

Final Report

Applying Climagine at the National Level in Lebanon - GEF MedProgramme, Child Project 2.1.



DIRECTOR OF PUBLICATION

Mr. Antoine Lafitte

AUTHOR

Mr. Hussam Hawwa, Difaf SAL, Plan Bleu/RAC Consultant

**REVIEWER**

Ms. Éloïse Leguérinel (Plan Bleu/RAC), and Ms. Insa Behrens (Plan Bleu/RAC).

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List of Acronyms and Abbreviations

BoE: Band of Equilibrium

CBA: Cost-Benefit Analysis

CNRS-L: National Council for Scientific Research - Lebanon

DPSIR: Drivers, Pressures, State, Impact, and Response

EBML: Establishment of the Water of Beirut and Mount Lebanon

GEF: Global Environment Facility

ICZM: Integrated Coastal Zone Management

IMP: Integrated Management Plan

IWRM: Integrated Water Resources Management

LARI: Lebanese Agricultural Research Institute

LIBNOR: Lebanese Standards Institution

MoE: Ministry of Environment

MoEW: Ministry of Energy and Water

Mol: Ministry of Industry

MoPH: Ministry of Public Health

NbS: Nature-based Solutions

PAP/RAC: Priority Actions Programme / Regional Activity Centre (UNEP/MAP component)

PSI: Pressure, State, and Impact

PSIR: Pressure, State, Impact, and Response

RACER: Relevant, Accepted, Credible, Easy to monitor, Robust

RSA: Rapid Stakeholder Assessment

SCCF: Special Climate Change Fund

SDGs: Sustainable Development Goals

UNEP/MAP: United Nations Environment Programme / Mediterranean Action Plan

WEFE: Water-Energy-Food-Ecosystems (Nexus)

Executive summary

This report constitutes a final synthesis of the Climagine activities implemented for the revision of the national Integrated Coastal Zone Management (ICZM) strategy and law in Lebanon in the frame of the GEF MedProgramme Child Project 2.1. Its purpose is to assess the application of the Climagine methodology at the national level and in relation to the United Nations Sustainable Development Goals (SDGs), particularly regarding climate action, gender, and ecosystem restoration. The Lebanese experience provides a useful test case because Climagine was implemented under conditions marked by political and institutional instability, weak and fragmented monitoring systems, uneven data availability, overlapping mandates, and mixed workshop participation involving technical experts, public institutions, and local stakeholders. These context characteristics are identified as factors that shaped implementation and require adaptation in practice.

The assessment presented here draws on two related but distinct applications. The first concerned the national Integrated Coastal Zone Management (ICZM) strategy and law process. This application benefited from a stronger expert baseline, a more advanced indicator framework, and a clearer policy target linked to the revision of the legal framework. The second concerned the Damour Integrated Management Plan (IMP) process, which adopted a "Source-to-Sea" approach to effectively integrate ICZM with Integrated Water Resources Management (IWRM). Here, territorial grounding, stakeholder diversity, and facilitation design were more decisive, while data scarcity and diagnostic incompleteness were more acute. The Damour process also benefited from earlier preparatory work, particularly the Rapid Stakeholder Assessment, which helped structure representation, identify territorial differentiation, and ground the foresight exercise in actual governance and social realities.

The report concludes that Climagine has real potential for national-level application in Lebanon, but not as a rigid or purely technical methodology. Its strongest contribution lies in its ability to structure dialogue across disciplines and sectors, connect qualitative stakeholder insight with more formal indicator logic, and support a transition from broad sustainability diagnosis toward more decision-relevant discussion through tools such as indicator tiering, Bands of Equilibrium, and amoeba diagrams. The methodology proved particularly useful in moving from divergence to convergence and in making cross-sectoral imbalance more visible. These strengths are directly reflected in the Lebanese application and are explicitly identified in the practitioner feedback.

At the same time, the Lebanese experience also exposed significant methodological limits. The process can become too dependent on data that do not exist, too abstract for mixed or non-expert audiences, and too optimistic about the ease of moving from workshop outputs to actual planning instruments. The methodological lessons note clearly highlights several limitations: the implicit assumption that data will be available, the risk that indicator-driven approaches may exceed governance capacity, the lack of clarity around facilitation, insufficient guidance for multi-scale adaptation, and the risk of becoming a stand-alone exercise if links to planning and implementation are not defined from the outset.

A central conclusion of this report is therefore that Climagine should not be seen as a one-format method. In the Lebanese case, it worked best when treated as an adaptive framework. At the national level, it supported policy-oriented prioritization and strategic coherence. At the territorial level, it became more grounded, participatory, and operationally meaningful, but also more dependent on simplification, translation, facilitation quality, and contextual preparation. This indicates that the methodology is strong and can be further developed when it oscillates between centralized and decentralized levels rather than being confined to one scale only.

The report also finds that three conditions are decisive for future use. First, the method requires stronger preparation before workshops, including clearer scoping, stakeholder mapping, baseline synthesis, indicator pre-screening, and scale definition. Second, it requires facilitation that is not generic but technically literate, process-oriented, and able to manage diverse audiences, uncertain data, and structured convergence. Third, it requires an explicit post-workshop pathway, including validation, institutional anchoring, clarification of monitoring responsibilities, and stronger linkage to planning, strategy, law, or governance instruments. Without these conditions, the methodology risks remaining analytically interesting but institutionally weak.

