop and enforce water policies -Initiate licenses of all water wells and extractions -Design water facilities -Oversee and protect water resources on a national level -Ensure public awareness
Regional Water Establishments (RWE)*	Governmental	<ul style="list-style-type: none"> -Water distribution (operation and maintenance) -Develop studies on water quality -Implement national water plans -Plan, operate and maintain local wastewater treatment plants <p>(Note: The Bekaa Water Establishment is responsible for managing water sources within the Litani River Basin)</p>
Litani River Authority (LRA)	Governmental	<ul style="list-style-type: none"> -Initially established as a "project implementation authority" in the Litani River Basin -Plan, operate, and maintain all water activities associated with the Litani River (including irrigation systems and hydro-electrical plants tied to the Litani River)
Ministry of Environment	Governmental	<ul style="list-style-type: none"> -Control and monitor all activities that impact the environment -Perform Environmental Impact Assessments (EIA) -Develop guidelines -Enforce policies
Council for Development and Reconstruction (CDR)	Governmental	<ul style="list-style-type: none"> -Provide support for water projects, through planning, funding, and managing -Work directly with international donor bodies
Ministry of Public Health	Governmental	<ul style="list-style-type: none"> -Establish regulations and guidelines that involved the quality of water (such as LIBNOR) -Ensure that the quality of potable water is acceptable -Publish data concerning the prevalence of waterborne disease in different areas -Issues licenses for bottled water
Ministry of Finance	Governmental	<ul style="list-style-type: none"> -Approve budgets for water agencies and municipalities -Collect fees for different water services
Ministry of Agriculture	Governmental	<ul style="list-style-type: none"> -Raise awareness among effective irrigation techniques among farmers and train them through different agencies, such as the Lebanese Agricultural Research Institute (LARI)
Local NGOs	Non-Governmental	<ul style="list-style-type: none"> -Have no legal standing in the water sector

		-Lobby for certain solutions to issues and may pressure groups into taking certain decisions
Municipalities	Governmental	-Control and maintain local water and sewage networks
Researchers and academic institutions	Non-Governmental	-Conduct studies, many of which have the potential to act as the major source of "research evidence" -Have the potential to form networks or channels to reach policy makers
International Organizations (Donor bodies)	Non-Governmental	-Plan, allocate, and provide funding for projects, mostly defined by their opinion of what is needed (in some cases, set terms and conditions for donor funding) -Work through governmental agencies, especially the CDR

The major actors mentioned in Table 4.2 are not the only actors in the Lebanese water sector. The Lebanese media is also an actor in various Lebanese sectors and plays a large role in influencing policy and spreading policy-relevant information across the country in some cases (El-Jardali et al., 2015). The media in Lebanon often is an extension of political parties that use televisions, radio stations, and social media as tools to further extend their views among citizens (Beyond Reform and Development, 2012). As earlier mentioned, since the media is capable of disseminating false information although it influences public policy formation, policymakers may depend on the media as their source of information (El-Jardali et al., 2015).

The Lebanese media often acts as a middleman between policymakers and citizens, creating a clash between both parties as seen before during the highly politicized Lebanese waste crisis in 2015. Daily news headlines leading up to the national revolts in 2015 included, “In Garbage Crisis, Lebanon chokes on bad air and bad politics”, and “Lebanese landfill closure once again threatens new trash crisis”. It is possible that such headlines lead up to civil society movements and revolts. Similarly,

it is possible that the media had an impact on the Lebanese government's move in taking the loan from the World Bank as part of the Lake Qaraoun Pollution Prevention Project. Prior to the World Bank granting the Lebanese Government with the loan, several national and international media outlets reported major issues related to the quality of the Lake. Such headlines included "Fish die en masse after Qaraoun Lake Poisoned", and "Qaraoun Lake drying up at an alarming rate". Such headlines appeared in July 2016, exactly one month before the World Bank approved the 55 million dollar loan as part of the Lake Qaraoun Pollution Prevention Project. This shows that government actions are perhaps initiated or further rallied for given that media sheds light on the issue. The role of the media in influencing citizens will be further explored throughout the study.

Civil society groups are also emerging in the country and have widespread opinions, and forming movements pushing for solving issues in different sectors, such as the "You Stink" movement during the waste crisis. In recent years, civil society groups in Lebanon were very active in addressing anti-corruption, and in some villages, implementing water projects (Farajalla, Kerkezian, Farhat, El Hajj, & Matta, 2015). In some cases, donor bodies, such as the USAID, allocate finances towards civil society efforts in carrying out water projects that engage citizens. One such example was as recent as September 2017, when the USAID signed grants with civil society organizations to carry out projects in hopes of "conserving water resources". Some involved civil society groups included the Association of Lebanese Industrialists, World Vision, and Industry and Agriculture in Zahleh. One of the major disadvantages regarding the role of civil society groups, however, is that their roles are not mentioned

through policies (ibid). Their presence needs to be supported by policymakers. As seen within the next section, the policies currently governing the water sector and are specific to governing Lake Qaraoun, or the Upper Litani River Basin, have their fair share of setbacks.

C. Existing policies related to Lake Qaraoun

As earlier mentioned, several of the currently effective laws governing the Lebanese water sector date back to the Ottoman Empire and French Mandate periods in Lebanese history (United States Agency for International Development [USAID], 2013). Furthermore, the majority of the laws and decrees governing the Lebanese water sector were introduced before the year 2000. The majority of the decrees that emerged during the Ottoman Empire are those that govern Lake Qaraoun today. One of the earliest is the Ottoman Code, established throughout the 1870s, which set the basic principles of water management in Lebanon. These principles included that water resources (for example, riverbeds and streams) belong to the public sector, legitimized the Irrigation principle, which states that anyone can irrigate from public bodies of water, and enabled water rights being sold along with the purchase of a land (USAID, 2013).

Later decrees, such as those established during the French Mandate, linked water resource management to public health. Decree 1932/16 and Decree 1935/2280 called for the protection of lands with potable water resources and banned the discharge of wastewater into bodies of water, unless otherwise specified by the government. Perhaps a notable decree that is related to the fate of Lake Qaraoun was a law passed in

1954 that established the Litani River Authority. It should be noted that the Litani River Authority was established before the Ministry of Energy and Water, which was established in 1966 through Law 20, more than 10 years after the establishment of the Authority (USAID, 2013). Furthermore, later decrees, such as Decree 14522 established in 1970, defined that the Litani River would be the major source of water for South Lebanon (including Beirut at the time). The allocation of the water supplies was calculated at the time according to the population and demand per capita, (USAID, 2013). This decree has yet to be updated although it is outdated given the changes in population increase witnessed today.

Another law, which led to overlapping duties between legal entities governing the Litani River Basin, was established in 1977. This decree established the laws needed for activating municipalities (or baladiyyehs) in Lebanon (USAID, 2013). This decree (Decree 118) set forth the terms under which municipalities operate. Municipality duties directly related to water resource management were valid through the mentioned decree, and included establishing collection networks for wastewater connected to wastewater treatment plants and confronting individuals or organizations that go against laws related to public health (USAID, 2013). Since Decree 118, little has changed in terms of clearly establishing the duties of different governmental stakeholders in water management. It is important to mention that the end of the Lebanese civil war in 1990 overlooked the importance of establishing policies that would address water resource management, and yet, the government focused on infrastructure and rehabilitation projects (Riachi, 2016). Table 4.3 represents the major laws and decrees passed since the year 2000 and have an impact on the management of Lake Qaraoun.

Table 4.3: Laws, decrees, and strategies passed that directly impact Lake Qaraoun (2000-2018)

Title	Year passed	Content of the Decree/Law
Law 221	2000	-The number of water establishments in the country is set to four (in addition to the Litani River Authority), replacing 21 local authorities and over 200 committees -The water authorities are governed by the Ministry of Energy and Water (MoEW)
Law 228	2000	-Set a framework for public private partnerships in all sectors. It specifically includes allowing for regulatory bodies to manage privatized projects
Law 337	2001	-Revises the title of the Ministry of Hydraulic and Electric Resources to the Ministry of Energy and Water -Directly relates to the functions of the new water authorities, calling for autonomy, approval of their functions as per the Council of Ministers, employment based on what they find suitable, and an annual update of their business plan -Auditing of accounts takes place through an independent body
Law 444	2002	-Protection of the Environment through 11 principles, which include prevention of natural resource deterioration, cooperation between the ministries and citizens, and environmental monitoring
National Water Sector Strategy (NWSS) (Resolution No. 2)	2012	-Strategy that aims to carry out the changes set by Law 221, present the water authorities with financial incentives, and introduce policy frameworks in hopes of bridging the institutional gaps -Target date for achieving the goals: 2015
Law 63	2016	-Referred to as the Budget Law

		-Outlines funding for the World Bank project to combat pollution -Allocates responsibility to the Litani River Authority for governing different components related to governance in the WHO project
Law 64	2016	-Issued in lieu of the World Bank project to combat pollution -Outlines the loan agreement and terms between the World Bank and the Lebanese government
Water Code (Law 77)	2018	-Drafted in 2005 with the assistance of a French agency -Calls for a “National” authority for carrying out water projects, project, guidelines, and policies comprised of ministries and water authorities -Calls for “water policy” enforcement authorities

Even though the above laws, decrees, and strategies represent major changes in the management, many aspects of the implementation regarding them are constantly under debate. Shaban (2016) states that Law 221 is not close to being implemented, since many discrepancies between legal and de facto functions are existent. Similarly, the National Water Sector Strategy strategies and goals set forth that were not achieved, and many institutions and organizations even questioned the data set forth from the Ministry of Energy and Water. The NWSS also failed to address the current situational changes with the impact of the Syrian Refugee crisis on water sources (El-Amine, 2016).

D. Issues being faced in Lake Qaraoun

Lake Qaraoun is a man-made lake located in the Bekaa Valley of Lebanon and was made to hold 220 million m³ of water (The World Bank, 2013). The lake is located

in the Bekaa region, which is the warmest area in Lebanon. The Lake is situated in the Upper Litani Basin as seen in Figure 7. The Litani River, the largest river in Lebanon, has been the focus of projects, studies, and international/national initiatives due to its escalating deterioration in recent years (Shaban & Hamze, 2018). As seen within Figure 7, the Litani River Basin (LRB) extends to four different governates in Lebanon, being the Bekaa, Mount Lebanon, Nabatiyeh, and South Lebanon. The LRB also includes an estimated 246 towns and villages, with a population of more than 350,000 individuals.

