

CLIMAGINE Workshop II Report


Integrated Coastal Zone Management (ICZM) Strategy and Law for Lebanon
GEF MedProgramme, Child Project 2.1.

UNESCO Regional Office, Beirut, Lebanon - 27 – 30 October 2025

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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 ICZM Law & Strategy was held on 29 October 2025. This initiative supports Lebanon in developing a robust national strategy aligned with the Barcelona Convention and its Protocol on Integrated Coastal Zone Management.

The process is driven by the application of Climagine, a participatory foresight methodology designed to facilitate the co-construction of sustainable futures. By combining expert knowledge with broad stakeholder engagement and indicator-based analysis, Climagine allows participants to assess current coastal conditions, explore future scenarios, and identify balanced development pathways that reconcile ecological integrity with socio-economic needs.

Building on the outcomes of the [first Climagine workshop](#), which established a comprehensive diagnosis of the key pressures, challenges, and opportunities affecting Lebanon's coastal zone, this second workshop served as a pivotal bridging step in the process. Designed as an expert-driven technical exchange rather than a validation meeting, the workshop aimed to deepen the technical understanding of priority themes, enrich the conceptual basis of selected sustainability indicators, and identify critical data gaps. These efforts were structured to prepare the necessary groundwork for the forthcoming scenario analysis and the definition of the "Band of Equilibrium," ensuring that future strategic decisions are grounded in a reliable and scientifically sound evidence base.



27 October 2025, UNESCO Regional Office

2. Workshop summary

2.1 WORKSHOP STRUCTURE

The second Climagine workshop dedicated to the National ICZM Strategy was structured as an expert-driven technical exchange, building on the diagnostic foundations laid during the first session. The format combined plenary presentations with thematic group discussions, intentionally designed to prioritize knowledge sharing, cross-sectoral dialogue, and methodological clarification rather than immediate decision-making or formal endorsement of indicators.

The introduction by Mr. Ante Ivcevic, Programme Officer at PAP/RAC, was followed by Ms. Éloïse Leguérinel, Project Manager at Plan Bleu/RAC, who presented the progress of the project and the methodological framework of Climagine. Mr. Hussam Hawwa, Plan Bleu consultant, then launched the Climagine workshop by outlining its objectives:

- Facilitate in-depth expert discussions on priority ICZM themes.
- Enrich the conceptual and technical basis of selected indicators.
- Identify data gaps, methodological challenges, and emerging research.
- Support the design of the forthcoming Band of Equilibrium exercise.
- Prepare inputs for online thematic discussions and the final Climagine workshop.

This workshop was therefore conceived as a **bridging workshop**, linking initial diagnosis with scenario development and action planning.

The event brought together a diverse assembly of national experts, regional organizations, research institutions, and practitioners. This broad technical expertise allowed for a deep exploration of the interconnected nature of inland, coastal, and marine systems, moving beyond administrative boundaries to address ecological realities.

Following the plenary sessions, participants were organized into **thematic working groups reflecting key ICZM domains**. These groups addressed specific sectors including Urban-Spatial Planning, Waste and Pollution Management, Natural Resource Management, Coastal Risks, the Blue Economy, and Governance. Within these groups, the dialogue focused on exchanging experiences, identifying specific knowledge gaps, and critically reflecting on the relevance and robustness of the proposed sustainability indicators.

Rather than aiming for immediate consensus, the workshop emphasized **iterative refinement**. The thematic discussions were explicitly framed as technical inputs to be further developed through online expert exchanges. This preparatory work is designed to facilitate the forthcoming Climagine exercise on the "Band of Equilibrium," ensuring that the final definition of the safe operating space for Lebanon's coast is scientifically sound and ready for consolidation during the final workshop.



2.2 WORKSHOP SUMMARY

The second Climagine workshop served as a pivotal platform for moving from a **general diagnosis to a structured technical analysis**. The sessions were divided into two main components: a plenary opening panel that established the scientific and strategic context, followed by intensive thematic group work where experts developed future scenarios and refined sustainability indicators.

2.2.1 Key Messages from the Opening Panel

The opening interventions set the stage by emphasizing that coastal management cannot be effective if treated in isolation. Three major themes emerged from the expert panel, framing the subsequent group discussions:

- **Source-to-Sea Connectivity:** Experts stressed that coastal degradation is inextricably linked to upstream pressures. Issues such as river abstraction, wastewater discharges, and land-use changes in the hinterland directly impact coastal ecosystems. A particular focus was placed on the role of groundwater and submarine springs, which are critical yet under-monitored components of the coastal water balance.
- **The WEF Nexus:** The Water-Energy-Food-Ecosystems nexus was highlighted as a necessary lens for ICZM. Panelists noted that agricultural practices—specifically irrigation and agrochemical use—are significant drivers of coastal pollution and aquifer depletion, requiring better alignment between agricultural policies and coastal management objectives.
- **Data and Monitoring Gaps:** A recurring concern was the lack of consistent data. Panelists identified significant gaps in hydrological monitoring, wastewater flows, and coastal water quality, which currently limit the ability to develop reliable baselines. Future scenario building must therefore prioritize the establishment of open data platforms and systematic monitoring to avoid fragmented assessments.