Finally, the report concludes that Climagine is relevant to SDG-oriented planning, particularly in relation to integrated governance (SDG 16), water (SDG 6), land (SDG 15), ecosystems (SDG 14), climate resilience (SDG 13), and institutional coordination (SDG 17). However, it should not be overstated as an SDG reporting tool in itself. Its value lies rather in helping actors translate SDG-type ambitions into context-sensitive, cross-sectoral, and participatory planning logic.

1. Introduction

This report presents a final methodological and strategic assessment of the application of the Climagine participatory foresight methodology under the GEF MedProgramme (Child Project 2.1) in Lebanon. It is prepared as the concluding deliverable following the implementation of Climagine activities under the national Integrated Coastal Zone Management (ICZM) track and the Damour Integrated Management Plan (IMP) track. The aim is to assess the lessons learned and the effectiveness of implementing the Climagine methodology at the national level and in relation to the United Nations Sustainable Development Goals (SDGs), on the basis of the Lebanese workshop experience.

The present document therefore differs in function from the workshop reports already prepared. Those reports documented the sequence, outputs, and thematic findings of the Climagine process in the national ICZM and Damour contexts. This report, instead, takes a step back to offer a reflective, comparative, and forward-looking analysis. Its purpose is reflective, comparative, and forward-looking. It investigates what the Lebanese experience reveals about the suitability, strengths, limits, and conditions of application of Climagine when used in real-world planning and governance contexts.

This distinction is important. A methodology may appear sound at the conceptual level yet prove difficult in practice. Conversely, a methodology may reveal its strongest value in how effectively it can be adapted to its operational context. Lebanon provides a particularly useful case in this respect because the methodology was not applied under stable institutional conditions, abundant data, or homogeneous participation. It was applied in a context characterized by governance fragmentation, an ongoing financial crisis, diverse stakeholder groups, varying levels of technical literacy, and uneven baseline information. As highlighted in the practitioner reflections prepared for Plan Bleu, these contextual conditions shaped the methodology itself and forced implementation choices that are analytically important, rather than merely incidental.

The report is organized around three main questions. First, what did Climagine actually contribute to the Lebanese ICZM and IMP planning experience? Second, what methodological bottlenecks or limitations emerged during implementation? Third, what does this imply for future applications at the national level, for a better articulation with local or territorial processes, and for its relation to SDG-oriented planning?

2. Purpose, Scope, and Analytical Basis

The purpose of this report is to assess the practical outcomes and lessons learned from implementing the Climagine methodology at the national level in Lebanon and, by extension, in comparable contexts where sustainability planning must be pursued under data scarcity and fragmented governance conditions. This assessment is based on direct implementation experience rather than an abstract methodological review.

The analytical basis of the report consists primarily of the two finalized Workshop 3 reports and the methodological reflections developed in parallel. The national ICZM Workshop 3 report makes clear that the ICZM process was the culmination of a structured sequence in which Workshop 1 established the participatory foundation, Workshop 2 refined the indicator logic and database, and Workshop 3 translated the broader indicator framework into a prioritized analytical subset used for Band of Equilibrium (BoE) and Amoeba diagram analysis in support of the revised national strategy and law.

The Damour Integrated Management Plan (IMP) Workshop 3 report similarly confirms that the process generated an operational indicator matrix, highlighted the role of proxy indicators and qualitative assessments in the face of data scarcity, and stressed the need to move from analysis toward governance structuring, monitoring design, and implementation.

Additional analytical value comes from the practitioner-oriented presentation prepared for Plan Bleu, which synthesizes insights from the implementation experience regarding method strengths, operational challenges, methodological limits, scale issues, and refinement needs. That material is particularly important because it identifies recurring implementation constraints, such as over-reliance on assumed data availability, inadequate guidance for facilitation, the difficulty of using abstract tools in mixed stakeholder audiences, and the need for stronger integration pathways from foresight to statutory planning.

A further useful reference is the note on indicator criteria and prioritization prepared by PAP/RAC consultants, which reflects a formal approach to valuing indicators through criteria such as relevance, acceptance, credibility with non-experts, ease of monitoring, robustness (the RACER criteria), frequency, and cost. While analytically sound, this framework also illustrates the degree to which more formal indicator treatment can become difficult to operationalize in local or mixed-audience workshop settings unless it is simplified and translated appropriately.

The report is therefore based on a combination of documented workshop outputs, methodological reflections from practice, and selected supporting materials that help interpret both what worked and what required adjustment in future iterations.

3. Climagine in Lebanon: Context and Application Pathway

The implementation of the Climagine methodology in Lebanon was profoundly shaped by its operational context, necessitating significant methodological adjustments. The practitioner reflections prepared for Plan Bleu identify the defining contextual challenges as political instability, an ongoing financial crisis, fragmented governance characterized by overlapping mandates, uneven data availability, monitoring gaps, and mixed participation involving experts, public actors, and local stakeholders.

