CLIMAGINE Workshop II Report

Integrated Management Plan for the Damour River Basin - GEF MedProgramme, Child Project 2.1.

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2.1
Mediterranean
Coastal Zones Climate
Resilience Water Security
and Habitat Protection"

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1. Introduction

Under the framework of the MedProgramme Child Project 2.1, implemented by Plan Bleu and PAP/RAC within the United Nations Environment Programme Mediterranean Action Plan (UNEP/MAP) system and funded by the Global Environment Facility, the second Climagine workshop for the IMP Damour was held on 28 October 2025. The meeting marked a key step in the process of developing the "Integrated Management Plan for the Damour Area in Lebanon", following the diagnostic and participatory phases completed earlier in the project. The Damour area, selected as a pilot site, provides a relevant case for applying the Climagine participatory foresight methodology to integrated water and land management in a context of increasing environmental and governance challenges.

Building on the outcomes of the Rapid Stakeholder Analysis and the first Climagine workshop, this second workshop aimed to move from problem identification to the development of solutions. Its specific objectives were to validate key indicators, prioritise challenges in the Damour area, and identify practical and feasible interventions to be integrated into the future management plan. The meeting brought together representatives from municipalities, national institutions, civil society, and technical experts.

27 October 2025, UNESCO Regional Office

2. Workshop summary

2.1 Workshop Structure

The second workshop for the Integrated Management Plan (IMP) of the Damour area built on the foundations laid during the first stakeholder meetings, aiming to deepen the **participatory dialogue** and strengthen the **shared understanding of area dynamics**. The sessions were designed to facilitate both collective reflection and targeted technical discussions, combining **plenary exchanges** with focused **working group sessions.**

The workshop was opened by Mr. Alessandro Candeloro, from the MedProgramme Coordination Unit at UNEP/MAP, who welcomed participants on behalf of the MedProgramme partners and recalled the overarching objectives of the programme in supporting integrated management and governance of freshwater and coastal resources in the Mediterranean region. He emphasized the importance of basin-level planning processes such as the Damour IMP in demonstrating the Source-to-Sea approach and the WEFE (Water-Energy-Food-Ecosystems) Nexus as practical frameworks for sustainability. This introduction was followed by Ms. Éloïse Leguérinel, Project Manager at Plan Bleu/RAC, who presented the progress made to date in the Damour IMP process, including key achievements and findings from the first Climagine workshop and early technical analyses. She outlined the next steps for consolidating the participatory and indicator-based approach that underpins the IMP's development. The objectives and facilitation of the workshop were then introduced by Mr. Hussam Hawwa, Consultant at Plan Bleu, who detailed the workshop's structure, expected outputs, and the participatory methodology guiding the discussions. He emphasized the intention to **collectively assess indicator trends** and **identify management priorities** through an open and evidence-based dialogue.

The workshop brought together representatives from local municipalities, civil society and community organizations, national institutions, technical experts, academic institutions and environmental actors, ensuring a balanced representation of territorial and sectoral perspectives. This diversity of voices helped to ground the discussions in the socio-environmental realities of the Damour source-to-sea continuum, while maintaining a focus on integrated planning.

Discussions were organized around several key thematic areas—water resources management, agriculture and rural development, environment and biodiversity conservation, urban planning and governance, and cross-cutting aspects of basin management. This thematic structure enabled participants to address specific sectoral challenges while recognizing the **interlinkages between human activities, ecosystems, and water systems**. The spatial dimension of the area was equally central to the workshop's design. The analysis of the Upper (mountainous source area), Middle (valley), and Lower (coastal plain) sections of the Damour area allowed participants to compare pressures, uses, and environmental conditions across different segments. By juxtaposing these local perspectives, the group was able to identify both **shared dynamics** and **unique challenges**, thereby reinforcing the integrated approach promoted by the IMP.

Indicators were used as the main tool to guide discussions and structure the participatory analysis. They provided a common language for assessing both environmental and socio-economic trends, as well as for connecting diagnostic findings with potential responses. Through this indicator-based framework, participants explored priorities for action, assessed their feasibility, and reflected on monitoring and governance mechanisms to accompany implementation.

Throughout the sessions, the facilitation team encouraged open and constructive dialogue, ensuring that multiple viewpoints were heard and that potentially sensitive topics were approached collaboratively. The participatory method fostered a shared understanding of key management priorities and laid the groundwork for the forthcoming stages of the Damour IMP, where the identified measures will be refined and integrated into a coherent strategy for sustainable basin management.

2.2 Workshop Summary

The second workshop on the IMP for Damour served as a key step toward consolidating a **shared understanding of the area's environmental challenges and governance needs**. Participants from municipalities, institutions, academics, and technical organizations jointly refined indicator sets, discussed priority interventions, and explored pathways toward a coordinated governance framework rooted in both formal and traditional management practices.

2.2.1 State of the Damour Area and Emerging Environmental Pressures

The opening discussions confirmed a shared recognition that **water stress** in the Damour area has evolved from being episodic to structural. Recent sub-basin assessments, including water balance analyses conducted in the Barouk area, point to mounting pressures on both surface and groundwater resources—similar conditions are witnessed on the Damour river. Throughout the discussions, participants expressed growing concern over the area's declining resilience. Several contributors noted that **water scarcity** now extends to mountainous zones traditionally regarded as resilient, mirroring national trends linked to over-extraction and climate variability. Indeed, marked variations in groundwater levels—sometimes reaching several tens of meters over recent decades—were observed in different parts of the area, suggesting **uneven abstraction patterns** and the **absence of effective well regulation**. Unregulated groundwater pumping, decreasing river flows, and deteriorating water quality were cited as interconnected symptoms of basin degradation. The frequent malfunction or underperformance of wastewater treatment plants, widespread dependence on septic systems, and the absence of systematic monitoring further aggravate the situation. In addition, direct pollution sources—such as the dumping of solid waste and illegal construction along riverbanks—continue to erode ecosystem integrity, while insufficient enforcement of land-use regulations allows degradation to spread unchecked.

Many participants underscored that **sustainably increasing surface water availability through improved management of springs, river flows, and retention systems** could enhance overall basin resilience, provided that abstractions and diversions remain controlled. Across discussions, the importance of **collective action** and **coordination among municipalities** emerged as a recurrent theme and a prerequisite for any effective response. These insights are consistent with regional studies emphasizing the need for integrated water accounting and basin-scale planning in semi-arid Mediterranean contexts.

