Stakeholder network analysis over three river basins:
Al Assi, Al Ostuan and Al Ghadir

June, 2024
Lebanon

KEY MESSAGES*

- The findings indicate that the current flow of information among river basin stakeholders lacks regularity, emphasizing the need for improvement in data and information sharing. Establishing structured and formalized communication channels could help ensure effective exchange.
- The governors were highlighted as key figures in mitigating natural water disaster risks. Their role was perceived as crucial in coordinating the preparation of Water Establishments across river basins.
- While Water Establishments are responsible for managing water-related conflicts, findings identified municipalities as central actors in mitigating water-based conflicts. To leverage their influence, it was recommended to establish formal communication channels, such as setting up complaint offices.
- An overlap of roles among water actors has been identified, contributing to a lack of alignment between current water management practices and the legal obligations that apply to these actors within river basins.

ASSESSMENT OVERVIEW

The research aimed to understand the relationships between key water actors and other stakeholders (for more information see ANNEX 1) within three river basins in Lebanon: Al Ghadir (Mount Lebanon), Al Ostuan (North Lebanon), and Al Assi (Beqaa). The objective was to better inform the management plans for the catchment areas. Additionally, it aimed to inform the implementation of relevant measures concerning roles, responsibilities and barriers associated with river basin management.

METHODOLOGY

The research consisted of Key Informant interviews (KII) identified through purposive sampling. The sample size was 103 individuals (Al Assi: 33; Al Ostuan: 37; Al Ghadir: 33) collected between February and March 2023. The assessment used a hybrid tool incorporating both closed and open-ended questions to investigate how stakeholders in and around the river basins interact and work on river basin and water resource management. Social Network Analysis was implemented to address research objectives and illustrate interactions between actors.

* All recommendations were drafted by the consortium partners.

CONTEXT & RATIONALE

Lebanon benefits from a comparatively favorable hydrological position within the Arab region. However, due to poor management of water resources and limited funds allocated to the water sector, a significant portion of the population is excluded from accessing reliable and affordable water services necessary to meet basic needs. Reduced institutional capacities has contributed to inadequate water access and weakened the connection between policymakers, service providers, and communities. As a consequence of the economic crisis, water infrastructure has reduced capacities thereby impacting efficiency and effectiveness in service delivery.

The aim of this research was to examine stakeholder relations within three river basins. Through this analysis, the goal was to strengthen management and accountability structures, thereby enhancing institutional functionality and the efficiency of water infrastructure in Lebanon.

This assessment is part of the Hawkamaa-EU project, which aims to support equitable water access and better resource management across river basins in Lebanon.

THE THREE RIVER BASINS

[Map of Lebanon showing Assi, Ostuan, and Ghadir basins]
**OVERVIEW OF THE RIVER BASIN**

**Al Assi**, also known internationally as Orontes, rises in the northern section of Bekaa near the city of Baalbek. It flows across northwestern Syria into southeastern Turkey and empties into the Mediterranean Sea. The basin area in Lebanon is estimated to 1,870 km² which makes it the second largest drainage area in Lebanon.¹ A total of 33 stakeholders were interviewed from the river basin.

**Al Ostuan** river basin is located in Akkar district in north Lebanon and flows to the east into the Mediterranean Sea in the Sahel area. Akkar hosts 6.7% of the population in Lebanon (324,000).² Al Ostuan basin comprises 51 villages. Rapid urban growth is one of the major factors affecting living conditions and the environment in the Ostuan basin. The total surface of the basin³ is 146.67 km². A total of 37 stakeholders were interviewed from the river basin.

**Al Ghadir** river basin is one of the smallest in Lebanon located in the southern region of Beirut, between the districts of Baabda and Aley. The governorate of Beirut hosts 7.1% of the population in Lebanon (341,700).⁴ The basin, of approximately⁵ 40 km², extends from Dhour Al-Abadiyyeh to the east of Beirut Airport and consequently the sea to the west. A total of 33 stakeholders were interviewed from this river basin.