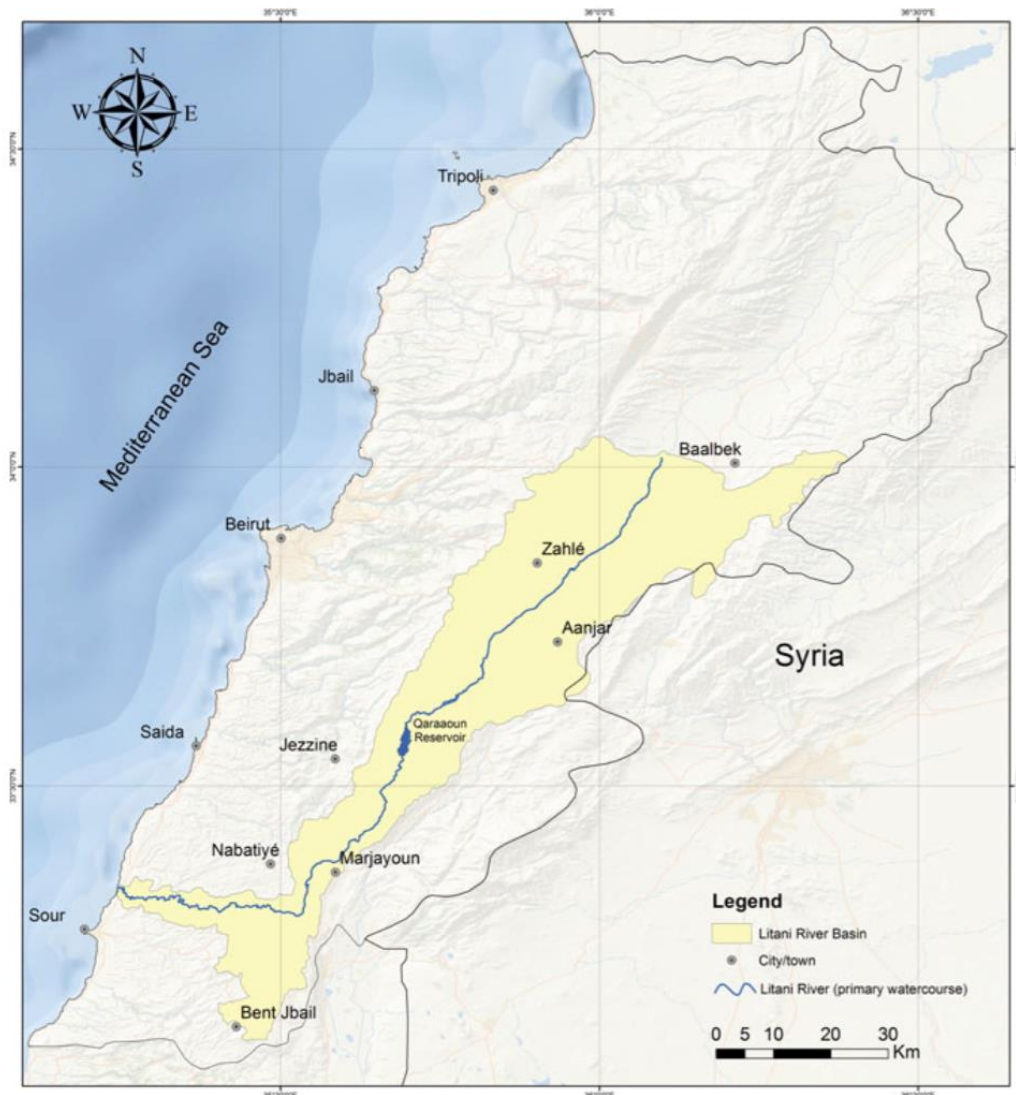


Figure 7: The Qaraoun Lake and the boundaries of the Litani River Basin

The United States Bureau of Reclamation proposed the construction of the Qaraoun Dam in 1959 (The World Bank, 2013). The major authority responsible for managing the Lake is the Litani River Authority. The major duties of the authority, according to the authority's website, include establishing and investing in projects involving irrigation, electricity, and drinking water in the region, water monitoring in all

of Lebanon's rivers, and conducting studies on lakes and dams (The Litani River Authority, 2016).

Pollution is the main problem in Lake Qaraoun, since the main source of input into the Lake is from the Litani River (Shaban & Hamze, 2018). The World Bank has classified the sources of pollution into four categories, mainly municipal wastewater discharge, in addition to municipal solid wastes from surrounding communities, wastewater discharge from industries, and agricultural runoff (pesticides and chemicals) from lands along the Litani River Basin (The World Bank, 2013). A three-year study published in 2013 showed that blooms of cyanobacteria, a type of bacteria that is capable of producing cyanotoxins, is present in Lake Qaraoun in the form of cyanobacteria blooms (Slim et al., 2013). The toxins produced in the lake are deadly to livestock, aquatic species in the lake, and humans who ingest the water in the lake (ibid). The growth of this specific type of bacteria is promoted by nutrients found in municipal and industrial wastewater, which is the case in the lake.

Environmental factors, such as high temperatures during the summer months, also promote bacteria growth. This coincides with Lebanese media reports in July 2016 that reported a large number of fish being found dead along the shore of Lake Qaraoun. At the time, however, media reports stated that someone had dumped a toxic chemical into the lake (The Daily Star, 2016). Most recently has the media brought such issues into light, although as reported by the Lebanese Ministry of Environment and the Swedish MVM consulting group, there was evidence of industrial wastewater pollution in the lake since the year 2000 (ECODIT, 2015).

Consequently, the lake has become the focus of several nongovernmental and international organization projects, with projects having mixed priorities related to how wellbeing and remedial efforts should be taken towards fixing the quality of the water in the lake. Projects have been directed on how to fix existing problems, rather than preventing them. This is also the case with past World Bank activities, which have focused on the water sector in the Bekaa region. One such example is that of the Emergency Reconstruction and Rehabilitation Project (1994), which called for a \$ 175 million dollar loan from the World Bank after the Lebanese civil war. The loan that was taken from the World Bank had included the construction of a wastewater treatment plant in Iaat, near Baalbeck (The World Bank, 2016). According to the World Bank, once the project reached the level of the local authorities, it was halted since they did not have the technical or financial capabilities required to complete the project. This is normally the end-result that is shared with other projects in the water sector that are funded by international agencies.

A major government effort to help identify the emerging sources of pollution in Lake Qaraoun emerged in 2010. During this time, EL ARD, a local environmental consulting company, published the Business Plan, which was completed in 2011 and estimated that remedial efforts would cost around \$ 255 million dollars (The World Bank, 2016). In turn, the Lebanese government endorsed the findings of this business plan, and requested financial assistance from the World Bank in 2013. This endorsement was brought on through the introduction of the Lake Qaraoun Pollution Prevention Project, which is a project focused on reducing untreated sewage through the connection of the lake to a sewage treatment plant and kicking off campaigns for

pesticide reduction (The World Bank, 2016). According to the World Bank, it also encompasses cleanup campaigns for municipal solid waste. In July 2016, the World Bank formally approved the project with a loan for \$ 55 million dollars to fulfill the mentioned project objectives. El Ard (in the Business Plan) estimated the total project cost for Combating Pollution of the Qaraoun Lake to be around \$ 66 million dollars for this phase specifically, with total costs of all stages amounting to \$ 144.33 million dollars (El Ard, 2011).

In addition to the World Bank, the USAID, as well as the LRA, have also been conducting projects in Lake Qaraoun. In 2005, the USAID conducted the Litani Water Quality Management Project through the establishment of the Litani Water Quality Management Basin Advisory Services (BAMAS) Project (USAID, 2005). This project included identifying sites for long term surface and groundwater monitoring in Lake Qaraoun, establishing acceptable parameters for common pollutants through a sampling campaign, and forming a national group on water issues (USAID, 2005). The project also aimed at investigating algal blooms in Canal 900, the main source in Lake Qaraoun that provides water to neighboring areas for irrigation (USAID, 2005). However, while the USAID conducted such projects that focused on investigating the level of pollution, the Litani River Authority has been conducting projects to maximize the amount of water for irrigation purposes through the Southern Bekaa Irrigation Project (The Litani River Authority, 2016). This project actually aimed to construct an additional pumping station at the bottom of Lake Qaraoun, which in turn, maximized the amount of subscribers depending on the lake for irrigation or domestic water uses in the region (The Litani River Authority, 2016). This is just one example of mixed priorities and

solutions to problems in the region. Neither of these projects, however, focused on policy recommendations as a fix to the Lebanese problems in management of water sources. One indicator of project effectiveness is the political support in a country like Lebanon. There is a lack of policy focus and according to the country's legal framework, there is no single ministry or entity that regulates the sector (Nassif et al., 2014). In addition, neither the MOEW nor the MOE has the legal authority to set policies in the water sector (Nassif et al., 2014). A study conducted on the analysis of water quality in Lake Qaraoun in 2014 called for greater stress needed to fix the gaps in the legal framework. It stated that one of the major problems identified other than outdated laws is that most quality standards are adopted from international organizations and are not based on actual Lebanese parameters and therefore, cannot be applied to the Lebanese context (Nassif et al., 2014). Furthermore, this has been reiterated by a local researcher, who has stated that part of the problem related to water is that the issue lies in the lack of knowledge among policymakers in Lebanon.

Other issues surrounding Lake Qaraoun are also identified as chronic management issues applicable to the Litani River Basin. Management decisions are taken through a top-down approach, which leads to decisions being taken by whoever exerts the most power and authority in decision-making. Legislation that control exploitation and conservation practices are also lacking (Shaban & Hamze, 2018). Government officials have stated that monitoring is impossible due to staff shortages in different authorities (Personal communication with a government official, February 7th, 2018). Further findings will be mentioned in the coming sections of the study.

CHAPTER V

FINDINGS AND DISCUSSION

The latter focuses on the content, actors, process, and context for the development of water policies that would aid in ameliorating the deteriorating situation in Lake Qaraoun. A stakeholder analysis is also presented within the section and outlines the positions of government vs. non-government actors when it comes to the use of evidence to inform policy.

A. Content

Three types of content were assessed: (1) the content of existing policies in the Lebanese water sector, (2) the content of policies that were drafted but not yet approved by the Council of Ministers or the Lebanese Parliament, and (3) content that has the potential to impact water management policies. All policies were assessed based on their impact on the management of Lake Qaraoun.

1. Content of existing policies in the Lebanese water sector

The content of policies that exist to support the management of Lake Qaraoun is lacking. This aspect was shared among the majority of participants, especially when it came to policies that outline the roles of different ministries or government agencies. The major issue with policies currently governing the Lebanese water sector, and overall management of Lake Qaraoun, were identified as the overlapping of administrative, authoritative duties, and vagueness.