2.2.2 Land Use and Governance Perspectives

Land-use planning and **regulatory enforcement** were identified as **central governance challenges** at the Damour area level. Participants emphasized that while zoning regulations and environmental decrees formally exist, they remain **weakly enforced** or entirely absent in most municipalities. Institutional mandates remain scattered across agencies with limited coordination or accountability mechanisms. Participants stressed that without a **shared framework** for data exchange, planning, and enforcement, policy interventions will remain inconsistent and reactive. A number of examples illustrated variations in enforcement capacity across localities—for instance, municipalities such as Aley have established active committees to oversee building permits, showing that institutional enforcement mechanisms can function effectively when supported by political and administrative will.

The exchanges underscored the **persistent gap between formal governance instruments and their implementation on the ground**. Several contributors warned that continued reliance on non-enforced regulations undermines both environmental protection and water management goals. These observations echo findings from national assessments that describe enforcement deficits as a systemic barrier in Lebanon's environmental and water governance frameworks. Participants converged on the need to **shift from aspirational policy-making toward concrete and implementable actions** at both municipal and basin scales, particularly in riparian zones where land-use changes directly shape river morphology, sediment dynamics, and water quality. The need for **fair and transparent governance** at the Damour area level was thus strongly reiterated, highlighting the importance of establishing collective rules and mechanisms for coordination among municipalities and relevant agencies.

2.2.3 Legal and Traditional Management Systems

Discussions also revisited legal and institutional models relevant to the Damour area management. The possible adaptation of elements from the Litani River Authority model to the Damour context was debated, particularly regarding centralized coordination and oversight. While participants acknowledged differences in scale, mandates, and institutional maturity, several expressed interest in **adopting selected governance mechanisms** rather than replicating the entire framework.

In parallel, traditional management systems such as the **Hima** **concept** —a community-based protected area for sustainable resource use and biodiversity conservation— were discussed as potentially complementary approaches. It was noted that while a full source-to-sea application of Hima may not be feasible for the entire Damour area, localized initiatives—such as those implemented in Kfarmatta—could be expanded to river zones and integrated into inter-municipal management structures. These insights align with regional experiences showing that **customary stewardship practices can effectively promote biodiversity conservation and local compliance** when embedded within formal legal frameworks.

Overall, participants concluded that **combining statutory instruments with locally rooted management systems** could reinforce both the legitimacy and the enforceability of the Damour area governance, particularly in contexts marked by fragmented authority and limited institutional capacity.

2.2.4 Illustrative Case: Silfaya Check-Dam

The Silfaya check-dam incident was frequently referenced as a case reflecting these structural governance weaknesses. The **uncoordinated construction of a small upstream barrier** resulted in downstream drying and ecological harm, sparking tensions among municipalities. Indeed, the placement of cement blocks across the river channel has led to upstream water retention and significant reductions in downstream flows, reportedly causing the drying of river sections in the Damour area. Participants described associated ecological impacts, including fish mortality, and considered the intervention as an environmental infringement. Representatives from Silfaya, however, invoked long-standing local practices, asserting customary rights to river water for irrigation. Downstream municipalities contested this interpretation, stressing that while water use should indeed be shared, no single community can justify actions that disrupt overall river continuity. The case underscored the **absence of basin-wide rules** defining water allocation, diversion, and environmental flow standards. Participants collectively recognized that such conflicts cannot be addressed at municipal level alone but require a **governance mechanism** ensuring fair water distribution and ecological balance. The Lebanese Water Code provides such a framework for managing these cases—including handling violations and criminal prosecution—but remains largely unenforced. Comparable situations in other Mediterranean basins underline the importance of explicit allocation rules and environmental flow standards to mitigate cumulative impacts from small-scale interventions.

2.3 Consolidated Priority Themes and Indicators for the Damour Area Management

During the indicator validation exercise, participants reviewed and refined the thematic indicator sets initially proposed during the first workshop. These indicators cover five closely interlinked dimensions:

- Urban governance and land management
- Agriculture and irrigation practices
- Water supply and wastewater systems
- Environment and biodiversity
- Cross-cutting coordination for Damour area governance.

The process helped confirm a smaller, **more practical set of priority indicators** that reflect both the area's urgent environmental pressures and stakeholders' shared management vision.

In parallel, the identification of feasible interventions gave the discussions a forward-looking and solution-oriented character. Participants agreed on **several priority actions**, including:

- The rehabilitation and proper operation of wastewater treatment systems.
- The introduction of groundwater monitoring, metering, and abstraction control.
- The promotion of efficient irrigation techniques and improved water-use practices.
- The integration of nature-based solutions to restore river continuity and enhance ecological resilience.
- The establishment of joint enforcement and coordination mechanisms among municipalities to regulate land use and prevent pollution.

Based on this, participants converged on a set of priority themes and indicators considered essential for monitoring and managing the Damour area. The indicators reflect both technical feasibility and relevance to local challenges, while

acknowledging existing **data limitations**. The outcomes are listed below (ranked by group from highest to lowest RACER (Relevant, Accepted, Credible, Easy, Robust) score).

These **outcomes are stakeholder-based**, reflecting the perceptions and expertise of participants involved in the process. This participatory approach lies at the core of the Climagine methodology, which recognizes stakeholders as experts in their own right, contributing essential local and sectoral knowledge to envision plausible futures.

Group Urban Planning and Governance					
Indicator (unit)	**Description / Relevance**	**DPSIR**	**Priority / Priority Measures**	**Scale / Data Source**	**Baseline**
Urban expansion in riparian zones (% or ha/year)	Tracks land sealing and habitat loss.	**Pressure/ State**	**High** – Enforce zoning regulations	Basin; CNRS, Landcover; Municipal plans; Remote sensing	**High Pressure** - 200,7 ha lost (2014-2024) ≈ **-20,1 ha/year** - Artificial areas cover **24%** (121 km²) of the total territory (500 km²)[1].
Alignment of municipal master plans with basin water management objectives (qualitative)	Consistency between zoning and water protection.	**Response**	**High** – Review plans against IMP	Municipalities; MoEW; DGUP.	**Fragmented / Outdated.** Zoning often conflicts with river buffer zones; enforcement is weak, leading to "haphazard" development
Enforcement actions on land-use violations (#/year)	Effectiveness of policing illegal construction.	**Response**	**Medium** – Fines and site closures	Basin; Municipal records; MoE; MoEW; EBML; ISF[2].	**Low / Reactive.** Violations (e.g., riverbank restaurants, drifting tracks) are visible but rarely penalized.
Citizen participation in monitoring and stewardship (qualitative / Composite Score (score 0-5))	Local stewardship engagement. Score = (active participation × 0.4) + (validated reports × 0.3) + (territorial coverage × 0.3)	**Response**	**Medium** – Establish citizen observatories and community-based monitoring programmes.	Basin; Municipalities; NGOs	Low or ad hoc participation. Score ≈1/5
Local data and stakeholder platforms (qualitative)	Indicates existence and use of shared platforms for data reporting, dialogue and coordination.	**Response**	**Medium** – Develop / strengthen basin information system and multi-stakeholder platforms.	Basin; Basin institutions; NGOs; MoEW[3]	Emerging or project-based initiatives. Lebanon's National Water Strategy 2024 – 2035 includes it in its action plan (under pillar 4 (4.2)).