2.2.2 Thematic Group Outcomes

Following the plenary, participants were divided into three groups, each addressing two specific themes. Within these groups, they worked to describe two contrasting future visions—Business-as-Usual (BAU) versus a Sustainable Pathway—and assigned preliminary values to key indicators (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 1 Urban-Spatial Planning & Land Use					
Context: The coastal zone faces rapid, unregulated urban expansion and land reclamation (sea filling) which threaten natural habitats, reduce public access, and degrade ecosystems. Governmental institutions struggle with fragmented spatial planning and a lack of enforcement capacity, leading to the proliferation of informal settlements and illegal infrastructure.					
Sustainable Pathway Scenario / Vision : Envisions the implementation of "Revised master plans", strict "Law implementation" (including Environmental Impact Assessments - EIA), and "reissuing municipality permits" to regain control					
Business-as-Usual Scenario / Vision : Characterized by "Quick uncontrolled expansion", "Expropriation," and a reactive approach described as "damage control" rather than planning					
Indicator (Unit)	Description / Relevance	DPSIR	Priority / Priority Measures	Scale / Data Source	Baseline
Coastal Urbanization / Land Loss (ha/year)	Rate of loss of green land cover to built-up areas. Highly robust due to satellite tracking.	Pressure	High - Revised master plans.- Control urban sprawl.	National;CNRS-L, MoE, CDR	- 214 ha/year of green land lost to built-up areas (2010-2020 average) ¹

¹ World Bank. (2024). *Cost of environmental degradation (COED) in Lebanon for 2023: A deliverable under programmatic ASA (P179435), final report*. Washington, DC: World Bank.

Rate of urban expansion in coastal zones (% increase)	Tracks the pressure of land transformation. Correlated with the above but measures density/spread.	Pressure	High - Revised master plans. - Regulation to control urban sprawl. - Implementation of the National Physical Master Plan of the Lebanese Territory (NPMPLT). - Enforcement of construction setbacks and protection of the maritime public domain against violations.	National, with specific focus on the coastal corridor (Arida to Naqoura) and major agglomerations (Beirut, Tripoli, Saida, Tyre, Jounieh); CNRS, CDR, METAP / World Bank Reports, SEDAC.	≈ 40% to 55% ² of the coastal zone is artificialized
Rate of land reclamation (sea filling) (ha/year)	Critical for monitoring coastline change and marine habitat loss.	Pressure	High - Enforce laws to prevent illegal construction. - Halt illegal filling.	Coastal; CNRS-L, UN-Habitat, MoE	≈ 20 ha/year ³ (uncontrolled filling)
Net change of unauthorized coastal constructions (Count)	Indicates enforcement effectiveness and potential loss or recovery of public coastal access.	Response	High - Removal of illegal structures. - Legal enforcement.	National/Coastal ; MoPW, MoIM, MoE, CDR, Legal records	High prevalence of illegal structures
Proportion of coastal zones covered by master plan (%)	Shows spatial planning coverage and regulatory effort.	State/Response	High - Integrated land use planning. - Reissuing municipality permits based on revised plans.	National/District DGA/MoIM, UN-Habitat	Minimal to non-present and reactive planning only

Group 2 Waste & Pollution Management

Context: The sector faces insufficient waste management services characterized by low coverage of functional collection systems, poor sanitary disposal, and a prevalence of illegal dumpsites. There is inadequate financing and weak institutional coordination, leading to severe pollution of the coastal zone and rivers.

Sustainable Pathway Scenario / Vision : Municipalities "communicate and plan jointly" for waste facilities, applying principles of the circular economy. Waste is "treated before disposal" with a strong focus on "sorting at source" and recovering reusable materials.

Business-as-Usual Scenario / Vision : "Minimal recycling," reliance on landfills, "scattered municipal efforts," and a lack of communication between municipalities regarding waste plans.

Indicator (Unit)	Description / Relevance	DPSIR	Priority / Priority Measures	Scale / Data Source	Baseline
Marine Litter Composition (%)	Percentage of plastic types found on beaches. Highly robust data from recent surveys.	State	High - Ban single-use plastics; Beach cleanup campaigns.	National;World Bank, CNRS-L	77.7% of marine litter is plastic (Hard plastics, soft plastics, foam) ⁴ (2021)

² Doumani, F. M. (2009). *Integrated Coastal Zone Management in Lebanon: The Northern Coast. Policy Brief n°1*. METAP–World Bank.

Approximately 50 km of the coastline is covered by urban areas : Issam Fares Institute for Public Policy and International Affairs (IFI). (2021). *Vulnerability and Energy Policy Tools for Lebanese Coastal Cities*. American University of Beirut, in collaboration with Friedrich Ebert Stiftung (FES).

³ World Bank. (2024). *Cost of environmental degradation (COED) in Lebanon for 2023: A deliverable under programmatic ASA (P179435), final report*. Washington, DC: World Bank.

⁴ Council for Development and Reconstruction (CDR), World Bank Group, & LDK for Management Consulting LLC, Earth Link and Advanced Resources Development S.A.L. (2024). *Final Draft National Integrated Solid Waste Management Strategy of Lebanon: Executive Summary (Phase 2, Deliverable D-2B, Rev. 01)*. Strategic Environmental and Social Assessment Study for Integrated Solid Waste Strategy. Lake Qaraoun Pollution Prevention Project.