These factors impacted the methodology at several levels. Political and institutional instability hindered participant continuity, institutional commitment, and the likelihood of effective follow-up. Concurrently, the financial crisis constrained the practical feasibility of data collection, monitoring, and even workshop participation. Fragmented governance weakened the clarity of institutional mandates and complicated the assignment of responsibility for monitoring indicators. Furthermore, uneven data availability reduced the applicability of rigidly quantitative approaches, while mixed participation required the method to function across different levels of technical language, institutional authority, and practical expectations.

The Lebanese application pathway must therefore be analyzed as a multi-track process. The national ICZM process and the Damour IMP process were related, but not identical in their starting points or operational conditions. The ICZM track benefitted from a stronger expert baseline and a more policy-oriented framing linked to the revised national strategy and legal framework. Conversely, the Damour track was more territorially grounded, more directly shaped by local stakeholder diversity, and more dependent on preparatory work to stabilize the scope and stakeholder architecture of the process.

This distinction matters because it reveals that Climagine did not function as a single uniform procedure. In practice, it operated as a flexible sequence involving diagnosis, indicator discussion, refinement, prioritization, tiering, threshold-setting, visual interpretation, and translation toward planning implications. The material retained from the drafting process also makes clear that the Workshop 3 stage did not treat all indicators as equally ready. A tiering system was introduced to distinguish between indicators that were already robust enough for threshold-based discussion, those that required proxy use or methodological strengthening, and those that remained strategically important but not yet fully measurable.

A critical operational lesson emerges from these distinct tracks: Climagine should not be understood as beginning at the first workshop. In Lebanon, meaningful application depended on extensive work before, during, and after workshop moments. Before workshops, there was preparatory scoping, indicator framing, and, in the Damour case, stakeholder and territorial groundwork. During workshops, there was structured convergence work. After workshops, there remained a necessary phase of consolidation, interpretation, and translation into statutory planning implications. This broader pathway is essential to understanding the method's real potential and bridging the implementation gap.

4. Comparative Experience: National and Territorial Application

A major contribution of the Lebanese experience is that it facilitates a direct comparison between national-scale application and territorial or decentralized-scale application. This comparison is not incidental; rather, it is one of the main sources of methodological insight.

4.1 NATIONAL APPLICATION THROUGH THE ICZM PROCESS

The national ICZM track was more advanced at the outset. It benefited from a stronger expert baseline, a clearer policy anchor, and a more developed indicator architecture linked to the revision of the national ICZM strategy and law. The Workshop 3 report explicitly describes the process as the culmination of earlier work in which thematic pressures had already been reviewed, candidate indicators had been identified using RACER logic, and Workshop 3 was tasked with moving from indicator refinement toward structured interpretation through Bands of Equilibrium (BoE) and Amoeba diagrams.

This gave the national process several advantages. Discussions could be more policy-oriented, the indicator set could be treated more explicitly as a monitoring and legal support architecture, and the broader strategic implications could be drawn more clearly. At the same time, operating at a national scale also carried risks. It tended toward abstraction, accumulating too many priorities, and was more prone to the “silo phenomenon” noted in the methodological presentations, where sectors are discussed in parallel but integration remains difficult.

4.2 TERRITORIAL APPLICATION THROUGH THE DAMOUR IMP PROCESS

The Damour IMP experience differed substantially. Here, the process evolved in parallel with a still-developing diagnostic foundation, acute data scarcity, and a more immediate need for stakeholder grounding. The methodological presentation notes that the Damour application required territorial and stakeholder grounding and that basin-level implementation revealed stronger data dependency. It also emphasizes that the prior Rapid Stakeholder Assessment (RSA) was especially useful because it improved stakeholder mapping, sub-regional differentiation of challenges, identification of tensions between decentralized and centralized governance, and the translation of foresight into grounded planning logic.

This gave the Damour process a different strength: it was less abstract, more rooted in territorial realities and lived constraints. It produced more immediate discussions around actual resource use, institutional conflict, and implementation practicality. The Damour report also shows that the methodology retained value even under weak data conditions by incorporating proxy indicators, qualitative assessments, and explicit discussions of monitoring gaps as part of the system diagnosis itself.

Its weaknesses were also clear. Tools such as Amoeba diagrams could become too abstract for varied audiences unless carefully translated and guided. Data scarcity limited the degree of formalization that could be achieved. Much more depended on the facilitator’s ability to keep the process grounded, inclusive, and analytically disciplined.