One major discrepancy identified through the thematic analysis and interview feedback was related to the governance that was supposedly granted to the LRA through Law 63. Although in principle Law 63 granted the LRA governance in Lake Qaraoun, this was not the case in reality. An interview participant from the LRA argued that one of the major challenges being faced in the overall management of Lake Qaroun has to do with the power granted to the LRA. He stated that a change in policies before anything else is needed since there are many things the LRA cannot do, even under Law 63. The LRA official also stated that the authority cannot make cases against people and industries that are known to be polluting the Lake.

Another form of legislation that was mentioned by an interview participant was the National Water Sector Strategy (NWSS). The head of a leading NGO in the Lebanese water sector was interviewed. She stated that the data presented within the strategy were inaccurate and at one point, she had communicated this with government officials, who brushed off her feedback. Another interview participant stated that the NWSS has major gaps in addressing basic aspects of water resource management, especially in terms of safeguarding groundwater. The participant's input was another example of a current form of policy that has little effect on managing Lake Qaraoun, and even the Litani River Basin.

Gaps similar to those identified within Law 63 and the NWSS were also identified with Law 221. One interview participant claimed that although Law 221 gives the Ministry of Energy and Water (MOEW) the role of providing the government with direction related to policy formation, responsibilities are not outlined for the ministry

within the Law. Studies reviewed as part of the thematic analysis also shared these views, with many raising questions over whether or not the law is even implemented after several years.

2. Content of policies that were drafted but not approved

As seen within the previous chapter, a number of policies have been drafted but were not approved by different levels of government. As put by one interview participant, who also happened to be an official at a government agency, the government is like a turtle when it comes to policymaking in the water sector. Interview findings showed that there have been policies and decrees drafted that would have led to positive outcomes in managing Lake Qaraoun.

One drafted policy mentioned was that concerned with granting the LRA a river basin authority status. An LRA official interviewed also revealed that the policy had been drafted years ago in parallel with the National Water Sector Strategy (NWSS), and called for the LRA to become a Basin Agency. The thematic analysis revealed that the Litani River Basin Management Support Project (LRBMS) conducted by the USAID had also recommended a unified single river basin authority. According to the LRBMS, the existence of the Litani River Authority in itself provides a unique foundation for establishing a medium that would have the potential to centralize and address challenges in an integrated manner (USAID, 2014). The basin authority would also be one step forward towards achieving IWRM in the Litani River Basin. However, the law is still pending approval.

3. Research that has the potential to impact water management policies in Lake Qaraoun

In terms of content that exists to impact the formation of policies relating to Lake Qaraoun, gaps related to the uptake of existing data exists, according to the majority of interview participants. One such example is related to the data generated by the MOPH related to the prevalence of waterborne illness in the Bekaa region. During a review of primary data related to quality issues within the Lake that are impacting neighboring villages, it was discovered that the MOPH generates data related to the prevalence of disease through the Epidemiological Surveillance program. The data is published on the MOPH website and is publically available. In 2018 alone, a total of 766 cases of food and waterborne disease were reported in the Bekaa (MOPH, 2019). These cases accounted for more than 60% of the total cases of communicable diseases reported in the Bekaa region of Lebanon. Viral Hepatitis A, a disease caused by drinking contaminated water, accounted for 423 out of the 766 cases reported. Although the MOPH states that it monitors the quality of household water sources within the area, there is no proof that there is action being taken to limit the burden of disease or even investigate the direct causes to the best of our knowledge.

A member of a local NGO specified that there is no government initiative to produce an approach to assessing and producing periodic forms of data related to monitoring of the Lake. A local researcher who studied Lake Qaraoun for several decades also indicated that his research focused on studying the sediments within the Lake for 20 years, however treating the sediments for heavy metals and other impurities was never mentioned within the roadmap for combating pollution in Lake Qaraoun. The

researcher, who is part of a national scientific committee, stated that he was never approached by the El Ard consultancy agency for data or recommendations regarding remedial efforts. This is the major reason why the researchers interviewed did not have hopes in the Lake Qaraoun Pollution Prevention project. Another researcher interviewed also labeled the roadmap for combating pollution as “baseless”, stating that the El Ard consulting agency simply gathered random data to label issues with a price tag for funding bodies to grant the government the loan. This was found to be a major area of disagreement between researchers and government officials interviewed.

A few of the interview participants (especially those working in ministries) claimed that the presence of the roadmap for managing Lake Qaraoun was being used as an effective guideline for action to be taken. They also expressed the roadmap being based on evidence, and in turn, being translated into laws, such as Law 63. The roadmap, which was created based on the 2011 El Ard Business Plan, is sometimes referred to as an 'action plan' rather than a roadmap in a sense that it outlines the actions needed to depollute Lake Qaraoun. A published version of the roadmap was not shared by the officials interviewed. A government official interviewed from the Ministry of Environment (MOE) and is directly involved in the Lake Qaraoun Project indicated that the actions outlined within the roadmap imply the shift from 120 studies (from the business plan) to policies and actions.

The nature of generated research evidence was also a reoccurring theme that appeared within the interviews not only among researchers, but also policymakers. One policymaker claimed that research evidence generated, especially on an academic level,

is too technical or narrow for them to comprehend. Recommendations made in certain publications do not address policy fixes, or do not make practice recommendations. However, there are forms of research studies that do, as seen within the literature review of the study.

Access to content is another major issue that was addressed by a number of interview participants. One participant mentioned that data developed by ministries is normally centralized within a specific ministry, and that ministries are sometimes skeptical about sharing statistics. A local NGO official stated that she had once approached a ministry in order to help a student get primary data related to rainwater precipitation but the official was denied the request. This may infer that there is a lack of mediums for exchange of information between different stakeholders within the water sector.

B. Context

In terms of the Lebanese context for forming evidence-informed policies that would better manage Lake Qaraoun, reoccurring themes were divided into facilitators and barriers. It should be noted that categorizing these themes was based on the author's judgement and input from the thematic analysis and interviews conducted. The factors are summarized in Table 5.1 and further explained below:

Table 5.1: Contextual factors (facilitators and barriers) specific to the use of evidence to impact policies for managing Lake Qaraoun

Contextual Factor	Nature (Facilitator / Barrier)
National Efforts (i.e. presence of national committees and passing of laws)	Facilitator
Lebanese political context	Barriers
Influence of the funding body	Barriers
Lack of technical data	Barriers
Lack of communication between policymakers and researchers	Barriers
Lack of data accessibility	Barriers

1. Faciliator

a. National Efforts

Although the barriers outweigh the facilitators, it should be noted that national efforts have been made related to managing the Lake, although not always in the form of policy or clear output. Many of the mentioned actions have the potential to impact policy, however, which is why certain efforts were classified as facilitators. One major effort is the emergence of the Lake Qaraoun Committee. The national committee emerged in 2014 as a result of a decision taken by the Council of Ministers. The major role of the committee is to supervise and follow up on the roadmap that was created for the remediation of Lake Qaraoun. A few of the positive aspects of this committee were mentioned during an interview with an official from the LRA. The official stated that the committee is composed of different ministries, municipalities, and water authorities that meet on a monthly basis to follow up on the implementation of the roadmap. The committee is also used to inform different ministries of violators, such as an illegal well being drilled, since the committee in itself cannot take action unless it is through a ministry. In a sense, this limits the committee's authority.

Just the fact that the committee was established places hope in the fact that there are government initiatives to manage the Qaraoun Lake, other than financial initiatives. However, the committee does have its limitations since it cannot take any action as an entity and have no legal authority. The best the committee can do is to inform other ministries of issues under their jurisdiction, or ensuring to include information within their periodic reports that may catch the eye of policymakers. Another limitation was mentioned by an official interviewed in the MOE was that the committee is missing the Ministry of Public Works and Transportation. She stated that they are an integral part of the solution in Lake Qaraoun, since many of the environmental issues being faced in the country are due to rapid urbanization. The inclusion of the ministry was overlooked upon the creation of the committee.

Another example of national effort to better manage Lake Qaraoun could perhaps be the passing of the recent solid waste decree, since waste management is a challenge in the Lake. Although the law was highly contested, a ministry official mentioned that the passing of this law would have a positive impact. The effects are too early to tell.

2. *Barriers*

a. Lebanese political context

The Lebanese political context was a barrier that was identified by the majority of study participants. Major findings related to the Lebanese political context that hindered policymaking were mainly mentioned as: an unstable political situation, with

consistent bickering among policymakers, lack of coordination among different ministries, power struggle among different ministries, and external pressures (especially international funding bodies) influencing political decisions.

One specific scenario that a local researcher and expert in the Lebanese water sector shared during an interview showed that political bickering impeded the passing of a drafted law within the water sector. The researcher stated that the NWSS was being revised almost 10 years after it was written and that the strategy was never implemented to begin with – and this was due to one political front not wanting to give credit to the political party that took credit for the strategy.

Although feedback received mainly portrayed the country's political context in a negative sense, the input received from one ministry official portrayed the political context in a positive light. When asked whether or not the country's political context is a barrier to policymaking, she stated that topics related to water issues unite citizens and politicians, ensuring that related laws are passed in a timely manner. However, throughout the study interviews, the general mood was not one that reflected a unified outlook when it comes to problems in Lake Qaraoun.

At the same time, the same official interviewed stated that there is one political challenge, related to the political cover some industries have in the area surrounding the entire Litani River Basin. She stated that even the ministry struggles with dealing with political parties operating in the area. Such a concern for “political party support” among government officials is alarming. This infers that without the support of a

political party, legislation cannot be effectively enforced. Specific examples of food industries operating in the area were also shared during an interview. Two examples of these industries given were Master Chips and LibanLait.

b. Influence of the funding body

Feedback from interviews showed that many of the funding bodies that carry out water-related projects and studies sometimes define the terms in which the project takes place. The funding body controls the project in a sense that it determines the budget and timeframe of a project, which are sometimes short-sighted and do not provide concrete policy recommendations after completion. An expert in water policy at a local university claimed that many donors impose their requirements on the Lebanese government and set the terms for the project, regardless of the need. Many local policymakers are also sometimes pressured into passing certain laws to receive funding. This supports the claim within one study that stated funding bodies operating in the Lebanese water sector play a leadership role in shaping policy and projects in the post-civil war era (Fraiture, 2017).

The influence of the funding body was portrayed in a negative light among other researchers interviewed as well, by stating that they further complicate the already fragmented institutional situation in the water sector. Another academic expert at a local university stated that donors contribute to the water sector through the following scenario: by building wastewater treatment plants regardless of existing problems with distribution networks, lack of electricity, and lack of technical knowledge being given to local individuals operating the plant once the project is completed.

c. Lack of technical data

Another major barrier identified is the lack of technical data, or data being developed, that is related to monitoring water quality and quantity. Although the literature review conducted within this study shows that there is ample research evidence that more or less presented similar findings, ongoing monitoring is a major gap related to evidence in the water sector. A senior advisor within a local ministry stated that water quality in the Litani River is not being consistently monitored within all tributaries. This was also verified by an official interviewed in the LRA that confirmed that they still have not started monitoring water results consistently in all sampling areas surround Lake Qaraoun and the LRB. This is a major gap related to assessing the quality of the influent being discharged into the Lake, and diminishes the prospect of linking quality issues with waterborne illnesses for future studies which are needed.