Wastewater Treated (%)	Volume of wastewater treated at secondary/tertiary levels vs. total generated.	Response	High - Rehabilitate coastal WWTPs (Ghadir, Tripoli, Sayniq operate at primary level only).	National / Coastal; MoEW, CDR	8% total treated ⁵
Open Dumping Rate (%)	Percentage of solid waste disposed of in open dumps vs. sanitary landfills.	Pressure	High - Close illegal coastal dumps; Sanitary landfill expansion.	National; MoE, UNDP	42% of waste ends up in open dumps (2023) (up from 22% in 2018) ⁶
Median Beach Marine Litter Density (items/m²)	Measures cleanliness of coast and waste leakage.	State	High - "Treat waste before disposal" and "Sort at source" to prevent leakage. - Regular beach cleanup campaigns and strict enforcement against littering.	Coastal / National ; MoE, CNRS-L, NGOs (e.g., Operation Big Blue), Municipalities	≈ 4.7 items/m² (Spring) to 6.6 items/m² (Autumn) ⁷
Proportion of operational Treatment Capacity (%)	Assessing efficiency of existing WWTP infrastructure vs installed capacity.	State	High – Implementation of "sorting at source"; Investment in sorting facilities. Operationalize existing plants.;- Network connection.	Local; MoE, CDR, OMSAR, Municipal records	6.8% ⁸ (Very low operation compared to capacity)
Proportion of coastal municipalities with functional waste collection systems (%)	Reflects quality and capacity of waste collection services; influences pollution control.	State	High – Municipalities to "communicate and plan jointly"; Ensure full collection coverage.	Local/National; OMSAR, MoE, CDR, UNDP	Low; "Scattered efforts"
Average Annual PM2.5 (µg/m³)	Fine particulate matter concentration. Indicator of air quality deterioration in coastal urban zones.	State	Medium – Monitor generator emissions; Public transport.	National / Coastal; MoE, Universities	29.5 µg/m³ (National Mean, 2019-2022). ⁹
Percent of materials recycled or composted (%)	Reflects adoption of circular economy principles and waste valorization.	Response	Medium – "Treat waste before disposal"; Maximize recovery/composting and reusable materials.	National; Municipal reports, MoE	7.9% of the generated waste is being treated in existing facilities ¹⁰

⁵ 6-7% treated at secondary/tertiary levels : World Bank. (2024). *Cost of environmental degradation (COED) in Lebanon for 2023: A deliverable under programmatic ASA (P179435), final report*. Washington, DC: World Bank.

⁶ *ibid.*

⁷ World Bank. (2021). *Marine litter baseline in Lebanon*. World Bank Group.

⁸ Only 440 tons/day are operational out of a total capacity of 6,390 tons/day. Despite Decree 5605/2019, domestic waste is still mostly collected as mixed waste.

⁹ 33.7 µg/m³ (Beirut Mean, 2010-2022). World Bank. (2024). *Cost of environmental degradation (COED) in Lebanon for 2023: A deliverable under programmatic ASA (P179435), final report*. Washington, DC: World Bank

¹⁰ Council for Development and Reconstruction (CDR), World Bank Group, & LDK for Management Consulting LLC, Earth Link and Advanced Resources Development S.A.L. (2024). *Final Draft National Integrated Solid Waste Management Strategy of Lebanon: Executive Summary (Phase 2, Deliverable D-2B, Rev. 01)*. Strategic Environmental and Social Assessment Study for Integrated Solid Waste Strategy. Lake Qaraoun Pollution Prevention Project.

Group 3 Natural Resource Management					
Context: The coastal zone suffers from groundwater over-abstraction, declining aquifer recharge, and seawater intrusion. Pollution from agricultural runoff and insufficient water quality monitoring further degrade the resource base. There is a shift from natural to built-up zones, fragmenting habitats					
Sustainable Pathway Scenario / Vision : "Regulated resource use," centralized monitoring (e.g. "1 monitoring well per municipality"), and widespread adoption of "eco-friendly farming" to reduce runoff					
Business-as-Usual Scenario / Vision : Continued "depletion of aquifers," increasing "salinity," and reliance on unregulated private wells					
Indicator (Unit)	Description / Relevance	DPSIR	Priority / Priority Measures	Scale / Data Source	Baseline
Groundwater level trend in coastal aquifers (cm/year)	Assesses aquifer health and extraction impacts. Robust physical metric.	State	High – Managed abstraction; "1 monitoring well per municipality"; Regulation of private wells.	National/Basin; MoEW, MoA, MoE	≈ - 50 cm/year ¹¹ ("Depletion" due to over-pumping.)
Share of Irrigated Land Using Water-Saving Techniques (%)	Tracks water efficiency in agriculture (consumes ≈ 60% of national water resources).	Response	High - Incentivize transition from flood to drip irrigation. - Modernize irrigation networks. - Essential for reducing pressure on aquifers	National / Basin - MoA, FAO, LRA, Litani River Authority	50% ¹² of irrigated lands adopt water-saving techniques
Incidence of saltwater intrusion in wells (Total dissolved solids (TDS) (mg/L))	Highlights ecological impacts of over-extraction and climate change.	Impact	High – Strict extraction limits; Regular testing of public/private wells.	Coastal; MoEW, MoA, MoE, CNRS-L	≈ 1 500 to 37 500 mg/L (TDS) ¹³
Average annual flow of coastal rivers (m³/s)	Reflects annual fresh surface water reaching the coast and trends under climate variability.	State	High - Maintenance and calibration of gauging stations. - Establishment of environmental flow requirements.	National/Basin; MoEW, LRA,	≈ 89 m³/s ¹⁴ (Marked by seasonal variability and decrease + persistent gaps in hydrological monitoring)

¹¹ Shaban, A. (2020). Proposed Solutions. In: *Water Resources of Lebanon*. World Water Resources, vol 7. Springer, Cham. https://doi.org/10.1007/978-3-030-48717-1_10

¹² Lebanon Crisis Response Plan. (2017). *Part II: Operational response plans - Food Security & Agriculture sector*. Ministry of Agriculture (MoA), WFP, & FAO

¹³ TDS≈0.64×EC (µS/cm) so ≈ 1 500 to 37 500 mg/L (TDC) ≈ 0.7 to 5.5 dS/m (EC). A value >3 dS/m indicates a severe risk. El Moujabber, M., Atallah, T., Darwish, T., & Bou Samra, B. (2004). Monitoring of groundwater salination by seawater intrusion on the Lebanese coast. *Lebanese Science Journal*, 5(2), 21–36.