<table>
<thead>
<tr>
<th>Stakeholders*</th>
<th>Al Assi</th>
<th>Al Ostuan</th>
<th>Al Ghadir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Society Organizations</td>
<td>1</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>Committees</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Governors</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Industries</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Local NGOs (L-NGOs)</td>
<td>9</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Ministries</td>
<td>2</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Municipalities</td>
<td>8</td>
<td>23</td>
<td>16</td>
</tr>
<tr>
<td>Private Sector</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Unions</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Universities</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Water Establishments</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
<td><strong>37</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>

The table above illustrates variations in the number of KII s across the three river basins. These variations are attributed to the diverse challenges encountered by the data collection partners (ACTED, LebRelief, and WWGVC) in engaging stakeholders.

*for more information see ANNEX 1

**FORMAL GOVERNANCE STRUCTURES OF WATER AUTHORITIES IN LEBANON**⁶

![Diagram of formal governance structures](image)
RIVER BASIN SPECIFIC NETWORKS

Each river basin is analyzed using network analysis (For more information, refer to ANNEX 2), known as Social Network Analysis (SNA) to identify the collaborating actors and their interactions over the 3 river basins.

Below are the key definitions used in SNA:

**Network Density** measures how connected a network is by comparing the number of existing connections to the total possible connections. A higher density indicates stronger connections within the network, ranging from 0 to 1. A value closer to 1 suggests tighter cohesion among network nodes.

**Network Clustering** measures how closely actors in a network group together. A high clustering coefficient, closer to 1, indicates dense connections where actors tend to group closely together. Conversely, a lower coefficient suggests less clustering or fewer connections between actors.

**Al Assi, Al Ostuan and Al Ghadir**

Summary of measures, including type of interaction, frequency of contact between key stakeholders are represented in the table below.

<table>
<thead>
<tr>
<th>Network measure</th>
<th>Al Assi</th>
<th>Al Ostuan</th>
<th>Al Ghadir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>0.47</td>
<td>0.47</td>
<td>0.33</td>
</tr>
<tr>
<td>Clustering</td>
<td>0.74</td>
<td>0.51</td>
<td>0.54</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interaction types</th>
<th>Al Assi</th>
<th>Al Ostuan</th>
<th>Al Ghadir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal*</td>
<td>23%</td>
<td>24%</td>
<td>93%</td>
</tr>
<tr>
<td>Informal**</td>
<td>49%</td>
<td>70%</td>
<td>5%</td>
</tr>
<tr>
<td>No Contact</td>
<td>28%</td>
<td>6%</td>
<td>2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency of Interaction***</th>
<th>Monthly</th>
<th>Every 3 Months</th>
<th>Daily</th>
</tr>
</thead>
</table>

* Formal interactions typically follow predefined roles, procedures and are often associated with official positions, hierarchical relationships.

** Informal connections are based on personal relationships, common interests or social dynamics, and are characterized by flexibility, fluidity, and lack of clear roles or procedures.

*** Frequency of interactions highlighted represents the most frequently reported by stakeholders in the network.

- Al Assi and Al Ostuan were identified as well-connected networks (having the highest density), indicating that stakeholders communicated with each other. This shows that actors within the network have strong interactions with each other, enabling the flow of information, resources, or influence among them. In terms of frequency of reported contacts, they were most often informal and occurring on a monthly basis.

- In Al Ghadir, the actors were well-grouped (having high clustering) and showed clearly identifiable clusters or groups. Despite the reported presence of cohesive groups, there were few connections between the different groups (having lowest density), hence the network was not well-connected. At the same time, among the actors in contact with each other, interactions were reported to be formal and most often occurring on a daily basis.
RIVER BASIN SPECIFIC NETWORKS (CONTINUED)

Below are presented the overall network diagrams for three river basins. They offer a comprehensive visual representation of stakeholders and their relationships within the complex governance structures of each river basin. Moreover, they provide a panoramic view of the overall structure and dynamics of the networks, illustrating the interconnection of different elements within the system.

**AL ASSI**

- The social network in Al Assi exhibited a high density, indicating that actors within the basin were connected to each other, either directly or indirectly through other actors. Overall, a high level of interaction was reported within this river basin.

- Many interactions between local NGOs were reported, indicating established communication and collaboration among different local NGOs.

- Al Assi had a high clustering coefficient, indicating not only extensive interactions with each other, but also a tendency to form groups based on shared objectives/interests/goals. In particular, local NGOs, Governors, Water Establishments, and Municipalities were observed to collaborate together to implement water-related projects.