4.3 MAIN COMPARATIVE FINDING

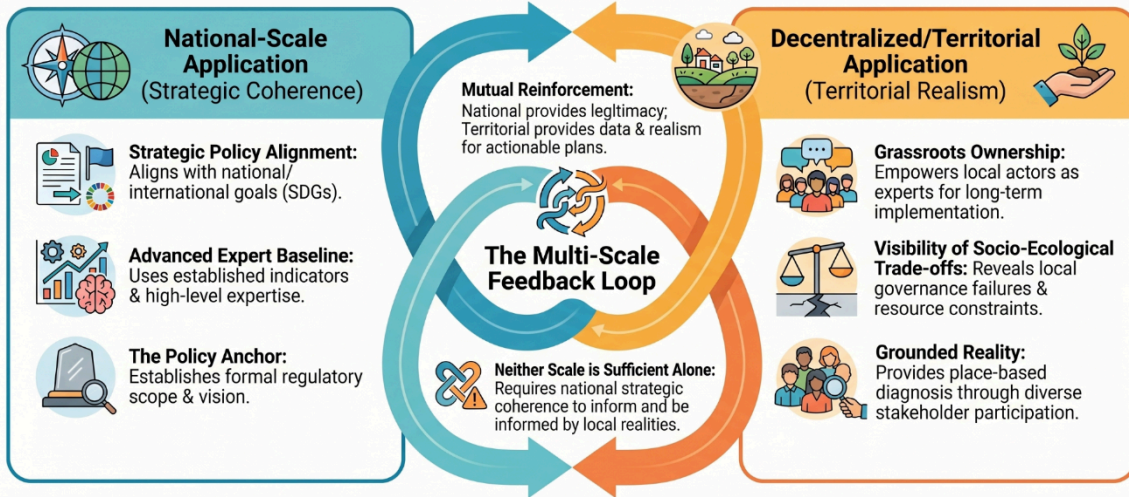
The central comparative finding is that Climagine should not be framed as choosing between national and local applications. Its value is greater when these scales are understood as complementary. National application offers strategic coherence, broader policy relevance, and stronger alignment with formal frameworks. Territorial application offers realism, ownership, grounded diagnosis, and clearer exposure of trade-offs and governance failures.

Table 1. Comparative overview of Climagine application in the ICZM and Damour tracks

Dimension	National ICZM Application	Damour Territorial Application	Main Comparative Insight
Main scale of application	National / coastal-zone scale	Territorial / sub-national scale focused on the Damour area	The methodology was tested across two distinct yet complementary scales
Main planning anchor	Revision and strengthening of the National ICZM Strategy and Law	Development of the Damour IMP and support for a shared long-term territorial vision	The national application was more directly linked to strategic and legal framing, while the Damour track was more closely tied to place-based planning
Starting point	More advanced expert baseline and a better-developed indicator architecture	More dynamic and evolving diagnostic context, with a stronger dependence on field grounding and stakeholder interpretation	The national track began from a more mature analytical basis; conversely, the Damour track required greater adaptation during implementation
Nature of indicator work	More structured and policy-oriented, with stronger potential for dashboard consolidation	More dependent on proxy use, qualitative judgment, and territorial interpretation	While indicator work was feasible in both cases, its degree of formalization differed substantially
Type of participation	More expert-driven and institutionally oriented, though still participatory	More heterogeneous and operationally challenging, involving local and mixed stakeholder profiles	Broader and more diverse local participation increased contextual realism but also required more intensive facilitation efforts
Data conditions	Better relative baseline, though still affected by monitoring and coordination gaps	More acute data scarcity, uneven availability, and fragmented local information	Although weak data affected both tracks, the Damour process was more directly constrained by it
Role of preparatory work	Baseline and expert framing were already stronger at the entry point	Preparatory territorial and stakeholder work, especially the RSA, was important in making the process workable	In decentralized application, preparation before workshops becomes even more decisive
Use of BoE and amoeba	Useful for synthesizing priority indicators and discussing acceptable ranges and strategic imbalance	Useful, but more abstract for non-expert audiences unless carefully translated and facilitated	The tools are transferable, but not equally intuitive across all audience types
Facilitation needs	Required structured moderation and thematic discipline	Required stronger contextual translation, simplified guidance, and closer management of group dynamics	Facilitation intensity rises significantly in mixed local settings
Main strength	Strategic coherence, stronger policy relevance, and a clearer link to national frameworks	Territorial realism, stakeholder grounding, and stronger visibility of actual trade-offs	The two applications reveal different but complementary strengths
Main limitation	Risk of abstraction, indicator overload, and distance from implementation realities	Risk of overdependence on facilitation quality, simplification needs, and a weak data foundation	Neither scale is sufficient on its own
Overall lesson	Climagine can support national strategy work when underpinned by a solid baseline and policy anchor	Climagine can support territorial convergence when grounded in local realities and adapted for audience diversity	The methodology appears strongest when national and decentralized applications inform each other

The Lebanese experience suggests that the methodology is strongest when these levels inform one another. National work benefits from territorial grounding, while local work benefits from national framing, strategic legitimacy, and wider policy linkages. This multi-scale complementarity is one of the clearest lessons emerging from practice.

Bridging the Scales: The Synergy of National and Territorial Planning in Climagine