- EC (dS/m or µS/cm): Preferable for agricultural contexts (irrigation). It is the standard indicator for soil salinity and crop tolerance (e.g. strawberry, tomato, etc.).

Saadeh, M., & Wakim, E. (2017). Deterioration of groundwater in Beirut due to seawater intrusion. *Journal of Geoscience and Environment Protection*, 5(11), 149–159.

<https://doi.org/10.4236/gep.2017.511011>

- TDS (mg/L) is the most meaningful for the general public and decision-makers, as it allows direct comparison with seawater (37,500 mg/L) and potable water (<1,000 mg/L).

- In critical urban areas (Beirut), values rise sharply. Some wells reach 22,000 mg/L to as high as 37,500 mg/L (equivalent to seawater).

¹⁴ The average annual net flow of Lebanese rivers is approximately **2,800 million m³/year (MCM)**.

Conversion to average discharge: **2,800,000,000 m³/(365 days×24h×3600s)≈88.79 m³/s**

Shaban, A. (2020). *Rivers of Lebanon: Significant water resources under threats*. In *Hydrology*. IntechOpen. <https://doi.org/10.5772/intechopen.94152>

Marine Biodiversity Richness (Count)	Total number of identified marine species in Lebanese waters.	State	High - Update national inventory; Protect deep-sea canyons.	National;CNRS-L, SPA/RAC	≈ 3 265 species recorded ¹⁵
National sea Marine Protected Area (MPA) coverage (%)	Extent of formal conservation coverage.	State / Response	High - Finalize decrees for pending MPAs (e.g., Al Chamieh/Jbeil) - "Designate and manage protected areas and key biodiversity areas (KBAs)". - Ensure legal protection against encroachments	National; MoE, CNRS-L, MAPAMED, UNESCO MAB	≈ 0.41% ¹⁶ (Very low coverage)
Invasive Species Impact (% of catch)	Proportion of alien species in commercial fish catch. Indicates ecosystem alteration.	Impact	Medium - Monitor NIS; Support targeted fishing of invasive species (e.g., pufferfish).	Local (e.g., Tyre);CNRS-L, MoA	37% of total catch in Tyre (South) consists of alien species (2008 data) ¹⁷
Cooperative Membership Rate (%)	Level of farmer organization for sustainable practices.	Response	Medium - Strengthen legal framework for cooperatives. - Capacity building to reduce fragmentation.	National / Local - MoA (Directorate of Cooperatives), NGOs	4.5% ¹⁸ (Very low)

Group 4 Coastal Risks & Climate Change

Context: Accelerating sea-level rise and coastal erosion are causing habitat loss and infrastructure damage. The frequency of climate-related disasters (storms, floods) is increasing, yet there is "no systematic monitoring" and responses remain reactive

Sustainable Pathway Scenario / Vision : Establishment of "Early warning systems," systematic monitoring of physical parameters (temp/acidity), and proactive nature-based protection

Business-as-Usual Scenario / Vision : "No systematic monitoring," reactive "damage control" responses, and increasing temperature/acidity

Indicator (Unit)	Description / Relevance	DPSIR	Priority / Priority Measures	Scale / Data Source	Baseline
CO₂ Emissions (Mt CO₂ eq)	Total national Greenhouse Gas emissions.	Pressure	High – Renewable energy transition; Efficiency in transport/industry.	National;MoE, UNDP	28.8 Mt CO₂ eq. (2020) ¹⁹

¹⁵ Lebanon’s marine waters hold 6% of global marine species. This includes: 385 species of phytoplankton; 783 species of zooplankton; 243 species of macrophytes including 29 non-native species; 1,072 species of zoobenthos; 367 species of ichthyofauna; 7 species of marine mammals; 4 species of marine herpetofauna including the loggerhead turtle; and 404 bird species constitute the marine ornithofauna.

Total = 385 + 783 + 243 + 1,072 + 367 + 7 + 4 + 404 = 3,265 species

World Bank. (2024). *Cost of environmental degradation (COED) in Lebanon for 2023: A deliverable under programmatic ASA (P179435), final report*. Washington, DC: World Bank

¹⁶ $679.58 \text{ km}^2 \text{ protected marine area} \div 166,000 \text{ km}^2 \text{ territorial waters} = 0,00409 \approx 0.41\%$

Emmanouilidou, P., Seddik, W., Webster, C., El Asmi, S., & Kheriji, A. (2019). *The legal framework for marine protected areas in Lebanon: Fact sheets (MedMPA Network Project). Specially Protected Areas Regional Activity Centre (SPA/RAC). United Nations Environment Programme Mediterranean Action Plan*

¹⁷ Aguilar, R., García, S., Perry, A. L., Alvarez, H., Blanco, J., & Bitar, G. (2018). *2016 Deep-sea Lebanon expedition: Exploring submarine canyons* (Towards Deep-Sea Conservation in Lebanon Project). Oceana. <https://doi.org/10.31230/osf.io/34cb9>