- Almost half of the interactions between stakeholders were reported to be informal, occurring monthly. This often facilitates the exchange of implicit knowledge, opinions, and information that may not be readily shared through formal channels.

**AL OSTUAN**

- Al Ostuan appeared to have a well-connected (high density) network, however, stakeholders within the network were not closely clustered, especially when compared to Al Assi. This indicates that while the network exhibited high levels of overall connectivity, it lacked clear or cohesive groups and hence opportunities for meaningful collaboration may be diminished.

- There was a low level of direct interaction among actors within their own groups, which can impact the cohesion and effectiveness of the group as a collective entity within the larger network.

- Most interactions were reported to be informal and occurred every three months, which is a lower frequency than in the other river basins.

**AL GHADIR**

- Al-Ghadir’s network was reported to be less connected (low density) than other river basins, indicating fewer interactions between actors. Additionally, actors were moderately clustered, suggesting some level of cohesion within the network.

- Municipalities in Al Ghadir were reported to engage with each other unlike other actors with minimal engagement within their groups.

- Among the reported interactions, most were described as formal and occurred on a daily basis. Interactions were mostly reported between Municipalities and United Nations (UN) agencies, as well as between Universities and Water Establishments.
The domain-specific network provides in-depth analysis of each river basin network regarding stakeholders' relationships in relation to: data sharing, expertise sharing, water quality, network maintenance, natural disasters, water-based conflicts, and key players. It defines the central actor and identifies gaps and weaknesses within this network. The table below explains why each domain is important and how a network measure is applied based on social network concepts.

(For more information, refer to ANNEX 2)

### Data Sharing

**Why?**
This domain visualizes the sharing and dissemination of data, information, and learning across interconnected stakeholders within a network. These network diagrams capture the flow of information pathways, providing insights into collaboration partners, information dependencies, and potential bottlenecks.

**Measures used:**
- **Closeness centrality** is a measure of how long it takes the information to spread from a given actor to other one in the network. The highest closeness centrality possesses shortest path to all neighbor actors.

### Expertise Sharing

**Why?**
This domain visualizes the exchange of expertise and experts, including capacity building, training, and other. These network diagrams capture the exchange of technical capacity, providing insight into the most valuable and demanding actors in terms of skills or consultancy.

**Measures used:**
- **Degree centrality (total degree)** is a measure of the total number of connections an individual has. Popular or important stakeholder categories have a higher degree.

### Water Quality and Network Maintenance

**Why?**
This domain visualizes the demand for service, particularly water testing and network maintenance. These network diagrams capture the flow of contact among actors regarding water testing capability as well as network tools maintenance.

**Measures used:**
- **Degree centrality (in-degree)** is a measure of the incoming (in-links) number of connections an individual has. Popular or more important stakeholder category has higher degree centrality.

### Natural Disaster

**Why?**
This domain visualizes the actors referred to in case of natural disaster occurrence. These network diagrams capture the focal point for emergency situations regarding water-based disasters such as flood and droughts.

**Measures used:**
- **Degree centrality** (in-degree) is a measure of the incoming (in-links) number of connections an individual has. Popular or more important stakeholder category has higher degree centrality.

### Water-based Conflict

**Why?**
This domain visualizes the actor contacted in case of water-based conflict. These network diagrams capture the flow of requests regarding water issues and provide information about the direction and formalities of those requests.

**Measures used:**
- **Betweenness centrality** is used to identify the level of influence a stakeholder category has over the flow of information in a network. It is used to identify the player that acts as a bridge, facilitating the shortest path between different parts of the network.

### Key Player

**Why?**
This domain visualizes the key player or influencer in the river basin, in addition to the perceived role by other stakeholders. These network diagrams help identify the key actor as reported by other stakeholders (nominated role) and the key actor based on their reported relations with others (functional role).

**Measures used:**
- **Authority score** and **Page rank** measure the relative importance of a node in a network. The former is based only on the number of connections (in-degree), showing how many direct links a node has. While the latter is considers both the quantity (number of connections) and quality (importance or authority) of the connections, prioritizing links from highly influential nodes in the network.
DOMAIN SPECIFIC NETWORKS

AL ASSI

DATA AND INFORMATION SHARING

Includes raw, and/or analysed and contextualized data, shared databases, reports, findings.