[1] Data indicate 629,789 m² of urban sprawl over field crops and 1,377,266 m² over permanent crops, with additional encroachment of 124,426 m² recently observed on field crops. This urbanization is rapidly replacing green cover, leading to the loss of agricultural land and a 25 m reduction in shoreline width between 1940 and 1990.
- Total urban sprawl area: **629,789 + 1,377,266 = 2,007,055 m²** = 200,7 ha / 10 years (2014-2024) = **20.07 ha/year**
MORES s.a.r.l. (2026). *Diagnostic analysis (Task 3): Under the preparation of an integrated management plan for the Damour Area in Lebanon* (Call for Offers 02/2024/CP2.1). Global Water Partnership-Mediterranean (GWP-Med).
[2] The Water Code grants MoEW and EBML the authority to issue violation notices
[3] The Water Code requires MoEW to share data, a commitment reinforced in Lebanon's National Water Strategy 2024–2035 action plan.

Group Agriculture and Rural Development					
Indicator (unit)	**Description / Relevance**	**DPSIR**	**Priority / Priority Measures**	**Scale / Data Source**	**Baseline**
Agricultural Water Demand (Million Cubic Meters (MCM)/year)	Theoretical water volume for crops.	**Pressure**	**High** – Water accounting	MoA; Field Survey; MoEW/EBML	**≈ 4.3 MCM/year** [4]
Efficient irrigation coverage (% of agricultural land)	Adoption of drip irrigation vs flood.	**Response**	**High** – Incentives for drip irrigation.	Basin; MoA; LARI; MoEW/EBML; remote sensing.	**Low Efficiency** **≈ 11-15%** (Drip Irrigation)[5]
Farmers applying Good Agricultural Practices – GAP (% of farmers)	Pollution reduction (fertilizers).	**Response**	**High** – Extension services, training on GAP and integrated pest management.	Basin; MoA; Cooperatives	Nationally **low** and likely **<10%** in Damour; no basin-specific quantified baseline yet.
Irrigated land using polluted water (% of irrigated land)	Use of untreated wastewater.	**Pressure**	**High** – Control sources of pollution; promote safe reuse standards and monitoring.	Basin; Field surveys; MoE; MoA; MoEW.	**Significant.** Due to water shortages and untreated sewage discharge, farmers in the lower basin often use polluted river water.
Active Water User Associations – WUAs (# active)	Collective management.	**Response**	**Medium** – Formalise WUAs; clarify roles in allocation, maintenance and conflict resolution.	Basin; MoA; MoEW; Local unions.	**Few / Inactive.** Management is largely individualistic
Farmers adopting organic practices or biopesticides (# of farmers)	Shift towards lower-chemical practices.	**Response**	**Medium** – Support pilot organic plots and biopesticide use in buffer zones.	Basin; MoA; NGOs	**Low** number of farmers.

Group Water Supply and Wastewater Management					
Indicator (unit)	**Description / Relevance**	**DPSIR**	**Priority / Priority Measures**	**Scale / Data Source**	**Baseline**
Seawater intrusion index (Chlorides mg/L	Salinity indicator	**State / Impact**	**High** – Reduce pumping near coast, enforce ecological	MoEW; Labs.	Critical Chlorides >200 mg/L[6]

[4] Total estimated demand is 4.3 Million m^3/year for a total irrigated area of ≈ 708 ha. Calculated based on 708 ha of irrigated land (Fruiting Vegetables: ≈2.53 MCM + Legumes: ≈0.80 MCM + Leafy Vegetables: ≈0.49 MCM)
MORES s.a.r.l. (2026). *Diagnostic analysis (Task 3): Under the preparation of an integrated management plan for the Damour Area in Lebanon* (Call for Offers 02/2024/CP2.1). Global Water Partnership-Mediterranean (GWP-Med).

[5] 50% use traditional (flood) irrigation, 39% sprinklers, and only ≈ 11% use drip irrigation
MORES s.a.r.l. (2026). *Diagnostic analysis (Task 3): Under the preparation of an integrated management plan for the Damour Area in Lebanon* (Call for Offers 02/2024/CP2.1). Global Water Partnership-Mediterranean (GWP-Med).

[6] Chloride levels have tripled, and TDS values have doubled between 1983 and 2003 in wells located near the saltwater–freshwater interface. Naameh reservoir chloride concentrations increased by ~300% over the same period. Saadiyat sample shows very high chloride levels due to direct contact between the Sannine Aquifer and the sea, combined with excessive groundwater pumping.
ARD (2003). CAMP Project – Lebanon: Integrated Water Resources Management – Final Report. Priority Actions Programme/Regional Activity Centre (PAP/RAC) & Ministry of Environment, Lebanon

or Total dissolved solids (TDS) (mg/L))			flows, protect recharge zones.		**≈ 435–1,163 mg/L** (TDS)
Groundwater Level Trend (m/year)	Rate of depletion	**State**	**High** – Install piezometers with data loggers, monthly monitoring, link to abstraction management.	Basin; CNRS-L; MoEW; Monitoring Wells	Declining **≈ - 0.5 to 7.6m/year**[7]
Groundwater Abstraction (MCM/year)	Volume withdrawn from aquifers	**Pressure**	**High** – Update well inventory, meter public wells, regular reporting, cap abstraction near the coast.	Basin; MoEW; EBML	High Pressure **≈ 13,5 MCM/year**[8]
Households connected to a functioning WWTP (% of households)	Effective sanitation coverage	**Response**	**High** – Complete collection networks and increase WWTP connection rates. Repair Pumping Stations (Damour, Naameh) to activate links to Ghadir.	Basin / municipal; Municipalities; EBML; WWTP operators	**< 10%.** [9]
Wastewater effectively treated (% = m³/day vs design capacity)	WWTP performance	**Response**	**High** – Secure O&M budgets; upgrade treatment and monitoring. Troubleshoot non-functional plants.	Basin; EBML; WWTP operators	**Low Efficiency.** **≈ 21%**[10]
Metered wells (# of wells)	Abstraction control.	**Response**	**High** – Basin-wide metering of public and major private wells.	Basin; MoEW; Utilities	**Low / Partial.** Private metering is negligible ("unmonitored abstractions").[11]
Water Quality Index (WQI) (Index Value 0-100)	Marine pollution status.	**State / Impact**	**High** – Functioning WWTPs (Ghadir/Damour).	CNRS-Marine; MoE.	**Medium to Poor** (Risk for Swimmers) Previous studies (2005-2009) showed "Good" average but very high fecal coliform levels at the Damour mouth due to sewage discharge, posing health risks. Current WWTP failures suggest degradation. General WQI "Good" upstream but degrades