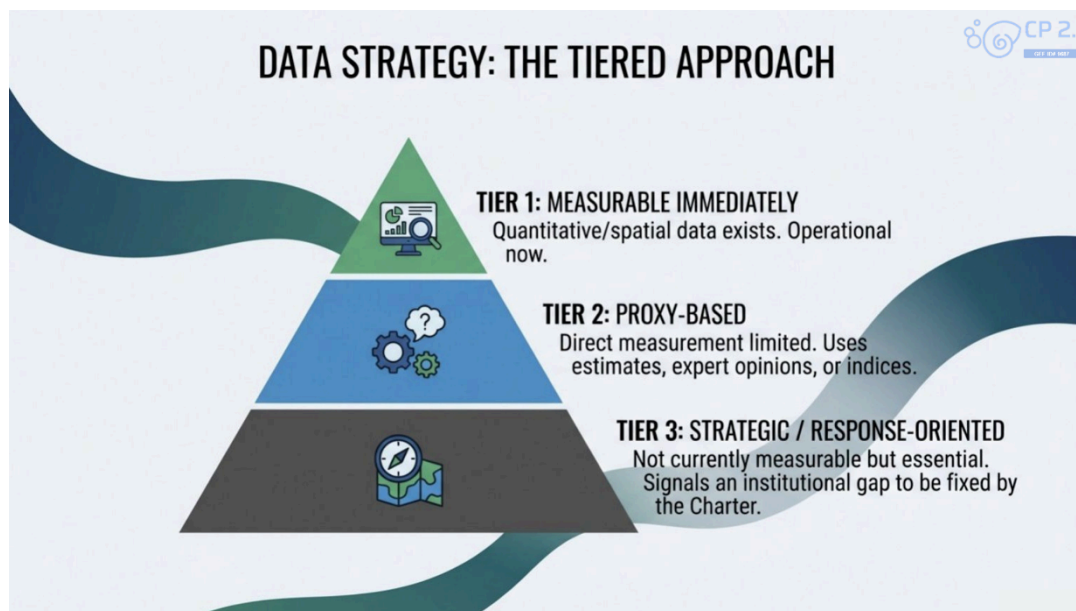


Summary: Climagine sustainability planning is most effective when it oscillates between national strategic framing and decentralized territorial grounding, bridging scientific diagnostics with local realities.

5. What Climagine Enabled in Practice

Despite the constraints noted above, the Lebanese application demonstrates that Climagine can make a meaningful contribution when strategically adapted. The methodological reflection prepared for Plan Bleu identifies a number of strengths that were confirmed in practice: structuring dialogue across sectors and disciplines, introducing long-term thinking under uncertainty, creating a shared language among heterogeneous actors, moving from divergence to convergence through Bands of Equilibrium and Amoeba diagrams, and producing decision-relevant pathways rather than mere theoretical discourse.

First, the methodology helped structure complexity. Sustainability problems in Lebanon's coastal and river-basin contexts are not simple sectoral problems; rather, they arise from interacting pressures related to land use, water, ecosystems, pollution, infrastructure, public-space management, and fragmented governance. One of the method's clear contributions was to organize this complexity into a form that could be discussed comparatively across sectors rather than in isolated fragments.



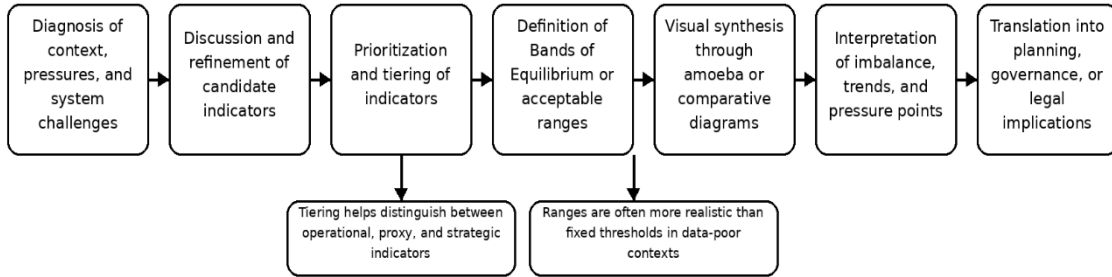
Second, the methodology created a bridge between qualitative insight and more structured analytical logic. This was particularly important in a context where not all priorities were equally measurable. The method did not eliminate qualitative judgment. Instead, it translated it into more explicit indicator discussions, threshold framing, and scenario reasoning. The tiering logic —specifically the Three Tiers of Data Evaluation system— is especially relevant here because it shows that data-poor contexts require a disciplined distinction between directly measurable indicators, proxy indicators, and strategically important but not yet quantifiable indicators.

Third, Climagine supported convergence. In mixed stakeholder settings, sustainability dialogue often remains general, normative, or fragmented. The Lebanese experience suggests that the Band of Equilibrium (BoE) was particularly useful because it forced discussion around acceptable ranges rather than idealized fixed numbers. The methodology presentation explicitly notes that the Band of Equilibrium was more useful than single thresholds in data-poor contexts. This is a significant practical contribution. In uncertain contexts, acceptable ranges are often more realistic and analytically more honest than false numerical precision.

Fourth, the methodology made systemic imbalance more visible. The Amoeba logic, when properly facilitated, allowed sectoral patterns to be visualized comparatively. The analytical drafts also highlighted an important interpretive point: the issue is often not uniform decline but imbalance, including the coexistence of structural deficits and pressures by excess. That dual pattern was particularly visible in the Damour Integrated Management Plan (IMP) process and is conceptually relevant beyond that case.

Fifth, Climagine helped reveal that governance is not simply one theme among others. In both the ICZM and Damour experiences, governance repeatedly emerged as the cross-cutting condition that shaped whether gains in any one sector

could become sustainable. The ICZM report explicitly identifies governance as the main cross-cutting constraint requiring stronger coordination, enforcement, monitoring, and operational legal frameworks. The Damour material points in the same direction by linking future effectiveness to governance, coordination, and monitoring responsibilities.