- Water Establishments, Municipalities and industries had the highest closeness centrality value. Information disseminated through these actors would quickly be shared with other actors in the network.
- The private sector and committees were reported to share data with other actors; however, no data was reported to be shared with them.
- Information flow was frequent between municipalities and I-NGO’s. However, most of the reported interactions were unidirectional, with other actors reporting information to the I-NGOs rather than receiving information from them.

EXPERTISE SHARING

Includes exchange of knowledge, capacity building, trainings, skills, consultancies, etc.

- L-NGOs were the most connected stakeholders; expertise exchange between them and connected actors was most frequently reported.
- Municipalities played a supportive yet significant role in expertise sharing within the Al Assi basin, and were reported to be actively engaged in expertise sharing with other stakeholders.

WATER QUALITY AND NETWORK MAINTENANCE

Includes water testing and infrastructure maintenance

- I-NGOs had the highest degree centrality value indicating its robust connection based on the number of direct connections with other actors. It was reported that I-NGOs received unilateral communication regarding water quality and network maintenance.
- Both formal and informal communication were reported in the network, yet informal lines were reportedly more common.
DOMAIN SPECIFIC NETWORKS

AL ASSI

NATURAL DISASTER RISKS OR MITIGATION
Includes floods and droughts
Governors held the highest degree centrality and served as a point of reference in case of natural disaster and mitigation efforts. Municipalities were reported to share essential data with government agencies during natural disasters and assist with on-the-ground mitigation efforts. Additionally, Civil Society Organisations (CSOs) were reportedly not engaged in discussions regarding natural disasters, suggesting that communication may be restricted to more formal stakeholders.

WATER-BASED CONFLICT
Includes unfair distribution, illegal networks, etc.
Conflict-related communication was primarily directed to municipalities through informal channels. Formal channels, on the other hand, were reportedly used to communicating with legal entities such as the court of law or internal security forces.

KEY PLAYER
Nominated role
Based on reports from other key informants, thus according to the Authority Score, Water Establishments were identified as key players.

Key informants cited their crucial role in water distribution and collection as a reason behind their key role. Additionally, it was reported that Ministries and municipalities identified them as primary actors responsible for water management and the implementation of water projects.

Functional role
Based on the reports from other key informants and number of reported interactions, thus using Page Rank measure, municipalities were identified as key players.

Key informants who identified municipalities as key actors attributed their significance to their role in project implementation, operation monitoring, distribution, quality control, and coordination with other actors in water management.
DOMAIN SPECIFIC NETWORKS

AL OSTUAN

DATA AND INFORMATION SHARING
Includes raw, and/or analysed and contextualized data, shared data bases, reports, findings.
- L-NGO and Municipalities had the highest closeness centrality, meaning that different actors were contacting them in connection to data and information sharing. As a result, information they share can quickly reach to other actors.
- Municipalities were reported to share data and information with other stakeholders, yet to have a limited inflow of information.

EXPERTISE SHARING
Includes exchange of knowledge, capacity building, trainings, skills, consultancies, etc.
- L-NGOs followed by municipalities were the most connected nodes, showcasing significant influence in expertise exchange between L-NGOs and their connected neighbors.

WATER QUALITY AND NETWORK MAINTENANCE
Includes water testing, infrastructure maintenance
- I-NGOs and L-NGOs had the highest degree centrality value. They most often received communication on water quality and network maintenance.
- The communication related to water quality and network maintenance was most often reported to be informal.
**DOMAIN SPECIFIC NETWORKS**

**AL OSTUAN**

**KEY PLAYER**

Nominated role

Functional role

Based on reports from other actors, thus according to the Authority Score and the Page Rank measure, I-NGOs, followed by L-NGOs, were identified as key players who would be effective in implementing water projects.

Key informants identified I-NGOs and L-NGOs as key players due to their reported expertise in capacity building for other organizations and experience in proposal writing. Additionally, their involvement in trainings, engagement with municipalities, and efforts in pollution reduction in the river basin were listed as additional reasons.

**NATURAL DISASTER RISKS OR MITIGATION**

Includes floods and droughts

Due to the limited responses recorded, a network measure could not be established.

**WATER-BASED CONFLICT**

Includes unfair distribution, illegal networks, etc.

Due to the limited responses recorded, communication lines regarding water-based conflicts could not be established.
DOMAIN SPECIFIC NETWORKS

AL GHADIR

DATA AND INFORMATION SHARING
Includes raw, and/or analysed and contextualized data, shared databases, reports, findings.