[7] Levels are dropping due to over-extraction with a long-term drop of ≈2m observed (1970–2014).
E.g. Mechref: Level dropped by 7.6m in a single dry year (2013-2014) and the salinity (EC) increased 7-fold (2012-2020).

[8] Total estimated abstraction in the Damour coastal aquifer (part of the Khaldi Cretaceous Basin, supplying ≈13 Mm³/year or one third of domestic water for over one million people in Beirut and suburbs) reached ≈13.5 MCM/year in 2011 (22 government + 8 municipal + ≈75 private wells), mainly for domestic use and increasingly irrigation (20%). This includes public wells (≈1.14–8.9 MCM), private wells (≈1.2 MCM from river interception), and unmonitored extraction, amid 55,000–60,000 illegal wells regionally complicating accounting. **No reliable updates exist.** Note that there are more than 22 EBML operated wells in the area.
Khadra, W. M. (2017). *Analysis and remediation of the salinized, Damour coastal (dolomitic) limestone aquifer in Lebanon* [Doctoral dissertation, Delft University of Technology]. TU Delft Repositories. https://doi.org/10.4233/uuid:6d4208be-65c1-43e8-afa0-5019f22c6167

[9] While historically in Damour ≈ 45% of households have network pipes, most do not reach a functioning plant. Deir El Qamar: Raw sewage discharged to river Networks exists but pumps (Damour, Naameh) are broken/vandalized, preventing flow to Ghadir WWTP.

[10] The treatment efficiency was calculated as the ratio of actual treated flow to design capacity. Results show: Al Barouk 25 %, Nabeh El Safa 10 %, Ain Bal 25 %, Kfar Qatra 60 %, El Khraibeh 20 %, Jbaa 36 %, and Al Moukhtara-Boutmeh 39 %. WWTPs operate at 21% weighted average capacity (vs. 31% simple average), heavily impacted by large underperforming plants like Nabeh El Safa (10% of 3,000 m³/day). All plants remain under capacity.
= (25%×1200 + 10%×3000 + 25%×2200 + 60%×250 + 20%×450 + 35.6%×225 + 38.9%×450) ÷ 7775 = 21.2%

[11] Only 287 public wells are equipped with flow meters across the whole establishment (NLWE/BMLWE/SLWE). Ministry of Energy and Water (MoEW) & United Nations Development Programme (UNDP). (2014). *Assessment of groundwater resources of Lebanon.* Beirut, Lebanon: MoEW and UNDP.

					downstream[12]

Group Environment and Biodiversity					
Indicator (unit)	**Description / Relevance**	**DPSIR**	**Priority / Priority Measures**	**Scale / Data Source**	**Baseline**
Coastal Vulnerability Index (CVI) (Index Value)	Quantifies coastal risk based on geomorphology, slope, erosion, and waves.	**State / Impact**	**High** – Coastal Setbacks.	CNRS-Marine; MoE.	**4.56** (Moderate Vulnerability).[13]
Forest Ecosystem Coverage under Protection (% of the Damour area)	Conservation of key habitats.	**State/ Response**	**High** – Enforce protection in Chouf Reserve and municipal woods + Enforce Law 558/1996 (protection of conifers) and localized Hima[14].	MoA; MoE; CNRS Landcover.	**≈ 41.3%** Wooded Cover [15]
Species Conservation Status (Count)	Conservation of key habitats. Red List.	**State**	**High** – Biodiversity inventory; protect specific habitats.	CNRS; NGOs; IUCN.	**≈ 4-10** threatened species [16]

[12] Massoud, M. A. (2012). Assessment of water quality along a recreational section of the Damour River in Lebanon using the water quality index. *Environmental Monitoring and Assessment, 184*(7), 4151–4160.
https://doi.org/10.1007/s10661-011-2251-z
The study (2005-2009) computed WQI (0-100 scale) for Damour River sites using 9 parameters: temperature (P=1), pH (1), EC (1), DO (4), TDS (2), SO4 (2), NH3-N (3), NO3-N (2), BOD (3). Average WQI across sites and years: ~76 (good quality, 71-90 range). Best at upstream rural sites (e.g., S10: ~80.6); worst at estuary (S1: **~72.1, medium-good**).

[13] While numerically the lowest among 5 basins studied, it remains "Moderate" due to high erosion, steep slopes, and "very high hydrodynamic forcing" (Level 5). El Haddad, J. (2025). *Assessment of coastal zone sustainability using three key performance indicators in five coastal Lebanese basins* (Master's thesis, Research Master in Marine Biology and Ecology). Supervised by Dr. Ghaleb Faour.

[14] Traditional Arab system (>1,500 years old) of community-managed protected areas for the sustainable use of natural resources (grazing lands, forests, water). Revitalized in Lebanon by SPNL for biodiversity conservation and Important Bird Areas (IBAs), in partnership with IUCN/BirdLife.

[15] Total wooded land is 208 km² (41.27% of basin). Protection is strong in the Upper Basin (Chouf Reserve) (Cedar/Fir forests are protected de facto by Law 558/1996) but weak in the Lower Basin.