A government official also raised the issue regarding lack of data within the water sector that could help link water quality problems to emerging health issues within certain areas. Although data released by the MOPH on waterborne disease is present, the official stated concerns regarding lack of cancer studies within the area. He stated that there is a constant debate regarding if the water ‘causes cancer’ or not and whether or not heavy metal pollution is linked to rising cancer cases confirmed by the media in the area.

d. Lack of communication between policymakers and researchers

A fourth barrier identified was the lack of communication between policymakers and researchers. This was a shared concern among those interviewed within both parties. Respondents from both camps stated that there is no formal channel for the communication of research, and that in many cases, universities depend on personal connections with policymakers for studies or panel discussions in the water sector. Local researchers stated that the major problem regarding communication between policymakers and researchers is that policymakers think that they can take decisions regarding Lake Qaraoun without knowledge of the biodiversity, flora, or even the biological state of the Lake.

Another researcher stated that the effectiveness of approaching a policymaker with evidence depends on a number of factors and conditions, being good timing, the political aspect, and the desire of the policymaker to want to gain knowledge of this evidence (i.e. if the issue at hand is within his/her agenda). This supports the model represented in Figure 3, which emphasizes individual factors specific to the policymaker impact the policymaking process.

e. Lack of data accessibility

A number of respondents agreed that a major barrier is the lack of accessibility to data. Many respondents stated that water data in the country is fragmented, with different numbers and statistics being shared among the public and being spread by the media. There is a need for data to be publically shared, similar to the Epidemiological

Surveillance program within the MOPH, especially for data related to water monitoring in Lake Qaraoun. An official at the LRA mentioned the following:

“If someone wants these [water quality] reports, they need to apply for them and get this request approved by the Director General of the LRA. Approval is received depending on the need. There are plans to share the reports, but this has not been finalized yet.”

C. Process

The process related to policymaking in the Lebanese water sector is unclear. A general observation as per feedback obtained during the interviews showed that there is no uniform process for policymaking, especially agenda setting, policy formation, and the use of evidence throughout the process of policymaking.

1. Agenda Setting

As previously mentioned within the literature review, there were two major policies that were adopted and related to the management of Lake Qaraoun, being Laws 63 and 64. A ministry official directly involved in the passing of the laws was asked how the issues related to Lake Qaraoun first came to the attention of policymakers and why they had decided to take action. The ministry official stated that action was initiated by the Ministry of Environment in 2011. During this time, the cleanup of the Litani River was an initiative of the MOE and the ministry placed the protection of the Litani River on the government policy statement. The interview participant stated that the ministry helped mobilize the necessary resources to start action since there have

been so many studies before, and that the ministry had to start with a kind of business plan. The ministry created a partnership with the UNDP to do this study and there was a bid granting the ELARD consultancy agency to do the business plan. She also mentioned that the cleanup of the Qaraoun Lake was part of national efforts relating to the cleanup of the Litani River, which appeared in the government policy statement in the first place as per recommendations from the various parliamentary commissions in the previous years.

Although the ministry official seemed to infer that problem identification was possible based on the actions of the MOE, the involvement of the UNDP as a foreign body may have pushed for government pressure to take action.

2.Policy formation

The form of the action taken regarding a policy issue is also influenced by a foreign body, as mentioned by one researcher. He explained that the policy formation process is set by the international organization or funding body, such as the World Bank. The researcher specifically mentioned that a foreign consultant part of the World Bank, USAID, or EU is commissioned with a report that uses “locally generated” data but is presented under foreign titles, since the Lebanese government “likes everything foreign”. He further explained that once the government is presented with the recommendations the study sets forth, they follow them, since these bodies have the knowledge in the government’s view. This shows that the government depends a lot on International organizations to help them orient policies. However, a ministry official

stated that the foreign bodies do not dictate the direction the government should take, but they assist.

When interview participants were asked about how the process of policy formation regarding Laws 63 and 64 took place, there were discrepancies identified throughout the responses. Ministry officials interviewed described the laws being passed due to “coordination” among the LRA, CDR, and ministries of MOE and MOEW. The LRA official had denied this. However, a municipality official that is part of the Qaraoun Committee stated that the Lebanese government only passed the law due to pressure from the World Bank in order to secure the funds for the loan. He also mentioned that the laws had been adopted to clearly identify the agreement between the Lebanese government and the World Bank.

3. Use of evidence in policymaking in the water sector

Generally speaking, the majority of government officials that were interviewed portrayed the presence of evidence and data derived from local sources as being drivers for formation of Law 63 and Law 64. As earlier stated, a ministry official claimed that 120 studies were used to form the roadmap, which led to the adoption of the World Bank Loan for the Lake Qaraoun Pollution Prevention Project, and ultimately, the formation of Law 63 and Law 64. Non-government officials, mainly researchers that were interviewed, disagreed over this.

One researcher interviewed claimed that the actual process of policymaking in the water sector lacks the use of evidence due to the cultural factors in Lebanon and

the concept of the “lord”, also known in Arabic as the “Zaim”. The researcher stated that if the Zaim calls for passing of a certain law, then followers would rally behind him regardless of the evidence. That is something that hinders citizens’ lack of awareness of what constitutes a policy.

As earlier mentioned within the context section of our findings, a number of the barriers specific to the use of evidence in policymaking were mainly attributed to not only cultural factors, but mainly political factors and the data or evidence available.

D. Actors

1. Identification and analysis of the roles of major governmental and non-governmental actors

The major actors in the Lebanese water sector, specifically those involved in Lake Qaraoun, are ample. The actors did not differ in terms of those mentioned within the literature review. General observations related to the actors and their role in the Lebanese water sector, specifically Lake Qaraoun, included the following major findings: overlapping roles among different government ministries, lack of coordination among different actors, issues of credibility among different government agencies, and unclear roles.

One major finding was related to the role of the LRA. An official that was interviewed within the LRA gave his honest input regarding the authority’s role in Lake Qaraoun. The official stated that if the LRA desires to do a cleanup campaign, they

cannot without permission from the MOE. The LRA official also stated that perhaps giving the LRA authority would result in taking powers from the MOEW. It is all an issue of politics.

A stakeholder analysis was conducted based on classifying the actors into two major groups: those who agree that evidence-informed policies are needed to manage Lake Qaraoun (supporters) and those who disagree that evidence-informed policies are needed to manage Lake Qaraoun (opponents). It should be noted that the opponents were classified as such since they expressed that the emergence of Laws 63 and 64 were already influenced by evidence, being the roadmap. Figure 8 portrays the stakeholder analysis.



Figure 8: Supporters and opponents regarding the need for evidence-informed policies to manage Lake Qaraoun

2. The role of the media in portraying issues related to Lake Qaraoun

The study also analyzed the role of a major actor being the Lebanese media. There were shared views regarding the impact of the media. Government and non-government actors mainly portrayed it in a negative light. An official in a ministry stated that although the media does play a positive role through informing the public of issues related to Lake Qaraoun, it does not present the information in a factual manner. She went further to state the following:

“The media has to ensure that they are not alarming people, especially while claiming that there are a number of deaths related to water contamination in the Litani and Qaraoun. We cannot prove this... we need lots of studies before reaching a conclusion. They need to be fair and analytical, asking the right people.”

Figure 9 organizes the major findings based on Walt & Gilson’s policy triangle.

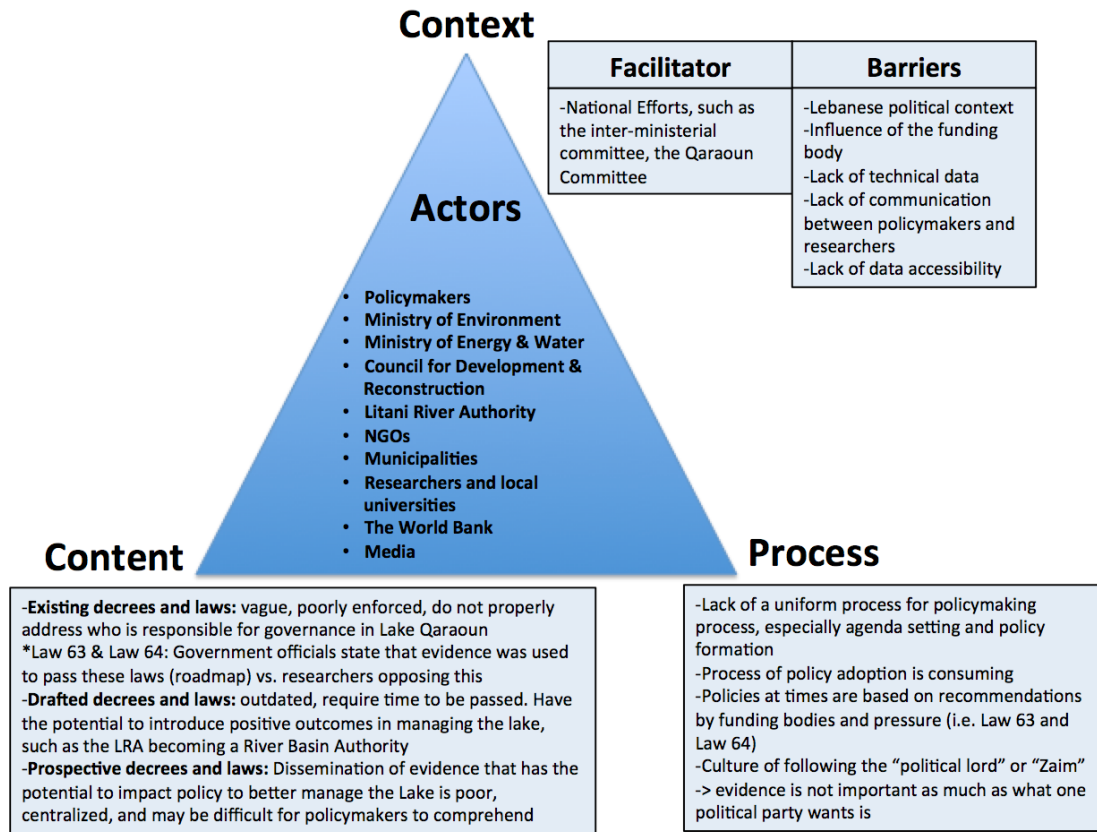


Figure 9: Major findings based on Walt & Gilson’s policy triangle framework

E. Discussion

The study’s findings shed light on the policymaking process in the water sector in Lebanon. This was done using the policy triangle framework, which assessed the interaction between content, actors, process, and context. This framework allowed for exploring the views of various ministries, researchers, government officials, non-governmental organizations, and municipalities regarding the use of evidence in policy, specifically within the context of Lake Qaraoun.