¹⁸ International Labour Organization. (2018). *The co-operative sector in Lebanon: What role? What future?* Regional Office for Arab States. <https://www.ilo.org/arabstates>

¹⁹ Decrease from 32.5 Mt in 2018 due to the crisis. World Bank. (2024). *Cost of environmental degradation (COED) in Lebanon for 2023: A deliverable under programmatic ASA (P179435), final report*. Washington, DC: World Bank

Coastal erosion (shoreline retreat) (ha/year)	Quantifies shoreline retreat and land loss impacts.	State	High – Nature-based solutions; Setback enforcement; Proactive protection.	Coastal; CNRS, MoPWT	≈ - 3.6 ha/year ²⁰ (Net erosion exceeding accretion)
Sea Level Rise Rate (mm/year)	Expected rise in sea level affecting coastal infrastructure and aquifers.	Impact	High – Adaptation plans for coastal cities; Infrastructure reinforcement.	Coastal; MoE, IPCC scenarios	≈ + 20 mm/year (Historical trend recorded since 1960) ²¹
Occurrence rate of climate-related disasters (Events/year)	Captures climate risk exposure and disaster risk reduction effectiveness.	Impact	High – Early warning systems; Disaster risk reduction planning.	National; DRR, CNRS, NDMA	≈ 1 to 2 events/year (Mostly flooding, frequency rising) ²²
Average annual sea surface temperature deviation (°C/year)	Tracks ocean warming driving ecosystem changes.	Pressure	Medium – Systematic monitoring at fixed stations; Research partnerships.	Regional/National; CNRS, NOAA, MoE	≈ + 0.04°C/year ²³ (Increasing trend)

Group 5 Sustainable Blue Economy & Socioeconomic Development

Context: Traditional sectors like fisheries are vulnerable due to overexploitation and Illegal, Unreported, and Unregulated (IUU) fishing. There is inequitable access to coastal resources, with a "saturation of coastal access" and loss of public beaches

Sustainable Pathway Scenario / Vision : "Sufficient knowledge" for management, "regulated use" of resources, "restoration of economic activities," and "Improved accessibility" to beaches

Business-as-Usual Scenario / Vision : "Overexploitation of resources," proliferation of IUU fishing ("loopholes remain"), and loss of public access/beaches

Indicator (Unit)	Description / Relevance	DPSIR	Priority / Priority Measures	Scale / Data Source	Baseline
Unemployment Rate (%)	National unemployment rate, affecting coastal livelihoods and poverty levels.	State	High - Blue job creation; Vocational training.	National; CAS, ILO	29.6% (2022) (Up from 11.4% in 2018) ²⁴
Female Labor Force Participation (%) (of total female population age 15+)	Percentage of women (15+) active in the workforce. Vital for assessing social equity in Blue Economy sectors.	State	High - Support women-led initiatives in agri-food and eco-tourism. - Vocational training for women in coastal sectors.	National / Coastal - CAS - ILO - Ministry of Labor	27.5% (2023) (Slight increase from 26.1% in 2015) ²⁵

²⁰ This is the estimated average annual erosion rate along the Lebanese coast observed between 1962 and 2016

[World Bank. \(2024\). Cost of environmental degradation \(COED\) in Lebanon for 2023: A deliverable under programmatic ASA \(P179435\). final report. Washington, DC: World Bank.](#)

²¹ 30 to 60 cm projected rise by 2050 (Business as usual) : [International Federation of Red Cross and Red Crescent Societies. \(2024\). Climate fact sheet: Lebanon. Red Cross Red Crescent Climate Centre.](#)

²² *ibid.*

²³ [El-Geziry, T. M. \(2021\). Long-term changes in sea surface temperature \(SST\) within the southern Levantine Basin. Acta Oceanologica Sinica, 40\(3\), 1-7.](#)

²⁴ [Central Administration of Statistics of the Lebanese Republic, & International Labour Organization. \(2022\). Lebanon follow-up labour force survey: January 2022. Central Administration of Statistics: International Labour Organization.](#)

²⁵ World Bank. (n.d.). Lebanon. Gender Data Portal. <https://genderdata.worldbank.org/en/economies/lebanon>

			- Enhance the role of women in protecting marine life.		
Cost of Environmental Degradation - Total (% of GDP)	Overall economic cost of environmental damage (Air, Water, Waste, etc.).	Impact	High - Integrated reforms in all environmental sectors.	National; World Bank	10.9% of GDP (≈ \$1.96 Billion) (2023) ²⁶
Cost of Coastal Zone Degradation (% of GDP)	Economic loss due to environmental degradation specifically in the coastal zone.	Impact	High – Policy advocacy using economic valuation.	National; World Bank	0.5% of GDP (≈ \$84.6 Million) (2023) ²⁷
Gender Inequality Index (GII) (Index 0-1)	Composite index measuring disparity in health, empowerment, and labor market.	State	High – Strengthen institutional mechanisms for gender mainstreaming within coastal governance. - Enforce laws prohibiting discrimination in the workplace.	National - UNDP - CAS (Central Administration of Statistics)	0.432 (2021) ²⁸ (Worsened from 0.381 in 2015) ²⁹
Proportion of monitored beaches deemed safe for swimming (%)	Critical indicator for public health, tourism ("Blue Economy"), and the impact of wastewater management efficiency.	State	High - "Addressing the issue of untreated wastewater being discharged into the sea". - Regular testing of water quality (bacteriological/chemical).	Coastal - CNRS-L (Annual Report), MoE, MoPH	≈ 63% (24 out of 38 beaches) ³⁰
Length of publicly accessible beaches (km)	Measures public equity and access to coastal resources.	State	High – "Remove all violations" and illegal private investments. - Amend Law 64/2017 to restrict occupation to public interest.	Coastal; CNRS-L, NAHNOO (Campaign & Study)	≈ 20% of the shoreline is accessible (≈ 40 km) ³¹ The coast is "marred by predominantly illegal private investments" and encroachments (> 5 million m ²)
IUU Fishing Index	Assesses sustainable resource use and regulatory effectiveness.	State / Response	High – "Proper enforcement of laws"; Citizen monitoring	National; MoA, Coast Guard	Score: 2.41 ³² (Reasonable but imperfect)