[16] - Species specifically identified and classified as Threatened (Vulnerable (VU), Endangered, or Critically Endangered (CR)) in recent assessments of the basin out of 332 taxa detected (based on eDNA and transect surveys): European Eel (*Anguilla anguilla*) CR + Freshwater Blenny (*Salaria fluviatilis*) CR (Isolated pop) + Spur-thighed Tortoise (*Testudo graeca*) VU + Riverine Flora Platanus orientalis VU. Difaf SAL. (2022). *Development of an integrated management plan for Damour River Basin, Lebanon – Final completion and impact report.* Critical Ecosystem Partnership Fund (CEPF), Mediterranean Basin Hotspot.
https://www.cepf.net/resources/final-project-report/final-project-report2655
- An earlier study (2004) reported 10 threatened species out of 370 recorded in Damour. Mehdi, S. (2004). *Coastal Area Management Programme – Lebanon: Damour*. Priority Actions Programme/Regional Activity Centre.
https://iczmplatform.org/storage/documents/asjLMelZtRXWwvOkIldLPnHy1hFSlbDQB9os9DaH.pdf

Environmental flow compliance (m^3/s)	Minimum ecological flow reaching the estuary to maintain connectivity.	**State / Impact**	**High** – Define and enforce environmental flow in allocation rules and operations. Enforce caps on abstraction during Aug-Oct.	Damour area; MoEW; LRA.	**Critical Failure (Almost Dry) ≈ 0.85 m^3/s** [17] (need to be 0.1-0.5 m^3/s for aquatic life) - Current Value (August 2023): **0.005m^3/s** at the river Damour Sea Mouth and **0.206 m^3/s** at the upstream flow (elQadi Bridge) indicating that **≈ 0.201 m^3/s (97% of the flow)** is extracted or lost in the lower basin before reaching the sea leaving only a **trickle for the ecosystem**.
Riverbank erosion (m/year)	Tracks physical degradation of the river channel and loss of land	**State / Impact**	**High** – Prioritise nature-based riverbank protection and restoration.	Damour area; Municipalities; NGOs; CNRS, Army maps.	**≈ 0.5 m/year** (Historical Proxy) [18]
Dumpsites rehabilitated (# of sites)	Solid waste pressure.	**Response**	**Medium** – Close illegal dumps; rehabilitate sites; improve municipal SWM.	Damour area; Municipalities	**7/13 rehabilitated (54%)**[19] Multiple informal dumps in riparian and hillside areas.
Active weather monitoring stations (# stations)	Density of operational climate and hydrometeorological stations.	**Response**	**Medium** – Upgrade and expand monitoring network to support risk assessment.	Damour area; CNRS-L	**3 Stations:** - Baakline station (LARI) exists but data gaps noted - Ain Zhalta (Shouf Biosphere Reserve) exists but non-operational - Bayssour (MoPWT) exists but non-operational[20]
Area under fire prevention measures (% wooded area)	Preparedness against wildfires affecting forests and upper catchment.	**Response**	**Medium** – Implement fire prevention plans and early-warning systems.	Damour area; Civil Defense; MoA; MoE; Municipalities	Low Coverage (< 10%)[21]

[17] LRA Gauging Stations from Litani hydrological data (1960s-2023 averages). Averages derived from listed annual means (e.g., 0.272 + 0.452 + ... across ~20 years per station, then station average). Most stations show compliance in wet months (Dec-Mar: >1 m^3/s) but risk non-compliance in dry seasons (Jul-Aug: <0.5 m^3/s at several sites; e.g.Canal el Raayen Es Safa Spring and Canal Beit edDine el QAA Spring), indicating enforcement needed for abstractions. Average annual flows support ecology overall, but state "High" flags summer enforcement priority.

[18] The coastal shoreline retreated 25m between 1940-1990 (≈0.5m/year). Similar erosion is suspected along rivers due to urbanization. UNESCO Intergovernmental Hydrological Programme. (2024, July). Characterization and assessment of the Damour priority coastal aquifer and related ecosystems: Final report. Damour Coastal Aquifer Project.

[19] 2016 Survey Status: Out of 13 non-operational dumpsites identified: – 6 were not rehabilitated. – 5 were rehabilitated-removed. – 2 were rehabilitated-covered. – 1 was inaccessible.
Operational Note: While these sites were classified as non-operational/rehabilitated in 2016, recent diagnostics (2026) warn that some abandoned sites in the Damour area (e.g., Bchetfine, Kfarmatta) are occasionally re-used or burned during collection crises.
Ministry of Environment & United Nations Development Programme. (2017). *Updated master plan for the closure and rehabilitation of uncontrolled dumpsites throughout the country of Lebanon* (Volume A). Earth Link and Advanced Resources Development (ELARD).
https://files.acquia.undp.org/public/migration/lb/Updated-Master-Plan-Volume-A_Final-ilovepdf-compressed.pdf

[20] UNESCO Intergovernmental Hydrological Programme. (2024, July). Characterization and assessment of the Damour priority coastal aquifer and related ecosystems: Final report. Damour Coastal Aquifer Project.

[21] World Bank. (2025). *Lebanon: Community-based wildfire risk management in Lebanon's vulnerable landscapes (P500390): Implementation support mission, September 10–19, 2025, aide-mémoire* [Official Use Only internal report]. World Bank Group.
• Current Status: Physical prevention (fire lanes, pruning) is currently restricted. MoA permits for these activities are conditional on municipalities having an approved Forest Management Plan, which most currently lack.
• Targeted Action: 11 Municipalities in the Damour area (including Baakline, Deir El Qammar, Kfarqatra) are selected beneficiaries of the new WB/MoE Wildfire Project.
• Progress: "Slow." A needs assessment for equipment and restoration is ongoing.

Group Cross-Cutting Coordination for the Damour Area Governance					
Indicator (unit)	**Description / Relevance**	**DPSIR**	**Priority / Priority Measures**	**Scale / Data Source**	**Baseline**
River Basin Charter / IMP (Yes/No or % progress)	Captures progress towards an agreed basin governance framework.	**Response**	**High** – Co-develop, adopt and implement Basin Charter / IMP.	Basin; MoEW; LRA	Draft under preparation.
Damour area water management model (Yes/No)	Indicates availability of a quantitative water balance and environmental flow model.	**Response**	**Medium** – Develop, calibrate and periodically update basin model.	Basin; CNRS-L; Consultants; MoEW/EBML.	No / Concept. Needs calibration with missing abstraction data
Water quality and quantity awareness / monitoring campaigns (#/year)	Tracks communication and citizen-science efforts at Damour area scale.	**Response**	**Medium** – Organise recurrent campaigns on pollution, scarcity and conservation.	Basin; NGOs; Municipalities; MoEW	Sporadic and project-based campaigns.
Basin-wide mapping completeness (% coverage)	Measures availability of spatial data on riparian areas, buffer zones, land-use and standards.	**Response**	**Medium** – Complete multi-thematic mapping and keep it updated.	Basin; CNRS-L; MoE	Partial and fragmented mapping.
Public awareness of the Damour area boundaries, stakeholders and conservation practices (qualitative)	Reflects knowledge of the Damour area as a management unit among residents and users.	**Response**	**Medium** – Implement basin-branded communication and education programmes.	Basin; Municipalities; Civil society	Low level of basin-wide identity and awareness.
Recreational Use Intensity (# visitors or # establishments)	Quantifies the social/economic value of the river and pressure from tourism.	**Pressure**	**Medium** – Sustainable tourism guidelines	Municipalities; Ministry of Tourism	**High Pressure / Unregulated.**[22]

[22] The lower river section is "heavily used" for recreation. Numerous restaurants encroach on the riverbanks (e.g., Ain Zhalta, Damour). High number and concentration of pools and private chalets with pools in previously agricultural areas (Kfarmatta, Bayssour, Mejdlaya, etc.)