Findings showed that the policymaking process in Lake Qaraoun and the Lebanese water sector is unclear, with different accounts regarding how laws were passed. There was general disagreement regarding the involvement and influence foreign bodies play when it comes to major phases of policymaking, especially agenda setting and policy formation. Although many ministry officials interviewed agreed that all parties worked in close coordination regarding the law, we see other examples across Lebanese sectors that prove otherwise. One such example is the passing of the controversial waste management decree. The decree, passed by Parliament in September 2018, called for the establishment of incinerators across Lebanon, a decision that was heavily opposed by researchers, academic centers, and ministries around Lebanon due to the health effects (Azar, 2018). Many critics stated that the law was passed in order to make Lebanon eligible for loans and projects from foreign bodies due to the upcoming CEDRE conference. This is just one example of how research evidence in Lebanon had the potential of impacting the policymaking process, and yet recommendations from research evidence or publications were overlooked. It can be inferred that a similar situation was the case in Lake Qaraoun with the passing of Laws 63 and 64.

The integration of research evidence in policymaking was found to be lacking. Although evidence is present through research studies and quantitative data published by the MOPH is publically available, the uptake of evidence to influence the policymaking process was found to rely heavily on factors other than the nature evidence, namely individual factors relating to policymakers and researchers.

The stakeholder analysis conducted showed a major difference in opinions regarding the need for evidence-informed policy to improve the current state of Lake Qaraoun. When various ministry and government staff were interviewed, many expressed that evidence is already integrated in policy formation, whereas non-government actors expressed the contrary. This was possibly due to different understandings of what evidence-informed policy really is, and how it can be applied to the water sector in Lebanon. As seen within the literature review, variations in what is considered evidence among policymakers and researchers causes further divergence in opinions and actions throughout the policymaking process. As mentioned by El-Jardali et al. (2013), there is a rather large gap when it comes to researcher and policymaker views regarding a certain issue in the Eastern Mediterranean Region (EMR). This was found to be due to a number of factors, mainly due to the treatment of research in many of the identified political environments of these countries, political factors, and even lack of trust among both parties.

Solutions are needed for bridging the gap between both camps. This specific area is understudied within the Lebanese water sector, and recommendations for bridging this gap are sometimes too general, with no assurance that they apply to the Lebanese context. A study conducted in Ghana presented potential solutions, suggesting researchers should match evidence that would be anticipated by policymakers and present solutions to pressing issues, involving policymakers in the research process early on, and perhaps relying on the media to get their message across (Amponsah et al., 2006). The media in Lebanon, however, is sometimes backed by political parties and it

would be hard to get a message across to the public if the evidence is not in line with political party interests.

The role of the media was portrayed in a negative light, especially when it came to covering issues related to Lake Qaraoun. Many journalists lack the technical ability to correctly identify effective and accurate evidence without being guided by researchers. This dynamic is not present within the Lebanese setting.

Respondents also stated that the media is responsible for spreading rumors linking the quality of water to the emergence of cancer and other illnesses in the Bekaa, however the lack of studies that focus on the linkages were the main problem related to this rumor. This is another example of the effects of lack of policy-relevant data. Due to the lack of evidence and proper training in identifying and communication evidence, the media plays a role in distorting and spreading rumors.

The majority of non-government actors that were interviewed agreed that the use of evidence to influence policies that would better manage Lake Qaraoun should be implemented, and acknowledged a number of barriers that are present. These barriers were identified as mainly contextual factors specific to Lebanon, in addition to cultural factors. The barriers included: the Lebanese political context, the influence of the funding body, the lack of and access to data, and the lack of communication between policymakers and researchers. The barriers identified were similar to studies conducted in the Lebanese health sector and energy sector regarding policy formation and were mainly identified as political.

It is worth mentioning that although the barriers are ample, there was one facilitator, which is a government effort in the form of the inter-ministerial committee to combat the pollution in Lake Qaraoun. Although the committee has a limited amount of authority, at least it is bringing issues to the attention of the Council of Ministers when possible. Many of the interview participants were members of the Qaraoun Committee, and gave positive accounts regarding their accomplishments. They have been playing a proactive role based on the interview findings. It is hoped that with the passing of the recent Water Code, which calls for the creation of a national water committee that would be responsible for closely studying the need and implementation of water-related decrees, the committee would be able to play a more proactive role. The effectiveness of the implementation of the water code could also be an opportunity for a future study.

Policymaking in the Lebanese water sector is understudied and studies relating to how potential policies can improve the water sector in specific cases is lacking. Findings were consistent with regional findings when it comes to evidence-informed policymaking barriers in the EMR in other sectors. For example, a study conducted in the health sector by El-Jardali et al. (2013) showed that common barriers were lack of policy-related research, lack of communication between researchers and policymakers, and political factors, especially corruption. These were more or less similar to the findings within the study in the water sector. The study has the potential of being used for establishing preliminary findings in the water sector concerning evidence use and barriers presented.

CHAPTER VI

CONCLUSION AND POLICY RECOMMENDATIONS

This study explored the use of evidence to inform policy in the Lebanese water sector. It identified the factors that influence the use of evidence in the water sector through the case study of Lake Qaraoun. The challenges being faced in the Lebanese water sector, the situation in Lake Qaraoun, and the existing policies related to the management of Lake Qaraoun were discussed. Different aspects of evidence-informed policymaking, with related challenges and benefits, as well as several case studies were presented across different policy areas.

Major studies mentioned within the literature review demonstrated consistency with study findings regarding the factors that facilitate or act as barriers when influencing the use of evidence in policymaking. One such study was conducted in the Lebanese energy sector. According to Khodr & Hasbani (2013), factors such as the Lebanese political context, lack of communication networks between policymakers and researchers, and lack of institutional capacity were identified as factors that contribute to the absence of evidence-informed policy. Another study in the health sector, specifically relating to drafting a nursing law, posed similar findings. Barriers identified included a fragmented policy formation process, lack of policymaker access to research evidence, and political factors specific to Lebanon, especially political influence and interests identified among stakeholders (El-Jardali et al., 2014).

Semi-structured interviews were conducted using an interview guide that was based on Walt & Gilson's Policy Triangle framework. Findings were also presented through the use of the policy triangle framework. These were divided into the following sections: content, context, process, and actors. Our findings concurred with the above literature; major findings also included facilitators and barriers to the use of evidence to influence policy.

Barriers identified included the Lebanese political context, influence of the funding body, lack of ongoing technical data, lack of communication between policymakers and researchers, and lack of data accessibility. These barriers were more or less consistent with the mentioned barriers identified in studies conducted in other Lebanese sectors. This study differed in a sense that it identified national efforts being taken to properly manage Lake Qaraoun in a positive light, regardless of assessing the effectiveness of these efforts in the long term and their impact to translate actions into policies. Recommendations made were specific to Lake Qaraoun, and were found that they could be applied to different Lebanese sectors, as mentioned in the following section.

A. Policy Recommendations

Based on the study findings, observations and discussion, recommendations for overcoming the barriers related to evidence-informed policymaking in the Lebanese water sector were formulated. These recommendations are also applicable in the case study explained within this study. Major recommendations were classified as the following:

1. Improving the existing policymaking process

Before addressing the issue of using research evidence to inform policy, there is a need to address the existing policymaking process in Lebanon across all sectors. As a result of the Lebanese civil war and ongoing political bickering, ministries are lacking when it comes to forming or implementing policies. There is an existing struggle for power when it comes to decision making. The policy process varies and is incomplete in a sense that two employees of two separate Lebanese ministries gave us different accounts of how the policymaking takes place.

Based on the case study of Lake Qaraoun, Laws 63 and 64 were passed since they were required for effective implementation of the the World Bank Loan in the Lebanese context. Policymaking is decided upon outside of public institutions, is based on specific situations, and as seen within our case study, is ‘influenced’ by the activities of international organizations. Statesmen that have the potential to impact the policy process at times belong to political powers, both foreign and local, and decisions reflect their interests, rather than citizen needs. Solutions are needed to create policies that involve all stakeholders among different sectors.

2. Improving the existing regulatory framework

Although a number of regulations related to the Lebanese water sector exist, the policies and decrees are outdated and are not properly implemented.

Recommendations for improving the regulations include the introduction of laws that clearly set forth the roles and responsibilities of major stakeholders involved in the Lebanese water sector. There is a need for highlighting the roles, duties of each

ministry, international organization, donor body, municipality and non-governmental organization (NGO). NGOs are especially playing an increasingly important role in the Lebanese water sector, with hundreds of environmental NGOs emerging and have been active in expressing the growing issues in Lake Qaraoun and acting as a catalysts for civil society movements. Shaaban (2016) has gone further to recommend policies related to liability, similar to the 'polluter-pays' dynamic, meaning industries dumping wastes into Lake Qaraoun would be fined based on such policies. The only issue would be related to enforcing such policies.

3. Enforcing environmental accountability and political transparency

Enforcing environmental accountability may appear to be a basic recommendation, but it should still be mentioned since had accountability been taken into consideration when the well being of Lake Qaraoun was first under threat due to industries or practices, perhaps the issue would not have reached the level of urgency it is at today. As expressed by ministry officials, the issue of accountability cannot be achieved without political transparency and putting personal interests secondary to all decisions taken when it comes to managing Lake Qaraoun. It is quite known that local political parties with connections support industries responsible for polluting Lake Qaraoun. These political parties ensure their actions remain unpunished. This recommendation is not only at a policy level, but it should also be effectively enforced with government officials giving it the attention it needs. A ministry official interviewed stated that a Law passed in 2014 called for the presence of environmental judges in each governate that should be fully dedicated to environmental issues. However, the country has yet to witness these fully dedicated judges in office.

4. *Changing the way policymakers, researchers, and citizens ‘frame’ water sector issues*

Ensuring that the longstanding problems in Lake Qaraoun need to be framed as not only ‘water quality or quantity’ issues, but as issues that also impact the health, industrial, and food safety realms is also needed among Lebanese policymakers researchers, and citizens alike. Rather than policymakers looking at environmental issues as merely political, and rather than researchers seeing them as merely scientific, a coordinated view of all aspects related to the problem among all parties should be achieved. Partnerships between citizens, researchers, and policymakers are needed, especially in developing countries.