- L-NGO, Water Establishments and Ministries had the highest closeness centrality value, indicating a wider reach when they share information.
- Most of the shared information occurred through formal channels.

EXPERTISE SHARING
Includes exchange of knowledge, capacity building, trainings, skills, consultancies, etc.

- Ministries were the most connected nodes; expertise exchange between ministries and their connected neighbors tended to influence the network the most.
- The expertise-sharing network was fragmented. Municipalities reported sharing expertise bilaterally with the private sector but not with other actors. Similarly, other actors did not report sharing expertise with municipalities or the private sector.

WATER QUALITY AND NETWORK MAINTENANCE
Includes water testing, infrastructure maintenance

- Water Establishments had the highest degree centrality value, which means that other actors were sharing with them information on water quality and network maintenance.
- The communication on water quality in Al Ghadir was predominantly formal. In addition to that, frequent internal communication was reportedly occurring among municipalities.
## Domain Specific Networks

### Al Ghadir

**Natural Disaster Risks or Mitigation**

Includes floods and droughts

The Governors had the highest degree centrality value and were considered a point of reference in case of natural disasters. Ministries and Unions were reportedly disconnected from the wider network, depicted by a lack of direct connections to other actors in the network.

Ministries and Unions were reportedly disconnected from the wider network, depicted by a lack of direct connections to other actors in the network.

**Municipalities** were reported to play a central role in communication regarding water-related conflicts, primarily utilizing formal channels.

The network showed a disconnected relationship between ministries and unions. They were reported to have strictly bilateral communication.

### Water-Based Conflict

Includes unfair distribution, illegal network, etc.

Municipalities were reported to play a central role in communication regarding water-related conflicts, primarily utilizing formal channels.

The network showed a disconnected relationship between ministries and unions. They were reported to have strictly bilateral communication.

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### Key Player

**Nominated role**

Based on reports from other actors, thus according to the Authority Score, UN agencies and governors were identified as key players in Al Ghadir river basin.

Key informants cited the active involvement of governors and UN agencies in improving water quality and network infrastructure in the region, as a reason behind their key role.

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**Functional role**

Based on the reports from other actors and number of reported interactions, thus using Page Rank measure, municipalities were identified as key players in the area.

Key informants reported high frequency of formal interactions that municipalities had related to water management. Limited information about the roles of the municipalities was provided.
CHALLENGES AT THE RIVER BASIN LEVEL

Four qualitative questions were included in the questionnaire to drive discussion around key challenges around water resource management, barriers, and potential ways forward.

• In **Al Assi**, the main reported challenges related to water resource management were the economic crisis, insufficient funding, inefficient water governance and water scarcity. Issues mentioned were linked to political tensions, illegal connections to the networks, higher demand of water, lack of waste management resulting in contaminated water as well as a general lack of awareness around these issues. Overcoming the challenges would include improving strategic planning and infrastructure, solarizing public water systems, and law enforcement.

*Diagram 1. Qualitative findings on challenges, reasons behind the challenges, and ways to overcome them in Al Assi.*

• In **Al Ostuan**, reported challenges included lack of energy and maintenance, governance issues, and lack of water resources caused by pollution and waste management issues. Key informants suggested raising awareness on water pollution, infrastructure development and solarized public water systems, as ways to overcome identified challenges.

*Diagram 2. Qualitative findings on challenges, reasons behind the challenges, and ways to overcome them in Al Ostuan.*

• In **Al Ghadir**, reported lack of energy and resources, limited funding, inefficient governance and flood risks, as the key challenges in water management. According to Key Informants, the main reasons behind those challenges were pollution, problems with water wells and malfunctioning pipelines. Implementing flood prevention, fixing water networks, solarized water systems, and an increase in funding were suggested as ways to overcome the above-mentioned challenges.

*Diagram 3. Qualitative findings on challenges, reasons behind the challenges, and ways to overcome them in Al Ghadir.*
RECOMMENDATIONS

All recommendations were developed by the consortium partners including ACTED, LebRelief, and WWGVC, drawing from insights gained from the SNA findings and their experience during the implementation of the Hawkamaa-EU activities.