The workshop concluded with a collective call to a clear investment planning framework and inter-institutional data sharing to enable consistent and evidence-based decision-making. Collective action across municipalities was repeatedly highlighted as a prerequisite for sustainable outcomes.

Beyond its technical deliverables, the workshop contributed to building **trust among stakeholders** and to **fostering a common sense of ownership over the Damour area's future**. The dialogue confirmed that sustainable recovery of the Damour River requires not only technological and financial inputs but also strengthened governance, accountability, and cooperation at every level.

Gender Inclusiveness at the Second Climagine Workshop

A core pillar of the MedProgramme is gender equality and the systematic integration of gender perspectives, as set out in the **MedProgramme Gender Mainstreaming Strategy.** In line with this commitment, the Damour Climagine workshop was designed to foster an inclusive and representative environment, both in its methodology and in the composition of its participants. The workshop brought together 51 participants and speakers from a wide range of sectors, including government ministries (Energy and Water, Agriculture, Public Works and Transport, Environment, Industry, Tourism), local authorities (Damour Municipality and other municipalities), academic and research institutions (University of Balamand, CNRS, etc.), United Nations agencies (UNESCO, UNICEF, UN/ESCWA, UNEP/MAP, Plan Bleu, PAP/RAC), consulting firms, NGOs, and civil society. Among the participants, both women and men held technical, decision-making, and facilitation roles, with women serving as directors, researchers, engineers, project coordinators, hydrologists, and sector experts, including key figures such as Mona Fakih (Director of Water, Ministry of Energy and Water), Tracy Zarour (Hydrologist, UN/ESCWA), and Youssra Ghoussein (Researcher, CNRS).

Gender Statistics for the Damour Climagine Workshop

- Total number of participants with identified gender: 51
    - Women : 25
    - Men : 26
- Percentage of women: 49%
- Percentage of men: 51%

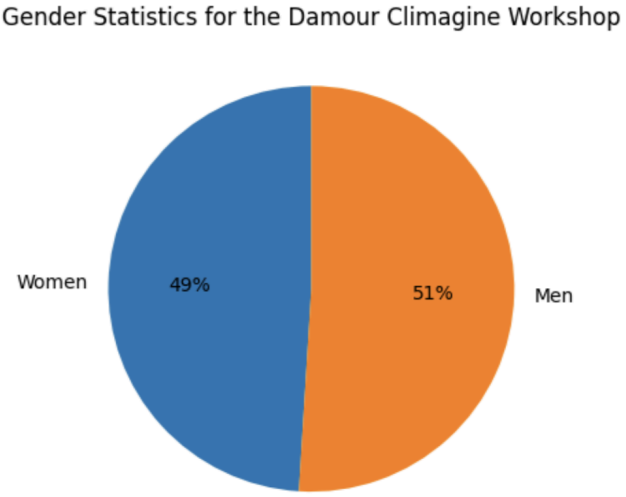

Figure 1. Gender Distribution of Participants for the Second IMP Damour Climagine Workshop

Gender was also addressed as a **cross-cutting theme** throughout the workshop, both in plenary discussions and within the thematic group work. Discussions nevertheless highlighted persistent challenges, particularly the **lack of sex-disaggregated data** and the **limited integration of gender indicators** in the water, agriculture, environment, and governance sectors. This lack of gender-specific data, combined with limited awareness of the gender-differentiated impacts of environmental management and climate change, underscores the need for targeted efforts in future data collection, capacity building, and awareness-raising activities under the programme.

3. Conclusion and Next Steps

3.1 Main Outcomes of the Second Climagine Workshop

The second Climagine workshop for the IMP Damour marked a significant step forward in the participatory planning process.

• First, the workshop confirmed a **shared diagnosis** of the area's main challenges across municipalities and sectors. Participants converged on the recognition that **water stress, wastewater pollution, river degradation,** and **weak enforcement** are **systemic** issues affecting the entire area, rather than isolated local problems. This convergence was observed across Upper, Middle, and Lower basin perspectives.

• Second, participants validated a consolidated **set of priority themes and indicators**. Indicators were collectively assessed for relevance and feasibility, with emphasis on water supply and wastewater management, agriculture and rural development, environment and biodiversity, urban planning and governance, and cross-cutting Damour area management. The agreed indicators provide a coherent monitoring framework capable of supporting both technical assessment and governance dialogue.

• Third, the workshop enabled **prioritisation of practical interventions**. Participants identified a range of feasible technical, governance, and nature-based solutions that can be progressively implemented. Particular emphasis was placed on restoring wastewater treatment functionality, improving water accounting and monitoring, strengthening land-use enforcement in riparian zones, and promoting demand management and water-efficient practices.

• Fourth, this participatory exercise **strengthened inter-municipal and institutional dialogue**. The workshop provided a **neutral platform for addressing contested issues**, including water abstractions, local diversions, and infrastructure choices, while maintaining a constructive focus. The participation of national institutions and regional partners reinforced the legitimacy of the process and highlighted opportunities for **Public–Public cooperation.**

• Finally, this second climagine workshop generated a **shared understanding of the need for Damour area-wide governance instruments**. The Integrated Management Plan for the Damour Area in Lebanon thus emerged as a central mechanism for translating dialogue into commitments, clarifying roles, and guiding subsequent planning and investment decisions.

3.2 Remaining Gaps and Challenges

While the workshop achieved its intended objectives, several gaps were identified that require attention before finalizing the Integrated Management Plan (IMP).