In the case of Lake Qaraoun, citizens are forming their own networks through civil society to voice their concerns. Citizens are at the heart of achieving SDGs since their awareness and engagement is vital for a number reason. Citizen awareness is especially needed to hold governments accountable when it comes to failing to meet their targets related to education, poverty, justice and equality. When organized into civil society groups, they have the potential to take action and shed the light on corruption or oppression (Sriskandarajah, 2018). Calls for ‘citizen-generated’ data, or data that is developed by citizens based on problems that they are affected by, is also a concept that has been called for as part of achieving the SDGs. Such forms of data can help feed evidence into policymaking through bottom-down approaches (ibid).

Coordination among different stakeholders is rare, especially among different ministries. Although committees that consist of members from different ministries exist, such as the Qaraoun Committee, the committee is disabled in a way that they do not

have the authority to take action. The water code that was passed in 2018 will need to be followed to see if the law will make any improvements in delineating roles and responsibilities in the sector.

5. Creating networks for sharing local research and evidence with policymakers

Although there are networks for presenting, sharing, and communicating local research evidence with policymakers in Lebanon, this is only the case for the health sector. Another major issue being faced is the use of local research, which is sometimes overshadowed in the presence of research coming from foreign bodies and organizations. The existence of academic studies conducted in Lebanese university settings that focus on water issues is growing. Universities and local researchers synthesizing reliable evidence in the Lebanese water sector is ample, however many of their findings fail to reach policymakers. A national effort to create a medium for sharing research findings related to the water sector, and Lake Qaraoun specifically, is recommended. Such mediums will also lead to communication among local researchers and policymakers. Positive outputs of such mediums were mentioned within this study in which the AUB Knowledge to Policy Center's findings impacted communication among policymakers and researchers, and impacted the formation of policy. Therefore, there are settings in which Lebanese policymakers are embracing evidence-informed policymaking.

B. Study Limitations

Although the contributions of this study to the conditions surrounding policymaking in Lebanon and in the water sector were satisfactory, this study did

encounter a few limitations. One major limitation was faced in terms of accessing certain stakeholders for interviews. A large number of those interviewed were first approached through personal connections or snowballing. A number of potential participants were contacted by e-mail or phone and refused to be part of the study perhaps given the sensitive nature of the topic. Some others did not reply to interview invitations after countless attempts to contact them. Another major limitation was that the deteriorating situation in the Litani River, and consequently, Lake Qaraoun, is an ongoing problem. As chapters of this study were finalized, new developments were unfolding regarding the case study at hand. Therefore, the analysis and recommendations of the study could be subject to change by this time the study is published. Although the recommendations presented were directly formulated based on study findings, their effectiveness can only be measured if applied to the Lebanese context.

Interviews with different stakeholders may have also lacked transparency or were bias, especially those interviewed within different ministries. For example, when asked about the effectiveness of government efforts or if current water policies were succeeding in properly managing Lake Qaraoun, perhaps ministry staff felt it was their duty to give positive responses given their employment status within these ministries.

The tools used within the study also have limitations, such as the stakeholder analysis tool. The positions of stakeholders interviewed were determined at one point in time, during which the interview was conducted. In addition, although it focuses on the stakeholder interests, it does not explain how these interests may influence

policymaking or change. The use of the case study approach also has its fair amount of drawbacks. One such drawback is the lack of a scientific basis, in addition to the inability to provide a basis for generalization (Crowe, Cresswell, Robertson, Huby, Avery, & Sheikh, 2011). In other words, translating findings from one setting to another (or in this study's case: sector) may be difficult or impossible to achieve using the approach.

C. Future Studies

Future studies related to exploring the use of evidence through additional case studies may be valuable in terms of adding more input to evidence-informed policymaking in the Lebanese water sector. This would lead to more specific and less general outcomes, rather than establishing findings based on one single study. In addition, perhaps the creation of focus groups involving different actors across various sectors specific to the Lebanese setting would be effective for brainstorming techniques for applying evidence to the policymaking process. This would allow for more input from various individuals. Another future study would be involving the citizens of surrounding villages, by gaining their insight into common issues and possible solutions they think would be effective. This may also result in more effective and tangible recommendations or tool developments that can be applied to all Lebanese sectors with input from all stakeholders, especially the public.

APPENDIX

I. Flyer for Study Participation

PARTICIPANTS NEEDED FOR A RESEARCH STUDY IN EVIDENCE-INFORMED POLICIES IN THE LEBANESE WATER SECTOR

We are looking for volunteers to take part in a research study titled
“Evidence-informed policymaking in the Lebanese water sector: The case of Lake
Qaraoun”

The purpose of this study is to explore possible gaps in the current policies governing the Lebanese water sector, the factors that lead to the absence of using evidence to inform policy, in addition to the input of different actors surrounding the application of research to policies. A long-term benefit of this study is to overcome the barriers related to using evidence to inform policy, with input from different stakeholders to pacify challenges being faced in the Lebanese water sector, a direct benefit of all Lebanese citizens. Such policies will have a positive impact on the management of water in Lebanon, and for villages near bodies like Lake Qaraoun, such policies will ensure the wellbeing of health and the environment.

Participant eligibility will be based on the participant’s potential to impact policy and familiarity with water quality and quantity deterioration in Lake Qaraoun. As a participant in this study, you would be asked to take part in a semi-structured interview. The location of the interview will be determined as per the participant’s choice. Your participation would involve **one** session, and is expected to be around 45 minutes.

For more information about this study, or to volunteer for this study,
please contact:

Dr. Hiba Khodr, Principle Investigator of the Study
Samantha Abisaab, the Co-Investigator of the Study
Department of Political Studies and Public Policy at the American University of Beirut (AUB)

Email(s): sha41@mail.aub.edu; hk39@aub.edu.lb

II. Interview Guide

I. Process (General questions related to water policy formation)

- In your opinion, what role does research play in the Lebanese water sector?
- How would you describe the water policy formation/drafting process in the country?
- Are there any recommendations you can make to improve the policy formation process?

II. Context (Political, economic, social factors on a national/international level)

- In your opinion, does the country's political context impact the formation (or non-formation) of policy in the Lebanese water sector? Please explain.
- In your opinion, does the country's economic context impact the formation (or non-formation) of policy in the Lebanese water sector?
- In your opinion, does the country's social, cultural, and religious context impact the formation (or non-formation) of policy in the Lebanese water sector?
- In your opinion, are there any other factors that impact the formation of policy in the Lebanese water sector?

III. Actors (Specific for Lake Qaraoun)

- Are there any major players or stakeholders you would consider that have great influence in solving the issues that surround Lake Qaraoun? (Do different stakeholders have power/authority more so than others or over others?)
- Are there mediums/committees for stakeholders (policy makers, researchers, members of international and local organizations) for discussing the ongoing issues in Lake Qaraoun? What roles do these mediums/committees play?

IV. Content

- What are the biggest challenges being faced surrounding the overall management of Lake Qaraoun?

- In your opinion, are there any identified policy gaps that could help in solving the issues surround Lake Qaraoun?
- Are you familiar with any of the policies that currently govern Lake Qaraoun and surrounding communities?
- What are some reliable sources of data that you use for your publications or research in water policy? How are the results of such research communicated to you as a stakeholder (policymaker or researcher)?
- Do you think research is used during the process of policy formation in the country? (If so, please provide examples. If not, why do you think that research is not used?)
- Are there any identified potential obstacles to research being accepted in the Lebanese water sector? (How can such challenges be overcome?)

BIBLIOGRAPHY

1. Amponsah, C., Anaman, K., & Addo, S. (2006). Bridging the Gap between policymakers and research and advocacy organizations [RAOs]. Published by the Institute of Economic Affairs.
2. Arabloo, J., Tourani, S., & Ravaghi, H. (2018). Application of policy analysis frameworks in tobacco control research: A systematic review of qualitative literature. *Medical Journal of the Islamic Republic of Iran*, 32, 52. <https://doi.org/10.14196/mjiri.32.52>
3. Assaf, H., & Saadeh, M. (2008). Assessing water quality management options in the Upper Litani Basin, Lebanon, using an integrated GIS-based decision support system. *Environmental Modeling and Software Journal*, 23(10-11), 1327-1337. doi: 10.1016/k.envsoft.2008.03.006
4. Azar, G. (2018, September 24). Parliament ratifies waste plan despite environmental outcry. *An-Nahar*. Retrieved from <https://en.annahar.com/article/866904-cabinet-convenes-for-the-first-time-since-elections>
5. Bayliss, H., Wilcox, A., Stewart, G. & Randall, N. (2012). Does Research Information Meet the needs of Stakeholders? Exploring Evidence Selection in the Global Management of Invasive Species. *Evidence & Policy: A Journal of Research, Debate and Practice*, 8(1): 37-56. doi: 10.1332/174426412X620128
6. Bowen, S., and Zwi, A. (2005). Pathways to “Evidence-Informed” Policy and Practice: A Framework for Action. *PLoS Medicine*, 2(7), e166. <http://doi.org/10.1371/journal.pmed.0020166>
7. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77–101. doi:10.1191/1478088706qp063oa
8. Brownson, R.C., Chiqui, J.F., & Stamatakis, K.A. (2009). Understanding evidence-based public health policy. *American Journal of Public Health Policy*, 99(9), 1576-83. doi: 10.2105/AJPH.2008.156224

9. Brugha, R., Bruen, C. & Tangcharoensathien, V. (2014). Understanding Global Health Policy. *The Handbook of Global Health Policy*, 21-45.
10. Buse, K., Mays, N., & Walt, G. (2005). *Making Health Policy*. Berkshire: Open University Press. doi: 10.1186/1471-2288-11-100
11. Chow, A. (2014). Understand Policy Change: Multiple Streams and National Education Curriculum Policy in Hong Kong. *Journal of Public Administration and Governance*, 4(2), 49-64. doi:10.5296/jpag.v4i2.5184
12. Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A., & Sheikh, A. (2011). The case study approach. *BMC Medical Research Methodology*, 11, 100.
13. Davies, H., Nutley, S., & Smith, P. (2000). What Works? The Role of Evidence in Public Sector Policy and Practice, *Public Money and Management*, 19(1), 3-5. doi: 10.1111/1467-9302.00144
14. DiCicco-Bloom, B. and Crabtree, B. (2006). The Qualitative Research Interview. *Medical Education*, 40(4), 314-321. doi: 10.1111/j.1365-2929.2006.02418.x
15. Dicks, L., Walsh, J., & Sutherland, W. (2014). Organizing evidence for environmental management decisions: a '4S' hierarchy. *Trends in Ecology and Evolution*, 29(11): 607-613. doi:10.1016/j.tree.2014.09.004
16. Doummar, J., Massoud, M.A., Khoury, R., & Khawlie, M. (2009). Optimal Water Resource Management: Case of Lower Litani River, Lebanon. *Water Resource Management*, 23(11), 2343-2360. doi:10.1007/s11269-008-9384-z
17. Earth Link and Advanced Resources Development SARL [El Ard]. (2011). Business Plan for Combating Pollution of the Qaraoun Lake. Retrieved from <http://test.moe.gov.lb/Documents/Final%20Business%20Plan%20Document%2013062011%20Main%20Report%20-%20Part1.pdf>
18. ECODIT. (2015). Strategic Environmental Assessment for the New Water Sector Strategy for Lebanon. Retrieved from <http://www.moe.gov.lb/getattachment/5ac7c2d8-4a3a-4460-a6c8-daa8acd42f1b/STRATEGIC-ENVIRONMENTAL-ASSESSMENT-FOR-THE-NEW-WAT.aspx>
19. El-Amine, Y. (2016). *Lebanon Water Forum: Rethinking Water Service Provision in Lebanon*. Paper Presented at Rethinking Water Service Provision in Lebanon, Beirut, Lebanon. Retrieved from http://website.aub.edu.lb/ifi/publications/Documents/conference_reports/20160526_oxfam_conference_report.pdf