6. Methodological Challenges and Bottlenecks Observed

For this final assessment to provide actionable insights, it must transparently address the methodological difficulties encountered in practice. The Lebanese experience did not only confirm the strengths of Climagine. It also showed where the method becomes difficult, particularly when applied under governance and data stress.

6.1 DATA SCARCITY AND MONITORING WEAKNESS

The most recurrent bottleneck was weak, absent, fragmented, or inaccessible data. The practitioner reflection explicitly states that the methodology implicitly assumes a level of data availability, quality, and access that often does not exist in the region. The Damour reports for the IMP similarly emphasizes the absence of systematic monitoring of river flows and groundwater levels, limited information on abstraction and use, and the lack of integrated data systems across institutions. This matters methodologically because indicator-based logic can easily become unrealistic if it is built around variables that are not actually monitored or not monitored consistently. In such cases, the risk is not merely incomplete analysis. The deeper risk is methodological overconfidence: if indicators are treated as if they are fully operational when they are not, the process may create the appearance of rigor without real monitoring capacity behind it.

6.2 RISK OF FALSE PRECISION

A related problem is the tendency to focus on precise numbers rather than ranges, despite inherent data uncertainty. The methodological presentation identifies this explicitly as an operational challenge observed during implementation. In fragile data contexts, this tendency can undermine rather than improve analytical quality. It encourages apparent exactness where approximation, proxy use, or qualitative reasoning would be more honest. The usefulness of the Band of Equilibrium as a range-based device is important precisely because it helps correct that tendency.

6.3 OVER-COMPLEXITY IN MIXED AUDIENCES

The Lebanese experience also showed that some parts of the methodology can become too abstract when applied in bottom-up or mixed-audience settings. This is especially relevant for Amoeba diagrams, highly formal indicator valuation, and technical terminology around thresholds and systems logic. The PAP/RAC indicator note shows a sophisticated set of indicator criteria involving relevance, acceptance, credibility, ease of monitoring, and robustness, acceptance, frequency, and cost (the RACER criteria), alongside frequency and cost. While this logic is useful in expert settings, in local settings, it can quickly become too heavy unless simplified, translated, and operationalized through guided discussion.

Practical feedback suggests a more flexible approach to the process, rather than adhering to it too rigidly. It highlights the importance of simplifying terminology, ensuring alignment in translation, and clarifying meanings—even among experts. More broadly, the challenge goes beyond linguistic translation, involving the need to bridge conceptual differences across professional communities as well as between experts and non-experts.

6.4 FACILITATION DEPENDENCE

The Climagine methodology is highly facilitation-sensitive. While not inherently a weakness, this reliance becomes problematic if facilitation is treated as a secondary administrative task rather than a core methodological requirement. Reflections from practice clearly identify facilitation as critical yet under-specified in early iterations. In practice, the success of the workshops depended on maintaining balanced participation, preventing institutional dominance, structuring disagreement, documenting assumptions and data gaps, and constantly bringing discussions back to indicators and decision relevance. These needs are now explicitly reflected in the facilitator guidance material retained from the process, which emphasizes the necessity of pairing neutral external facilitators with local technical experts to manage unequal power dynamics.

6.5 WEAK PATHWAY FROM FORESIGHT TO IMPLEMENTATION

The most critical bottleneck identified is that the pathway from workshop exercises to actual statutory planning remains too weak if not deliberately designed. Methodological assessments identify this directly as the risk of “exercise without integration” and emphasize that the transition from foresight to decision-making needs stronger structuring. This is consistent with the Damour Integrated Management Plan (IMP) and national ICZM materials, both of which ultimately point toward governance, monitoring frameworks, and implementation mechanisms as the real test of the work. To effectively bridge this implementation gap, future applications must explicitly align the participatory process with statutory planning milestones and integrate financial reality checks, such as Cost-Benefit Analyses (CBA), from the outset.