DATA AND INFORMATION SHARING

- Emphasize the importance of data sharing among all River Basin stakeholders.
- **Structured and regular data communication channels should be established**, led by the Water Establishments (WE) and municipalities. This could facilitate access to information for water users and local committees.
- The significance of data dissemination from NGOs to all other stakeholders should be highlighted. Thematic information sharing should be promoted, taking into consideration water projections and climate change.
- Structured communication channels, including regular meetings, workshops, database platforms, and newsletters should be promoted.
- **Funds for key positions within the staff pool** should be allocated to be able to implement proper accountability and monitoring activities through feedback mechanisms.
- Collaboration between L-NGOs and municipalities with Water Establishments (WE) in staff capacity building and technology integration should be encouraged.
- The involvement of L-NGOs, possessing expertise in operational fields, in discussions with ministries should be supported.

EXPERTISE SHARING

- Structured communication channels, including regular meetings, workshops, database platforms, and newsletters should be promoted.

WATER QUALITY AND NETWORK MAINTENANCE

- Customer complaints and feedback system within the maintenance and distribution departments should be established.
- Water testing and the management of network maintenance assets, including inventory management, should be supported.
- A coordination mechanism to assist Water Establishments (WE) with updating the current network data through a thorough on-the-ground data verification process, should be established.
- Clearly structured and documented roles and responsibilities in relationships between Water Establishments (WE), municipalities, and NGOs, should be advocated for.
- Establishing structured communication channels and advocating for the implementation of laws and regulations that require formal communication is essential.
- Municipalities’ perspectives on the potential inclusion of a Water Establishments (WE) office within their facilities to handle water-related issues, should be explored.

NATURAL DISASTER RISKS AND MITIGATION

- Structured communication channels should be established, and L-NGOs and Municipalities should be involved in resources allocation and community engagement.
- Local preparedness for Water Establishments (WE) should be increased, through awareness building and risk assessments on potential natural disasters in river basins, with the support of the High Relief Commission and the Ministry of Energy and Water.

WATER-BASED CONFLICT

- Municipalities (via Water Establishments) should be engaged in conflict notifications. Conflict reports should go through formal resolution channels and the comprehensive resolution of reported conflicts should be ensured.
- A comprehensive Social Network Analysis (SNA) study focusing on conflict management within the Al Assi river basin should be conducted.
- Awareness sessions for water actors on communication lines and feedback and complaints systems should be organized.
STAKEHOLDER NETWORK ANALYSIS | LEBANON

STUDY LIMITATIONS

- Sample selection: The sample was unevenly distributed across the three river basins, due to the inability to establish contact with all stakeholders within the data collection timeline. This limited the ability to conduct a thorough comparison of active networks between the three river basins.

- Sample structure: Not all types of stakeholders were interviewed as Key Informants, which prevented the inclusion of their perspectives on river basin management and relationships.

- Insufficient data for in-depth explanatory analyses: While the questionnaire focused on relationship types and the stakeholders that actors interact with, it did not explore the reasons behind specific types of interaction or interactions with specific stakeholders. More qualitative assessment would be needed to identify these reasons.

- Interaction frequency: The analysis doesn’t include details on how often interactions occur in different areas, which could give us useful insights into the strength and commonness of relationships.

- Timeline gap: Due to a delay between data collection and analysis, the current situation may vary from the one under analysis.

ENDNOTES


ABOUT IMPACT

IMPACT Initiatives is a Geneva based think-and-do-tank, created in 2010. IMPACT’s teams implement assessment, monitoring & evaluation and organisational capacity-building programmes in direct partnership with aid actors or through its inter-agency initiatives, REACH and Agora. Headquartered in Geneva, IMPACT has an established field presence in over 30+ countries. IMPACT’s team is composed of over 300 staff, including 60 full-time international experts, as well as a roster of consultants, who are currently implementing over 50 programmes across Africa, Middle East and North Africa, Central and South-East Asia, and Eastern Europe.
The stakeholders referred to in our research are all water actors working or coordinating in the water and sanitation sector in Lebanon. These were identified by IMPACT’s data collection partners: ACTED, LebRelief, and WWGVC.

In general, stakeholders can include government agencies, actors from municipalities, unions of municipalities, non-governmental organizations (NGOs), community members, water utility companies, water establishments, policymakers, donors, and other entities involved in WASH-related activities.