20. El-Amine, Y., Farajalla, N., Chehadeh, A., & Acaf, Y. (2018). Policy Brief #4: Water security in the Bekaa: Introducing an Integrative Lens to the Lebanese Water Sector. *Issam Fares Institute for Public Policy and International Affairs (AUB Policy Institute), Beirut, Lebanon*. Retrieved from http://website.aub.edu.lb/ifi/publications/Documents/policy_memos/2018-2019/20181003_water_insecurity_bekaa.pdf
21. El-Jardali, F., Ataya, N., & Fadlallah, R. (2018). Changing roles of universities in the era of SDGs: rising up to the global challenge through institutionalizing partnerships with governments and communities. *Health Research Policy and Systems, 16*, 38. <http://doi.org/10.1186/s12961-018-0318-9>
22. El-Jardali, F., Bou Karroum, L., Bawab, L., Kdouh, O., El-Sayed, F., et al. (2015). Health Reporting in Print Media in Lebanon: Evidence, Quality and Role in Informing Policymaking, *PLOS ONE 10*(8). <https://doi.org/10.1371/journal.pone.0136435>
23. El-Jardali, F., Hammoud, R., Younan, L., Nuwayhid, H.S., Abdallah, N., Alameddine, M., Bou-Karroum, L., & Salman, L. (2014). The making of nursing practice Law in Lebanon: a policy analysis case study. *Health research policy and systems*.
24. El-Jardali, F., Jamal, D., Ataya, N., Jaafar, M., Raouf, S., Matta, C., Michael, S., & Smith, C. (2011). Health Policy and Systems Research in Twelve Eastern Mediterranean Countries: a stocktaking of production and gaps (2000-2008). *Health Research Policy and Systems, 9*, 39. <http://doi.org/10.1186/1478-4505-9-39>
25. Elueze, I. (2016). *Towards Evidence-informed Agriculture Policy Making: Investigation the Knowledge Translation Practices of Researchers in the National Agricultural Research Institutes in Nigeria* (Electronic Thesis). Retrieved from the Electronic Thesis and Dissertation Repository. (Accesorion No. 4237)
26. Etiaba, E., Uguru, N., Ebenso, B., Russo, G., Ezumah, N., Uzochukwu, B., & Onwujekwe, O. (2015). Development of Oral Health Policy in Nigeria: An analysis of the role of context, actors, and policy process. *BMC Oral Health Journal, 15*(56). doi: 10.1186/s12903-015-0040-8
27. Farajalla, N., Kerkezian, S., Farhat, Z., El Hajj, R., & Matta, M. (2015). The Way Forward to Safeguard Water in Lebanon: National water Integrity Risk Assessment. Retrieved from http://website.aub.edu.lb/ifi/publications/Documents/research_reports/20150429_CC_Water_Summary.pdf
28. Fischer, F. (2002). *Citizens, Experts and the Environment*. Duke University Press, Durham.

29. Flyvbjerg, B. (2006). Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*, 12(2), 219-245. doi: 10.1177/1077800405284363
30. Fraiture, R. (2017). *Setting the Water Management Agenda: A case study on policy response to the environmental impact of the Syrian crisis on Lebanon's water* (Master's thesis, Central European University, Hungary). Retrieved from www.etd.ceu.hu/2017/fraiture_robin.pdf
31. Green, A. & Bennett, S. (2007). *Sound Choices: Enhancing Capacity for Evidence-Informed Health Policy*. Alliance for Health Policy and Systems Research. Retrieved from http://www.who.int/alliance-hpsr/resources/Alliance_BR.pdf
32. Head, B. (2015). Toward More "Evidence-Informed" Policy Making? *Public Administration Review*, 76: 472-484. doi:10.1111/puar.12475
33. Hennik, M., & Stephenson, R. (2006). Using Research to Inform Health Policy: Barriers and Strategies in Developing Countries. *Journal of Health Communication*, 10(2), 163-180. doi: 10.1080/10810730590915128
34. Hilal, N., Fadlallah, R., Jamal, D., & El-Jardali, F. (2015). *K2P Evidence Summary: Approaching the Waste Crisis in Lebanon: Consequences and Insights into Solutions* [Evidence summary]. Retrieved from https://www.aub.edu.lb/k2p/Documents/K2P%20Evidence%20Summary%20Waste%20Management_Final_%20Dec%202014%202015.pdf
35. Holloway, I., & Todres, L. (2003). The status of method: Flexibility, consistency and coherence. *Qualitative Research*, 3, 345–357. doi:10.1177/1468794103033004
36. Horton, P. & Brown, G. (2018). Integrating evidence, politics and society: a methodology for the science-policy interface. *Palgrave communications*, 4(42). doi: 10.1057/s41599-018-0099-3
37. Hyder, A., Corluka, A., Winch, P.J., El-Shinnawy, A., Ghassany, H., Malekafzali, H., Lim, M., Mfutso-Bengo, J., Segura, E., & Ghaffar, A. (2011). National policy-makers speak out: are researchers giving them what they need? *Health Policy and Planning*, 26(1), 73-82. doi: 10.1093/heapol/czg020
38. International Network for the Availability of Scientific Publications. (2016). *Evidence-Informed Policy Making Toolkit*. Retrieved from <https://www.inasp.info/sites/default/files/2018-04/EIPM%20Toolkit-Ed2-FULL.pdf>

39. Juntti, M., Russel, D., & Turnpenney, J. (2009). Evidence, politics and power in public policy for the environment. *Environmental Science and Policy*, 12, 207–215. doi:10.1016/j.envsci.2008.12.007
40. Kerkezian, S., and Farhat, Z. (2016). The Way Forward to Safeguard Water in Lebanon (Policy Brief 5). Retrieved from https://www.aub.edu.lb/ifi/publications/Documents/policy_memos/2015-2016/20160309_water_integrity.pdf
41. King, N. (2004). Using templates in the thematic analysis of text. In C. Cassell & G. Symon (Eds.), *Essential guide to qualitative methods in organizational research* (pp. 257–270). London, UK: Sage.
42. Khodr, H. & Hasbani, K. (2013). The dynamics of energy policy in Lebanon when research, politics, and policy fail to intersect. *Energy Policy*, 60, 629-642. doi:10.1016/j.enpol.2013.05.080
43. Kunigk, E. (1999). Policy Transformation and Implementation in the Water Section in Lebanon: The Role of Politics. Retrieved from <https://www.soas.ac.uk/water/publications/papers/file38370.pdf>
44. Lavis, J. & Panisset, U. (2010). EVIPNet Africa’s first series of policy briefs to support evidence-informed policymaking. *International Journal of Technology Assessment in Health Care*, 26(2): 229-232. doi:10.1017/S0266462310000206
45. Lebanese Ministry of Environment (MOE), United Nations Development Program (UNDP), & ECODIT. (2011). State and Trends of the Lebanese Environment. Retrieved from http://www.undp.org.lb/communication/publications/downloads/SOER_en.pdf
46. Lebanese Ministry of Public Health [MOPH]. (2019). *2018 Communicable Disease Surveillance Data (Bekaa)*. Epidemiological Surveillance System. Available from the MOPH website: https://www.moph.gov.lb/userfiles/files/Esu_data/Esu_pastyears/Bekaa2018.htm
47. Makdisi, K. (2007). Towards a Human Rights Approach to Water in Lebanon: Implementation beyond ‘Reform’. *International Journal of Water Resources Development*, 23(2), 369-390. doi: 10.1080/07900620701189434
48. Mukuni, J, & Price, B. (2014). Implementation challenges of a donor funded development project: Lessons learned through a deep-end strategy while implementing a development program in Zambia. *Journal of African Studies and Development*, 6(1), 1-7. <https://doi.org/10.5897/JASD2013.0262>

49. National Collaborating Centre for Healthy Public Policy. (2013). Public Policy Models and Their Usefulness in Public Health: The Stages Model. Retrieved from https://www.nchpp.ca/docs/ModeleEtapesPolPubliques_EN.pdf
50. Nassif, N., Maatouk, I., & Saliba, R. (2014). Environmental Assessment and Legal Approach of Qaraoun Artificial Lake, Lebanon. *Journal of Scientific Research and Reports*, 5(1), 58-84. doi: 10.9734/JSRR/2015/14193
51. Nicols, P. (1991). *Social Survey Methods: A Fieldguide for Development Workers*. Banbury Road, Oxford: Oxfam Publishing.
52. Nutley, S., Davies, H., & Walter, I. (2002). *Evidence based policy and practice: cross sector lessons from the UK* (Working Paper No. 9). United Kingdom: ESRC UK Centre for Evidence Based Policy and Practice.
53. Nutley, S., Leffler, J.C., & Hansen, B.A. (2009). Toward a research agenda for understanding and improving the use of research evidence. Retrieved from Northwest Regional Educational Laboratory (NWREL), Portland, OR. <http://www.nwrel.org/researchuse/report.pdf>
54. Onwujekwe, O., Uguru, N., Russo, G., Etiaba, E., Mbachu, C., Mirzoev, T., and Uzochukwu, B. (2015). Role and use of evidence in policymaking: an analysis of case studies from the health sector in Nigeria. *Health Research Policy and Systems*, 13:46. doi: 10.1186/s12961-015-0049-0
55. Oxman, A., Lavis, J., Lewin, S., & Fretheim, A. (2009). Support Tool for evidence-informed health Policymaking (STP) I: What is evidence-informed policymaking? *Health Research and Policy System*, 7 (Suppl 1). <https://doi.org/10.1186/1478-4505-7-S1-S1>
56. Picciotto, R. (2002). The Logic of Mainstreaming: A Development Evaluation Perspective. *SAGE Publications*, 8(3), 332-339. <https://doi.org/10.1177/135638902401462420>
57. Punton, M. (2016). How can capacity development promote evidence-informed policymaking? Literature review for the Building Capacity to Use Research Evidence (BCURE) Program. Retrieved from ITAD – Monitoring & Evaluation for International Development.
58. Riachi, R. (2014, October 31). Lebanon Must Tackle its Water Crisis Head-on. *The Daily Star Lebanon*. Retrieved from <http://www.dailystar.com.lb/Opinion/Commentary/2014/Oct-31/275991-lebanon-must-tackle-its-water-crisis-head-on.ashx>
59. Riachi, R. (2016). Water Policies and Politics in Lebanon: Where is Groundwater? (Report Number 9). *Groundwater Governance in the Arab World*

– *Taking stock and addressing the challenges*. Retrieved from the International Water Management Institute.