- Critical **data gaps** persist, particularly regarding **quantitative measurements of water resources**. Participants noted the relative availability of river discharge data, but highlighted the lack of systematic data. Addressing these deficiencies through targeted monitoring campaigns and the definition of common measurement standards will be essential for operationalizing the agreed indicators.
- **Institutional coordination mechanisms** also need to be further developed. Participants recommended the establishment of a basin initiation or coordination committee to oversee follow-up actions, facilitate data sharing, and support the development of basin-level instruments. Such a mechanism would enhance intermunicipal collaboration and ensure the continuity of the participatory process.

Additional gaps were identified in **spatial data** and **mapping coverage**. A comprehensive mapping effort is required to delineate the Damour area boundaries, riparian zones, land use, protected areas, and water and wastewater service coverage. Improved alignment between water supply, wastewater, and land-use master plans will also be important for coherent and integrated planning.

3.3 Next Steps

Building upon these steps, the **last Climagine workshop** for the IMP Damour—scheduled for early February 2026 in Beirut—will focus on defining the **Band of Equilibrium (BoE)** and **Amoeba diagram**, or "safe operating space", for each sustainability indicator. This process will involve expert review of the proposed indicators, ensuring their scientific robustness, feasibility, and data compatibility. Stakeholders will then participate in establishing minimum and maximum

threshold values for each indicator, thereby translating sustainability principles into measurable targets tailored to the Damour context.

On another level and based on the discussions, the following steps were also agreed upon:

- Consolidate and finalise the prioritised indicator framework.
- Define monitoring methods, responsibilities, and data sources.
- Establish a basin coordination or initiation mechanism.
- Initiate drafting of the River Basin Charter.
- Prepare the structure and outline of the Integrated Management Plan for the Damour Area in Lebanon.
- Address key data gaps through targeted field measurements and monitoring.

The project partners—Plan Bleu/RAC, GWP-Med, PAP/RAC, UNESCO-IHP, contracted parties and institutions—together with other concerned Lebanese institutions and local stakeholders, remain committed to maintaining this **dynamic momentum.** With inclusive governance, robust data, and locally grounded planning, the Damour Integrated Management Plan will evolve into a practical and forward-looking tool for sustainable development and climate resilience in the Damour area.

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5. Annexes

5.1 Event agenda

Venue: UNESCO Regional Office in Beirut, Cite Sportive Avenue, Bir Hassan

Day 1 – 27 October 2025

I. The development of an Integrated Management Plan for the Damour Area from source to sea (Damour IMP)

Time	Session Description	Partner
09:00-10:30	**Session 1: Overview and Status of the Damour IMP development** • Introduction on the Damour IMP preparation process, (Christina Kontaxi and Barbara Tomassini, GWP-Med) • Presentation of the development of the management plan (Raji Maasri, MORES s.a.r.l) • Q&A (in plenary)	GWP-MED
10:30-11:00	*Coffee Break*	
11:00-12:30	• Facilitated plenary discussion on Damour area	
12:30-14:00	*Lunch break*	
14:00-15:30	**Session 2: Consultation meeting for the development of the Damour Coastal Aquifer Management Plan** • Introduction of UNESCO activities in Lebanon • Presentation of management scenarios for the Damour coastal aquifer component • Q&A (in plenary)	UNESCO-IHP
15:30-16:00	*Coffee Break*	
16:00-17:30	• Group discussions with stakeholders • Plenary feedback • Way forward	

Day 2 - 28 October 2025

I. The development of an Integrated Management Plan for the Damour Area from source to sea (Damour IMP) - continued

Time	Session Description	Partner
09:00-10:30	**Session 3: Building a shared vision for the Damour Area - Prioritization of Sustainability Indicators** • Introduction to the Climagine foresight approach for participatory planning • Identification and framing of key environmental and socio-economic challenges (previous workshop)	Plan Bleu PAP/RAC

	• Thematic groups addressing water, agriculture, biodiversity, and governance	
10:30 - 11:00	*Coffee break*	
11:00 - 12:30	• Each group ranks Sustainability Indicators based on RACER criteria tailored to Damour's context • Each group establishes minimum and maximum indicator values that define a "safe operating space" to maintain ecosystem and socio-economic balance through 2030 and 2050 • Each group uses the Band of Equilibrium (BoE) to visualize current states and limits of sustainability	
12:30-14:00	*Lunch break*	
14:00-15:30	**Follow-up _ Session 3: Building a shared vision for the Damour Area - 2050 indicator targets** • Each group explores two main scenarios: i. Business-as-usual: continuation of current unsustainable trends. ii. Sustainable pathway: proactive strategies to achieve sectoral and overall sustainability • Each group presents past and present Sustainability Indicators states using BoE diagrams • Each group introduces Amoeba diagrams for illustrating proposed future indicator values in 2050	Plan Bleu PAP/RAC
15:30-16:00	*Coffee Break*	
16:00-17:30	• Debate thresholds and address any data gaps or missing indicators and agree on indicator values that align with the sustainable vision (plenary) • Consolidate validated indicators and thresholds as a foundation for the Damour Integrated Management Plan • Plan continued stakeholder engagement and data mobilization for the final Climagine workshop	

Day 3 - 29 October 2025

II- Cross-sectoral coordination and spatial integration for enhanced natural resources management in Lebanon within the framework of MedProgramme (ICZM Strategy and Law)

Time	Session Description	Partner
09:00-10:30	**Session 4: What is new in the ICZM Strategy and Law** • Introduction to PAP/RAC's activities in Lebanon (Ante Ivcevic) • Key presentation of the ICZM Strategy and Law achievements (Manal Nader and Josiane Yazbeck) • Interactive Plenary Session • Q/A	PAP/RAC
10:30-11:00	*Coffee break*	
11:00-12:30	**Session 5: Building a shared vision for the Lebanese coastal area through the Climagine participatory approach** • Introduction to the Climagine participatory methodology for integrating stakeholders' views on the Lebanese coast • Review of key environmental pressures and socio-economic challenges identified in the previous workshop • Thematic groups assess past and present coastal conditions using sustainability indicators ranked by RACER criteria	Plan Bleu PAP/RAC
12:30-14:00	*Lunch break*	
14:00-16:00	**Follow-up Session 5** • Groups define minimum and maximum indicator values to establish a "safe operating space" for ecosystem and socio-economic balance by 2050 • Groups use of the Band of Equilibrium (BoE) to visualize current sustainability states and limits • Workshop participants examine two future scenarios for Lebanon's coast: Business-as-Usual with ongoing unsustainable impacts, and a Sustainable Pathway focused on long-term policies • Each thematic group uses amoeba diagrams to graphically represent the current status and desired future targets of Sustainability Indicators, highlighting gaps to address	Plan Bleu PAP/RAC