Table 2. Main methodological strengths, limits, and mitigation needs

Methodological aspect	Observed strength	Observed limitation	Mitigation need
Cross-sectoral structuring	Facilitated the organization of complex sustainability issues into coherent thematic discussions	Risk of thematic overload or parallel sectoral discussions without true systemic integration	Provide stronger synthesis guidance and cross-sectoral prompts during facilitation
Indicator-based reasoning	Encouraged the transition from general discussions toward a more structured analytical framing	In data-poor contexts, indicators can appear more operational than they really are, leading to methodological overconfidence	Apply explicit tiering (e.g., the Three Tiers of Data Evaluation system) to distinguish between measurable, proxy, and strategic indicators
Long-term foresight	Enabled participants to think beyond immediate crisis management and consider long-term future trajectories	Future-oriented discussions can become too abstract without strong contextual grounding	Use territorial examples, practical reference points, and simplified explanatory materials
Bands of Equilibrium	More realistic than fixed numerical thresholds in contexts of uncertain data	Participants sometimes tend to seek false precision even where precision is not justified by the baseline data	Emphasize acceptable ranges, document assumptions, and provide explicit justification notes
Amoeba diagrams	Useful for visualizing systemic imbalances and relative positioning across themes	Often too abstract for non-experts or mixed audiences if insufficiently explained or translated	Develop simplified explanation sheets (e.g., utilizing Doughnut Economics logic) and ensure facilitator-led interpretation
Participatory convergence	Supported structured dialogue across stakeholders with divergent perspectives	Group convergence remained highly sensitive to workshop time constraints, group composition, and moderation quality	Require better pre-workshop preparation, stronger group facilitation, and more structured synthesis mechanisms
National policy relevance	Particularly useful in linking sustainability concerns to statutory strategy and law updating (e.g., ICZM Law)	National-level work can drift toward abstraction and distance itself from implementation realities	Reinforce territorial feedback loops and implementation-oriented interpretations
Local grounding	Strong in revealing territorial realities, resource trade-offs, and decentralized governance tensions	Stronger dependence on local facilitation, conceptual translation, and uneven stakeholder capacity	Use simplified tools, conduct comprehensive stakeholder mapping (e.g., the Rapid Stakeholder Assessment), and execute targeted preparatory work
Data use	Encouraged evidence-based discussions where robust data existed	The methodological assumption of data availability often exceeded actual monitoring realities	Ensure greater transparency regarding data gaps, proxy use, and inherent uncertainty
Governance discussion	Helped demonstrate that governance is a cross-cutting condition rather than a separate, isolated theme	Governance findings can remain purely diagnostic unless linked to formal institutional follow-up	Require clearer institutional mapping and a defined post-workshop uptake pathway
Overall process	Provided an adaptable framework for structured sustainability dialogues	Risk of remaining an isolated foresight “exercise” if not explicitly linked to statutory implementation (the “implementation gap”)	Build post-workshop validation and statutory planning integration directly into the methodology

7. Environmental Monitoring, Institutional Fragmentation, and the Limits of Indicator-Based Planning

A recurring constraint throughout the Lebanese application of Climagine was not simply the absence of data, but rather the fragmented structure through which environmental monitoring is currently organized. The issue is therefore institutional as much as technical. Environmental information is generated by multiple public institutions, research bodies, local authorities, laboratories, and civil society actors, yet; however, this does not amount to a coherent monitoring system. Instead, the current landscape remains dispersed across thematic silos, variable reporting practices, and weak coordination channels.

At the national level, a number of institutions hold formal or de facto mandates related to environmental monitoring, including ministries, sectoral agencies, research institutions, and standards bodies (e.g., LIBNOR). Collectively, these actors cover a broad set of themes, such as air quality, surface and groundwater quality, marine and coastal pollution, biodiversity, industrial and municipal discharges, public health risks, and environmental standards. On paper, this suggests a relatively rich monitoring architecture. In practice, however, monitoring functions remain unevenly distributed and only weakly connected to one another. Data is generated for different purposes, at different temporal scales, and with different methodologies, often without an interoperable framework that would allow consolidation into a common national evidence base (such as a Unified National Coastal Observatory).

Research institutions and technical bodies (such as the CNRS-L and LARI) remain particularly important in this landscape. They often produce some of the most technically robust information available, especially in fields such as climate and meteorological observation, marine and coastal systems, hydrology, biodiversity, and selected pollution parameters. Yet, these efforts are frequently project-based, donor-supported, or geographically limited. This reduces continuity, weakens comparability over time, and restricts the extent to which datasets can support long-term adaptive planning. In effect, technically sound monitoring may exist, but not always in a form that feeds routine policy cycles or regulatory decision-making.

At the local level, municipalities and other local authorities are expected to contribute to monitoring functions related to waste management, pollution complaints, local land-use change, and environmental nuisance. However, their capacity remains highly uneven. In most cases, local monitoring is constrained by limited staffing, weak technical tools, low operational budgets, and the absence of standardized reporting channels linking municipal observations to national systems. As a result, local environmental signals may be visible on the ground but remain weakly captured in structured monitoring frameworks. To bridge this gap, integrating 'Citizen Science' initiatives and establishing local community-based observatories could formalize grassroots efforts and ensure continuous, socially validated data collection.

Civil society organizations, universities, local initiatives, and third-party laboratories also contribute significantly to the production of environmental knowledge. Their role is sometimes underestimated, but they are instrumental in filling spatial and thematic gaps, supporting awareness raising, and generating localized evidence, including community-based or project-specific monitoring. However, these contributions usually remain parallel to formal state systems rather than being formally integrated within them. This systemic disconnect results not only in duplicated efforts but also in the severe underutilization of available evidence. Valuable information may exist, yet remain disconnected from official planning, compliance review, or long-term trend analysis.

A major structural weakness lies in the lack of a centralized or interoperable environmental data platform. Data is dispersed across institutional systems, project-specific databases, consultant archives, and internal files, often stored in inconsistent formats and subject to varying quality standards. Accessibility is equally uneven: in some cases, data exist but are not shared; in others, they are only partially published or lack the temporal continuity required for robust trend analysis. This fragmentation significantly undermines the feasibility of indicator-based approaches such as Climagine. It constrains the ability to monitor changes over time, validate proxy indicators, conduct cross-scale comparisons, and define realistic Bands of Equilibrium (BoE) grounded in sustained observation. Addressing this issue requires, as a critical prerequisite, the establishment of a Unified National Coastal Observatory.