60. Richards, G.W. (2017). How Research-Policy Partnerships can benefit Government: A Win-Win for Evidence-Based Policy-making. *Canadian Public Policy*, 43(2), 165-170. <https://doi.org/10.3138/cpp.2016-046>
61. Romano, J. & Knechtges, P. (2014). Global Public Health and Toxicology. In the *Encyclopedia of Toxicology* (3rd edition, pp. 746-750). Retrieved from <https://www.sciencedirect.com/science/article/pii/B978012386454300806X>
62. Rose, D., Sutherland, W., Amano, T, Gonzalez-Varo, J., Robertson, R., Simmons, B., Wauchope, H., Kovacs, E., Duran, A., Vadrot, A., Wu, W., Dias, M., DiFonzo, M., Ivory, S., Norris, L., Nunes, M., Nyumba, T., Steiner, N., Vickery, J., & Mukherjee, N. (2018). The major barriers to evidence-informed conservation policy and possible solutions. *Conservation Letters*, 11(5). <https://doi.org/10.1111/conl.12564>
63. Safa, S. (2016, August 19). K2P Center impacts policy yet again. *American University of Beirut – News*. Retrieved from <http://www.aub.edu.lb/news/2016/Pages/k2p-impact-policy.aspx>
64. Segone, M. (2008). *Bridging the Gap: The role of monitoring and evaluation in evidence-based policy making*. UNICEF Evaluation Office. Retrieved from <http://mics.unicef.org/files?job=W1siZiIsIjIwMTUvMDEvMzAvMDMvMTYvNDkvMjQ2L2V2aWRlbnNIX2Jhc2V2kX3BvbGljeV9tYWtpbmcucGRmIl1d&sha=66f7484e16ed9da3>
65. Shaban, A. (2009). Indicators and Aspects of Hydrological Drought in Lebanon. *Water Resource Management*, 23(10), 1875-1891. doi: 10.1007/s11269-008-9358-1
66. Shaban, A. (2016). New Economic Policies: Instruments for Water Management in Lebanon. *Hydrology Current Research*, 7(1). doi: 10.4172/2157-7587.1000222
67. Shaaban, A., & Hamze, M. (2018). *The Litani River, Lebanon: An Assessment and Current Challenges*. Cham, Switzerland: Springer International Publishing AG.
68. Smith, M., & Clausen, T.J. (2018). Revitalizing IWRM for the 2030 Agenda (World Water Council Challenge Paper), presented at the High-Level Panel on IWRM at the 8th World Water Forum, Brazilia, Brazil, 2018.
69. Sohn, J. (2018). Navigating the politics of evidence-informed policymaking: strategies of influential policy actors in Ontario. *Palgrave communications*, 49(4). <https://doi.org/10.1057/s41599-018-0098-4>

70. Sriskandarajah, D. (2018). *Toward an Accountability Revolution?* (Working Paper). Retrieved from the Action for Sustainable Development website: <https://action4sd.org/wp-content/uploads/2018/01/TowardAnAccountabilityRevolution.CitizenParticipationAndTheSDGs.pdf>
71. Straus, S. E., Tetroe, J., & Graham, I. (2009). Defining knowledge translation. *CMAJ: Canadian Medical Association journal = journal de l'Association medicale canadienne*, 181(3-4), 165-8. doi: 10.1503/cmaj.081229.
72. Sutcliffe, S. & Court, J. (2005). *Evidence-Based Policymaking: What is it? How does it work? What relevance for developing countries?* Overseas Development Institute. Retrieved from <https://www.odi.org/resources/docs/3683.pdf>
73. Sutherland, W., Pullin, A., Dolman, P., & Knight, T. (2004). The need for evidence-based conservation. *Trends in Ecology and Evolution*, 19, 6. doi:10.1016/j.tree.2004.03.018
74. Swanborn, P. (2010). *Case Study Research: What, Why, and How?* London: SAGE Publications Ltd.
75. Swedish International Development Agency [SIDA]. (2018). About Us – Our Mission. Retrieved from <https://www.sida.se/English/About-us/Our-mission/>
76. The Daily Star Lebanon. (2014, June 8). \$730 million plan to clean up Lebanon's Litani river unveiled. *The Daily Star Lebanon*. Retrieved from http://www.ifpinfo.com/asa/asa-news.php?news_id=4742
77. The Daily Star Lebanon. (2016, July 12). Fish die en masse after Qaraoun Lake poisoned. *The Daily Star Lebanon*. Retrieved from <http://www.dailystar.com.lb/News/Lebanon-News/2016/Jul-12/361560-fish-die-en-masse-after-qaraoun-lake-poisoned.ashx>
78. The Litani River Authority. (2016). Official Website of the Litani River Authority –Home. Retrieved from <http://www.litani.gov.lb/en/>
79. The United Nations [UN]. (2015). The Sustainable Development Agenda. Retrieved from <https://www.un.org/sustainabledevelopment/development-agenda/>
80. The United Nations [UN]. (2016). Lebanon Country Profile. Retrieved from <http://data.un.org/CountryProfile.aspx?crName=LEBANON>

81. The United Nations [UN]. (2017). Millennium Development Goals. Retrieved from <http://www.un.org.lb/english/millennium-development-goals>
82. The World Bank. (2013). Lake Qaraoun Pollution Prevention Project – Project information document (PID). Retrieved from <http://www.databank.com.lb/docs/Lake%20Qaraoun%20Pollution%20Prevention%20Project.pdf>
83. The World Bank. (2016). International Bank of Reconstruction and Development Project Appraisal Document on a Proposed Loan in the amount of US \$ 55 million to the Lebanese Republic for the Lake Qaraoun Pollution Prevention Project. Retrieved from <http://documents.worldbank.org/curated/en/279341468589482380/pdf/PAD860-PAD-P147854-R2016-0133-1-Box396255B-OUO-9.pdf>
84. The World Bank. (2017). Water Resources Management: Context and Challenges. Retrieved from <https://www.worldbank.org/en/topic/waterresourcesmanagement>
85. The World Health Organization [WHO]. (2004). World Report on Knowledge for Better Health: Strengthening Health Systems. Geneva: World Health Organization. Retrieved from <http://www.who.int/iris/handle/10665/43058>
86. The World Health Organization [WHO]. (2018). Sponsoring national processes for evidence-informed policy in the health sector of developing countries - Nigeria. Retrieved from http://www.who.int/alliancehpsr/projects/ihrgebonyi_etpsnp/en/
87. The World Health Organization [WHO]. (2018). Evidence-Informed Policy Network. Retrieved from <http://www.who.int/evidence/about/en/>
88. Tudisca, V. (2018). Development of measurable indicators to enhance public health evidence-informed policymaking. *Health Research Policy and Systems*, 16(47). <https://doi.org/10.1186/s12961-018-0323-z>
89. Uneke, C., Ezeoha, A., Ndukwe, C., Oyibo, P., & Onwe, F. (2010). Development of Health Policy and Systems Research in Nigeria: Lessons for Developing Countries' Evidence-Based Health Policy Making Process and Practice. *Healthcare Policy*, 6(1), e109–e126.
90. Uneke, C., Sombie, I., Keita, N., Lokossou, V., Johnson, E., Ongolo-Zogo, P., & Uro-Chukwu, H. (2017). Promoting evidence informed policy making in Nigeria: a review of the maternal, newborn and child health policy development process. *Health Promotion Perspectives*, 7(4), 181–189. <http://doi.org/10.15171/hpp.2017.33>

91. United States Agency for International Development [USAID]. (2005). Litani Water Quality Management Project – Rapid Review Report. Retrieved from http://pdf.usaid.gov/pdf_docs/Pdacd246.pdf
92. United States Agency for International Development [USAID]. (2013). Litani River Basin Management Support Program: Establishment of a Water Federation of Municipalities. Retrieved from <http://www.litani.gov.lb/wp/wp-content/uploads/LRBMS/017-LRBMS-ESTABLISHMENT%20OF%20A%20WATER%20FEDERATION%20OF%20MUNICIPALITIES.pdf>
93. United States Agency for International Development [USAID]. (2014). Litani River Basin Management Support Project (LRBMS). Retrieved from <https://www.globalwaters.org/HowWeWork/Activities/litani-river-basin-management-support-project>
94. Uzochukwu, B., Onwujekwe, O., Mbachu, C., Okwuosa, C., Etiaba, E., Nystrom, M., & Gilson, L. (2016). The challenge of bridging the gap between researchers and policy makers: experiences of a Health Policy Research Group in engaging policy makers to support evidence informed policy making in Nigeria. *Globalization and Health*, 12(1), 67. doi: 10.1186/s12992-016-0209
95. Varvasovszky, Z., and Brugha, R. (2000). A stakeholder analysis. *Health Policy and Planning Journal*, 15(3), 338-345.
96. Volmink, J. (2017). Evidence-informed Policy Making: Challenges and Opportunities. *British Medical Journal Global Health*, 2, A3.2-A3. 10.1136/bmjgh-2016-000260.3
97. Walt, G., & Gilson, G. (1994). Reforming the health sector in developing countries: the central role of policy analysis. *Health Policy Unit, London School of Hygiene and Tropical Medicine*, 9(4), 353-370.
98. Walt, G., Shiffman, J., Schneider, H., Murray, S. F., Brugha, R., & Gilson, L. (2008). “Doing” health policy analysis: methodological and conceptual reflections and challenges. *Health Policy and Planning*, 23(5), 308–317. <http://doi.org/10.1093/heapol/czn024>
99. Ward, V., House, A., & Hamer, S. (2009). Developing a framework for transferring knowledge into action: a thematic analysis of the literature. *Journal of Health Services Research & Policy*, 14(3), 156–164. <http://doi.org/10.1258/jhsrp.2009.008120>
100. Wilmot, A. (2005). Designing sampling strategies for social qualitative research: With particular reference to the Office for National Statistics’ Qualitative Respondent Register. Centers for Disease Control and Prevention (CDC). Retrieved from <https://www.cdc.gov/qbank/Quest/2005/Paper23.pdf>

101. Yin, R. (2013). *Applications of Case Study Research*. London: Sage Publications Ltd.