A water actor specifically refers to any individual, group, or organization directly involved in activities related to water management, distribution, access, or conservation within the WASH sector. Thus, while all water actors are stakeholders, not all stakeholders are water actors.

The KIIs were done with different stakeholders, the below table defines key stakeholders interviewed during the assessment.

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Referring To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Society Organizations</td>
<td>Association, Cultural Centre, Foundations, Civil Societies, etc.</td>
</tr>
<tr>
<td>Committees</td>
<td>Water Committees and Local Committees</td>
</tr>
<tr>
<td>Governors</td>
<td>Parliament members, public research institutions, public management unit in villages from the river basins</td>
</tr>
<tr>
<td>Industries</td>
<td>Engineering companies, Farmers and Agricultural Engineers, waste management, etc.</td>
</tr>
<tr>
<td>Local NGOs (L-NGOs)</td>
<td>Non-Governmental Organizations that operate only in Lebanon</td>
</tr>
<tr>
<td>Ministries</td>
<td>Ministry of Energy and Water, Ministry of Agriculture</td>
</tr>
<tr>
<td>Municipalities</td>
<td>Municipalities from the river basins</td>
</tr>
<tr>
<td>Private Sector</td>
<td>Local Restaurant, Resorts, consulting companies, farmers, fisheries, etc.</td>
</tr>
<tr>
<td>Unions</td>
<td>Unions of municipalities from the river basins</td>
</tr>
<tr>
<td>Universities</td>
<td>Universities from the river basins</td>
</tr>
<tr>
<td>Water Establishments*</td>
<td>Establishment of the Water of Beirut &amp; Mount Lebanon (EBML), Bekaa Water Establishment (BWE), North Lebanon Water Establishment (NLWE)</td>
</tr>
</tbody>
</table>

* The term Water Establishment (WE) is used to represent a Regional Water Establishment (RWE) in the context of a region (or river basin) in a related paragraph and may also represent all water establishments in a generalized context.

In addition to the above stakeholder categories, others have been mention throughout the assessment but were not interviewed. The table below lists those stakeholders:

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Referring To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Court of Law</td>
<td>Law institution responsible of resolving law conflicts</td>
</tr>
<tr>
<td>Donors</td>
<td>Donors for water projects</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>Internal security forces</td>
<td>Lebanese Internal Security Forces</td>
</tr>
<tr>
<td>International NGOs (I-NGO)</td>
<td>Non-Governmental Organizations that operate outside Lebanon</td>
</tr>
<tr>
<td>Military</td>
<td>Lebanese military forces</td>
</tr>
<tr>
<td>Political Party</td>
<td>Lebanese political parties</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations agencies</td>
</tr>
</tbody>
</table>

ANNEX 1: STAKEHOLDER KEY INFORMANT CATEGORIES
Network analysis is a method of studying the relationships between the components in a network and understanding how the network functions as a whole. It is represented by a graph, where the node can be an actor or group of actors having same social value or role.

Socio-centric network analysis involves the quantification of relationships between people within a defined group – a classroom of children, a board of directors, the residents of a village or town, the trading partners in a bloc of nations or, as is our research, the stakeholders involved present in three river basins in Lebanon.

<table>
<thead>
<tr>
<th>Definition</th>
<th>Description</th>
<th>Symbol of the notation in the maps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Node</strong> (Vertex)</td>
<td>A unit of a network (e.g. a stakeholder is the node of the stakeholders’ network)</td>
<td>The size of the node in the map is dependent on its weight (or degree), which is defined by the variable each node is representing. Different types of maps highlight different centrality measures, and the size of the node can vary according to the centrality measure it is portraying.</td>
</tr>
<tr>
<td><strong>Edges</strong></td>
<td>The line connecting two nodes representing the presence of a relationship</td>
<td>Each edge could have a weight-value and can be represented as a number above or below the arrow. Each edge could be directed or undirected. The thickness of the arrow can highlights the frequency of communication or its weight.</td>
</tr>
</tbody>
</table>

Social Network Analysis is used to investigate the degree of influence of each actor within a network, their impact on each other’s behaviors, and the level of connectedness, cohesion, and clustering within the network. Centralization measures such as degree (in-degree, out-degree, total degree), betweenness, closeness, authority, and PageRank effectively indicate the presence of powerful and important actors in the network. Actors with high centrality are more likely to influence others and hold more power within the network.