Day 4 - 30 October 2025

III- MedProgramme outreach workshop

Time	Session Description	Partner
09:00-9:30	**Opening and welcome speeches:** • Paolo Fontani, Director, UNESCO Regional Office for UN Coordination for the Arab States • Nancy Khouri, GEF Operational Focal Point for Lebanon, Ministry of the Environment • Mohamad Kayyal, MedProgramme Coordinator	
9:30-10:30	**The MedProgramme activities in Lebanon:** • PAP/RAC - UNESCO IHP - GWP Med - Plan Bleu: the Integrated Management Plan for the Damour Region and the Integrated Coastal Zone Management Strategy • PAP/RAC - UNESCO IHP - GWP Med - Plan Bleu: the Integrated Coastal Zone Management Strategy and Law, the national dialogue on conjunctive surface and ground water management, the NEXUS assessment and recommendations • MedProgramme: removal of PCBs, prevention of new POPs and circular economy • UNICEF: rehabilitation and upgrade of waste water treatment plants • Q&A	
10:45-11:15	*Coffee break*	
11:00-12:30	**MedProgramme success stories from other countries** • PAP/RAC, Plan Bleu, ICZM Plans with Integrated Climate Change Adaptation measures, including gender sensitive climate risk assessment (including socio-economic risks), nature-based solutions, Climagine participatory planning, cost benefit analysis, investment planning • UNESCO IHP- Marine-freshwater interactions: the mapping and sampling of submarine groundwater discharges • GWP Med NEXUS Demonstration actions on precision irrigation and smart agriculture • Marine Protected Areas Management Plans with the involvement of Civil Society and Women Organisations, SPA/RAC	

	• The Post2020 SAPBIO and the NAP+ in a National Sustainable Blue Economy Development Pattern • Q&A	
12:30-14:00	*Lunch break*	
14:00-15:00	**MedProgramme gender mainstreaming, communications and information management good practices** • How to benefit from the MedProgramme Comms and Knowledge Management Actions • Practical MedProgramme examples of Gender Mainstreaming • Mid Term Review and pre-completion evaluation assessment in view of GEF9 • Q&A	
15:00-15:30	*Coffee break*	
15:30-17:15	**Towards the "National Replication Atlas"** • Exchanges on replication potential of MedProgramme Actions, priority areas, priority hot spots in the country, requirements, actors	
17:15-17:30	**Conclusions and Closure**	

5.2 List of Participants

Title	First Name	Last Name	Organisation	Position
Dr.	Abbas	Fayad		National Advisor/Consultant
Mr.	Alessandro	Candeloro	UNEP/MAP	
Mr.	Ante	Ivcevic	PAP/RAC	
Ms.	Antoinette	Ghattas	Ministry of Energy and Water	Director General of Hydraulic and Electrical Resources
Mr.	Bachir	Aoun	Municipality of Damour	Lawyer
Ms.	Barbara	Tomassini		
Mr.	Bassam	Jaber		Former Director of Exploitation at MEW / Water Expert
Ms.	Christina	Kontaxi	GWP-Med	
Ms.	Christine	Haffner-Sifakis	UNEP/MAP	
Ms.	Éloïse	Leguérinel	Plan Bleu / RAC	
Mr.	Georges	Gharios	UNESCO	National Programme Officer for Natural Sciences
Mr.	Georges	Tekli	Majdelmouch Cooperative	
Ms.	Georgina	Saade Merhej	Majdelmouch	Member
Ms.	Ghania	Slim	Ain Zhalta Cooperative / Samad Association	Principle
Ms.	Hanan	Hassan	Shouf Biosphere Reserve	
Mr.	Hussam	Hawwa	Difaf	National Expert and Consultant
Mr.	Ihab	Hammad	Jbaa Municipality	Head
Ms.	Jasmine	El Kareh	LEWAP	
Mr.	Kamal	Slim		Consultant, CNRS
Mr.	Mahmoud	Termos	MoI	Industrial Zone Beam
Mr.	Manal	Nader	University of Balamand	Director, Marine and Coastal Resources Program, Institute of the Environment
Mr.	Maroun	Farah	Majdelmouch	Municipal Env Committee
Mr.	Marwan	Kais	Batloun	Head
Mr.	Michel	Khoury	With MP Dr. Najat Saliba	
Ms.	Mona	Fakih	Ministry of Energy and Water	Director of Water
Mr.	Nabil	Rizk	UNICEF	WASH specialist – Communication and engagement
Mr.	Nadim	Kanaan	Municipality of Damour	

Ms.	Nadine	Saade	CAS	National Coordinator of the Environment Sector at CAS
Ms.	Najwa	Chaaya	Municipality of Damour	Lawyer
Mr.	Nizam	Bou Khzam	البيت البناني للبيئة - كفرحيم	Eco-tourism
Mr.	Raed	Nasr	Kfarfakoud Municipality	
Ms.	Ranim	Tahhan		Consultant
Ms.	Rawan	Al Jamal	University of Balamand	Research Assistant, Marine and Coastal Resources Program, Institute of the Environment
Ms.	Rita	Marteleira	UNESCO	
Ms.	Salam	Nassar	MORES	
Ms.	Sallama	Namani	Makhzoumi Foundation	Environment / Development Program Manager – Consultant to President
Ms.	Samah	Termos	Remote Sensing Center	Surveying Engineer Research Assistance
Ms.	Senem	Elcin Berber	UNEP/MAP	
Ms.	Tamara	Maalouf	CAS	
Mr.	Tony	Naufal	MORES	Junior Geologist
Ms.	Tracy	Zarour	UN/ESCWA	Hydrologist
Dr.	Youssra	Ghoussein	CNRS	Researcher
Mr.	Zaher	Ayoub Mechref	Municipality of Mechref	Head
Mr.	Ivica	Trumbic	UNEP/MAP	Consultant
Mr.	Mazen	Al Halawani	MOA	Advisor to the Minister
Mr.	Talal	Bou Khzam	Kfarhim Municipality	Member
Mr.	Nizar	Zahreddine	Kfarfakoud Municipality	Member
Mrs.	Hiam	Abou Abdallah	Damour Municipality	Vice President
Mr.	Ziad	Al Boustany	Beirut Water	
Mrs.	Ferial	Abu Hamdan	WALM	رئيسة لجنة التنمية الاقتصادية
Mr.	Nabil	Zahran	Damour Municipality	