²⁶ World Bank. (2024). *Cost of environmental degradation (COED) in Lebanon for 2023: A deliverable under programmatic ASA (P179435), final report*. Washington, DC: World Bank

²⁷ *ibid.*

²⁸ United Nations Development Programme. (n.d.). *Gendered data from Lebanon*. <https://www.undp.org/lebanon/gendered-data-lebanon>

²⁹ Avis, W. R. (2017). *Gender equality and women's empowerment in Lebanon* (K4D Helpdesk Report 175). Institute of Development Studies.

³⁰ Centre National pour la Recherche Scientifique au Liban (CNRS-L) & National Center for Marine Sciences (NCMS). (2025). *التقرير السنوي للعام 2025*. https://nahnoo.org/public_spaces/the-coast-for-all/

³¹ NAHNOO. (n.d.). *The coast for all*. https://nahnoo.org/public_spaces/the-coast-for-all/

³² IUU Fishing Risk Index. (n.d.). *Lebanon*. <https://iuufishingindex.net/profile/lebanon>

(Compliance rate) (Index 1-5)			systems; Closing loopholes.		compliance, "Loopholes remain").
% of coastal population employed in blue economy (%)	Tracks economic diversification and inclusion (gender/age).	Response	Medium – Support for green/blue jobs; Vocational training.	National; CAS, MoL	Remains underdeveloped

Group 6 Governance, Institutions & Enabling Environment

Context: The governance framework is hampered by fragmented institutional mandates ("congestion in government"), conflict of interest, and weak enforcement. There is a lack of transparency and participation ("apathy"), with outdated or separate mechanisms for coastal management

Sustainable Pathway Scenario / Vision : "Unified, multidisciplinary approach," "Updated digital platforms," "Youth involvement," and coordinated enforcement via inter-ministerial committees

Business-as-Usual Scenario / Vision : "Outdated/Separate mechanisms," "Congestion," "Conflict of interest," "No existence" of data platforms, and "Apathy/lack of participation"

Indicator (Unit)	Description / Relevance	DPSIR	Priority / Priority Measures	Scale / Data Source	Baseline
Illegal Coastal Occupation (m²)	Area of maritime public domain illegally occupied by private entities.	Pressure	High – Audit maritime domain; Apply fines (Law 324/2024).	Coastal;MoPWT	≈ 2.5 to 5 million m ² of sea filling/illegal occupation (Estimates vary 2012-2014) (>1000 transgressions) ³³
Number and quality of laws/decrees adopted or amended (Count)	Measures progress in legal reform and enforcement effectiveness.	Response	High – Update ICZM law; "Inter-ministerial committee"; "Coordinated enforcement".	National; MoE, MoJ, MoPWT	5 relevant texts (Enforcement weak) ³⁴
Existence of a public coastal data platform (Count)	Reflects transparency and accessibility of information for stakeholders.	Response	High – Creation of "Unified digital platform"; Regular data updates.	National; CNRS-L, MoE	≈ 3 (Existing but incomplete/scattered data) ³⁵ .
ICZM Strategy Implementation Status	Status of the legal adoption of the ICZM strategy and law.	Response	High – Finalize and ratify the ICZM Law.	National;MoE	Draft Strategy (2015); Protocol ratified (2014); Law pending

³³ World Bank. (2024). *Cost of environmental degradation (COED) in Lebanon for 2023: A deliverable under programmatic ASA (P179435), final report*. Washington, DC: World Bank

³⁴ If the indicator requires only recently adopted or amended laws (for example, within the last 5–10 years), the value would rather be 2 (Law 130/2019 and the ICZM Ratification 2017). However, for an indicator of the "Key legal instruments" type describing the current legal framework, the sources emphasize the coexistence of older (144/S, 4810) and newer texts (444, 130/2019), which justifies the value of 5 (Decree 144/S, Decree 4810, Law 444, Law 130/2019, etc.). Social Justice and the City. (2017). *Legal Timeline: Chronology of laws and decrees affecting Beirut's coastal development*. Beirut, Lebanon. Source based on the Lebanese Building Law. Retrieved from https://www.aub.edu.lb/ifi/Documents/publications/docs/beirut_zone/20180921_beirut_zone_10_location_map_16.pdf

³⁵ Coastal platform opened at University of Balamand: <https://www.balamand.edu.lb/IOE/OurProjects/ICZM/Pages/default.aspx>
 CNRS : <http://rsensing.cnrs.edu.lb/geonetwork/srv/eng/search>
 Atlas of Lebanon's coastline of AUB : <https://icil.aub.edu.lb/lebanoncoastlineatlas/>

Number of public consultations on coastal issues (Count/year)	Measures inclusiveness and legitimacy of the governance process.	Response	Medium – "Active youth involvement"; Standardized consultation processes.	National/Local; MoE, Civil Society	Low / "Apathy" "Lack of participation".
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The panel discussions concluded by reaffirming that this second workshop represents an intermediate step in the ICZM process. Its primary contribution lies in enriching the analytical base, refining indicator logic, and informing facilitation strategies for the forthcoming Band of Equilibrium exercise. Participants agreed that continued expert engagement through online thematic work will be essential to translate this workshop insights into concrete scenarios and prioritized actions during the final workshop.

Gender Inclusiveness at the Second Climagine Workshop

Gender equality and inclusiveness remain key principles of the MedProgramme, as reflected in its Gender Mainstreaming Strategy. Accordingly, the Second ICZM Law Climagine Workshop was organized to ensure balanced participation and gender-responsive engagement across all sessions and thematic areas.

The workshop gathered 64 participants from various sectors, including national ministries, local authorities, academia, research institutions, international organizations, NGOs, and civil society.

Gender Statistics for the ICZM Law Climagine Workshop

Total participants: 64

- Women: 36 (56 %)
- Men: 28 (44 %)

Gender Statistics for the ICZM Law Climagine Workshop

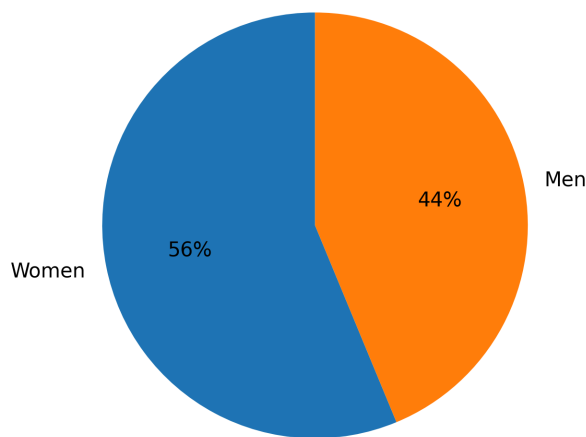


Figure 1. Gender Distribution of Participants for the Second ICZM Law Climagine Workshop

This strong female representation highlights continued progress toward inclusive coastal governance in Lebanon. Women contributed as technical experts, legal and policy advisors, researchers, and local representatives, with active involvement in group discussions, facilitation, and analysis sessions.

Prominent women participants included Mona Fakhri (Director of Water, MEW), Antoinette Ghattas (Director General for Hydraulic and Electrical Resources, MEW), Ghada Baliis (DG of Hydraulic and Electric Resources), Karen Nawwar (Social Expert, GEF MedProgramme), and several academics and municipal leaders such as Hiam Abou Abdallah and Najwa Chaaya.

Gender was also explicitly addressed as a cross-cutting theme in discussions on capacity building, equitable access to coastal resources, and community resilience. Participants emphasized the need to:

- Strengthen institutional mechanisms for gender mainstreaming within coastal governance structures.
- Integrate gender-sensitive indicators in ICZM planning, monitoring, and evaluation frameworks.
- Enhance awareness and capacity among policymakers and technical experts to assess gender-differentiated impacts, particularly in vulnerable coastal areas.

The workshop reaffirmed that gender equality strengthens both environmental sustainability and social resilience, underscoring women's essential role in advancing integrated coastal management in Lebanon.

Youth Inclusiveness at the Second Climagine Workshop

In line with the MedProgramme's commitment to inclusiveness and capacity building, the Second ICZM Law & Strategy Climagine Workshop also placed particular emphasis on engaging youth representatives and fostering participation from young professionals and university students. This allowed the new generation of coastal and environmental experts to actively contribute to discussions on integrated coastal zone management (ICZM) and climate adaptation in Lebanon.

A total of 64 participants took part in the workshop, **13 of whom were university students or young researchers**, primarily affiliated with the University of Balamand under the supervision of Dr. Manal Nader. This represents **20 % of total participants**.

Youth Statistics for the ICZM Law Climagine Workshop

- Total participants: 64
 - Youth participants (students and young researchers): 13 (20 %)
 - Other participants (professionals, institutional experts, consultants): 51 (80 %)

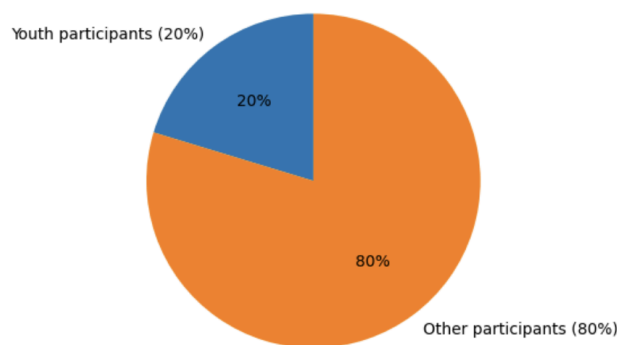


Figure 2. Youth Participation at the Second ICZM Law Climagine Workshop

The active involvement of university students enriched the workshop's collaborative approach, bringing in scientific curiosity, new research perspectives, and innovative ideas on community resilience and sustainable coastal governance. Students contributed notably during thematic discussions, group facilitation exercises, and plenary feedback sessions. Their participation underscores the importance of continuous academic engagement in policymaking processes related to integrated coastal zone management and environmental law. By encouraging youth inclusiveness, the workshop supported knowledge transfer between seasoned experts and emerging professionals—an essential step toward ensuring the long-term sustainability of Lebanon's coastal governance framework.

3. Conclusion and Next Steps

The series of Climagine workshops conducted under the GEF MedProgramme's Child Project 2.1 has marked a decisive transition from general diagnosis to structural, evidence-based planning for Lebanon's coastal zone. By engaging a diverse spectrum of stakeholders—ranging from national ministries and academic institutions to local municipalities and civil society (students)—the process has successfully established a shared vision that transcends administrative boundaries and sectoral silos.

3.1 KEY TAKEAWAYS FROM THE CONSULTATION PROCESS

- **Consensus on Critical Pressures:** Stakeholders have converged on a shared diagnosis of systemic challenges, specifically: unregulated urban expansion (currently estimated between 40-55% artificialization), the critical loss of public access (with only \approx 20% of the coastline remaining unoccupied), and the severe degradation of water resources due to wastewater mismanagement and aquifer depletion.
- **Adoption of a Source-to-Sea Approach:** The workshops successfully anchored the necessity of managing the coast through a "Source-to-Sea" and "WEFE Nexus" (Water-Energy-Food-Ecosystems) lens. Participants acknowledged that coastal health is inextricably linked to upstream river management, agricultural runoff, and groundwater governance.
- **Data-Driven Governance:** The transition to an indicator-based framework has highlighted both the potential for rigorous monitoring and the "persistent gaps" in data availability (e.g., hydrological monitoring, specific blue economy employment data). This underscores the urgent need for a unified, public coastal data platform.

3.2 NEXT STEPS

Moving forward, the process will advance from technical refinement to strategic scenario building. The upcoming phases are designed to translate the selected indicators into a definable "safe operating space" for Lebanon's coast, culminating in an actionable revised National ICZM Strategy and Law.

1. Defining the "Band of Equilibrium" (BoE) : The immediate next step (Workshop III) will focus on establishing the Band of Equilibrium for the prioritized indicators. Experts and stakeholders will collaborate to define:

- **Minimum Acceptable Values (Thresholds):** The "red lines" that must not be crossed to avoid irreversible ecological collapse (e.g., halting sea filling, preventing aquifer salinity >4500 mg/L).
- **Maximum Desired Values (Targets):** The ambitious yet realistic goals for 2030/2050 (e.g., achieving 100% wastewater treatment coverage, increasing the IUU Fishing compliance score to 1).

2. Scenario Visualization (Amoeba Diagrams) : Using the BoE thresholds, the project will generate Amoeba diagrams. These visual tools will allow stakeholders to compare the "Business-as-Usual" trajectory—characterized by uncontrolled privatization and degradation—against the "Sustainable Pathway" scenario. This visualization is crucial for policymakers to understand the magnitude of change required.

3. Bridging Data Gaps : Targeted efforts will be initiated to close critical data gaps identified during the workshops. This includes harmonizing monitoring protocols between the CNRS-L, the Ministry of Environment, and local actors, particularly for water quality parameters and coastal erosion rates.

4. Finalizing the Legal and Strategic Framework : The technical outputs will directly inform the drafting of the National ICZM Strategy and the update of the ICZM Law.

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5. Annexes

5.1 EVENT AGENDA

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PROGRAMME

2nd Multi-stakeholder Consultation on the Integrated Management Plan for the Damour Area from Source to sea and MedProgramme National Outreach Workshop

27 – 30 October 2025
Beirut, Lebanon





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 <ul style="list-style-type: none"> 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	<i>Coffee Break</i>	
11:00-12:30	<ul style="list-style-type: none"> Facilitated plenary discussion on Damour area 	
12:30-14:00	<i>Lunch break</i>	
14:00-15:30	Session 2: Consultation meeting for the development of the Damour Coastal Aquifer Management Plan <ul style="list-style-type: none"> 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	<i>Coffee Break</i>	
16:00-17:30	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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





	<ul style="list-style-type: none"> Thematic groups addressing water, agriculture, biodiversity, and governance 	
10:30 - 11:00	<i>Coffee break</i>	
11:00 - 12:30	<ul style="list-style-type: none"> 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	<i>Lunch break</i>	
14:00-15:30	<p>Follow-up _ Session 3: Building a shared vision for the Damour Area - 2050 indicator targets</p> <ul style="list-style-type: none"> Each group explores two main scenarios: <ol style="list-style-type: none"> Business-as-usual: continuation of current unsustainable trends. 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	<i>Coffee Break</i>	
16:00-17:30	<ul style="list-style-type: none"> 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	<p>Session 4: What is new in the ICZM Strategy and Law</p> <ul style="list-style-type: none"> • 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	<i>Coffee break</i>	
11:00-12:30	<p>Session 5: Building a shared vision for the Lebanese coastal area through the Climagine participatory approach</p> <ul style="list-style-type: none"> • 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	<i>Lunch break</i>	
14:00-16:00	<p>Follow-up Session 5</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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	<i>Coffee break</i>	
11:00-12:30	MedProgramme success stories from other countries <ul style="list-style-type: none"> 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 	





	<ul style="list-style-type: none"> • The Post2020 SAPBIO and the NAP+ in a National Sustainable Blue Economy Development Pattern • Q&A 	
12:30-14:00	<i>Lunch break</i>	
14:00-15:00	<p>MedProgramme gender mainstreaming, communications and information management good practices</p> <ul style="list-style-type: none"> • 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	<i>Coffee break</i>	
15:30-17:15	<p>Towards the “National Replication Atlas”</p> <ul style="list-style-type: none"> • 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

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