Monitoring coverage is also uneven across themes. Some domains, such as selected meteorological parameters or certain water quality variables, are relatively better covered. Others remain substantially weaker, especially coastal ecosystem

condition, cumulative pollution loads, diffuse agricultural impacts, land-sea interactions, shoreline change, and microbiological contamination in some areas, and the integrated monitoring of coastal and river-basin pressures. This unevenness matters because integrated methods such as Climagine depend not only on the existence of data, but on the comparability and balance of evidence across themes (e.g., adhering to the Source-to-Sea continuum and the Water-Energy-Food-Ecosystems Nexus).

A further important limitation lies in the insufficient linkage between monitoring and enforcement mechanisms. Even where data are available, they do not consistently translate into regulatory action, corrective measures, or strengthened institutional accountability. This gap points to a broader governance challenge observed throughout the Climagine process: while partial technical knowledge exists, the operational chain connecting monitoring, interpretation, compliance, and response remains underdeveloped.

The main structural constraints affecting the use of indicators in the Lebanese context can be summarized as follows:

Table 3. Environmental monitoring constraints affecting indicator-based planning in Lebanon

Dimension	Current situation	Relevance for Climagine
Institutional distribution	Monitoring functions are dispersed across multiple actors with limited institutional integration	Hinders indicator validation and complicates long-term tracking
Data continuity	Many datasets are heavily project-based, partial, or discontinuous, often relying on short-term donor funding	Weakens long-term trend analysis and undermines data comparability over time
Local reporting	Municipal and local contributions are uneven and poorly standardized, lacking formalized community-based monitoring frameworks	Reduces the capacity to ground indicators in place-based evidence without the integration of Citizen Science initiatives
Data interoperability	Absence of a centralized, interoperable environmental data platform (e.g., a Unified National Coastal Observatory)	Limits cross-sectoral analysis and impedes integrated statutory planning
Thematic coverage	Some themes are monitored more consistently than others, often neglecting critical areas like land-sea interactions and groundwater-dependent ecosystems	Creates systemic imbalances in indicator selection and interpretation across the Source-to-Sea continuum
Monitoring-enforcement link	Existing data do not consistently trigger regulatory action, corrective measures, or compliance follow-up	Reduces the policy usefulness of monitoring outputs and perpetuates the implementation gap
Overall implication	Monitoring exists, but not yet as a coherent environmental governance system	Requires explicit indicator tiering (e.g., the Three Tiers of Data Evaluation system), proxy use, and transparency regarding methodological assumptions

Under such fragmented conditions, indicator systems risk becoming purely descriptive rather than transformative.

From an ICZM and integrated planning perspective, the current monitoring landscape fails to function as a unified management tool. It operates more as a collection of parallel, often donor-driven initiatives than as a coordinated environmental intelligence system. Consequently, current monitoring efforts lack the level of integration, standardization, continuity, and institutional usability required for strategic coastal governance, policy evaluation, or adaptive management.

Within the context of this final assessment, the core implication is evident: the main data bottleneck encountered in the Climagine process is not merely a technical shortage of empirical measurements, but rather the absence of a sufficiently integrated monitoring governance framework. This is why several indicators had to be adapted through explicit tiering (e.g., utilizing the Three Tiers of Data Evaluation system), proxy use, or qualitative interpretation, and why transparency regarding methodological assumptions became essential. In other words, the monitoring problem is not external to the methodology; rather, it defines the operational boundary conditions under which the methodology can realistically function.

This points to several priority needs: stronger institutional coordination across monitoring actors (e.g., through a formal Inter-Ministerial Coordination Committee); clearer standardization of methods, parameters, and reporting formats; improved integration between research-generated data and statutory policy systems; enhanced reporting pathways from local to national levels; a more interoperable data architecture (such as a Unified National Coastal Observatory); and, critically, a

stronger connection between monitoring outputs and regulatory or planning action to effectively bridge the implementation gap. In this sense, environmental monitoring should be understood not only as a technical support function, but as a core governance pillar for any serious ICZM or multi-scale sustainability framework.

Strategic Proposal: Establishing a Unified National Coastal Observatory for Lebanon

The implementation of the Integrated Coastal Zone Management (ICZM) process in Lebanon is structurally constrained by chronic data scarcity, fragmented governance, and an over-reliance on short-term, project-based monitoring. Currently, vital environmental information is generated by multiple entities—including the Ministry of Environment, the National Council for Scientific Research (CNRS-L), and local authorities—but remains dispersed across institutional silos without an interoperable framework. To overcome these persistent data gaps and bridge the implementation gap, it is imperative to establish a Unified National Coastal Observatory. This Observatory will act as a centralized, open-access digital platform to consolidate datasets, thereby moving the country from isolated observation toward a coordinated environmental intelligence system that directly informs statutory planning and regulatory enforcement. To systematically operationalize this platform in Lebanon's data-poor context, the Observatory's data strategy must be structured around the Three Tiers of Data Evaluation. This framework ensures that planning can proceed pragmatically while actively treating data gaps as targets for intervention:

- **Tier 1: Reliable Data** This tier consists of validated and available data produced by established national institutions and research bodies. The Observatory will aggregate these verified metrics—such as specific sea-level rise rates, coastal erosion mapping, and selected meteorological parameters—to form the foundational evidence base for immediate coastal decision-making and policy alignment.
- **Tier 2: Usable Estimates** In areas where continuous quantitative monitoring is fragmented, the Observatory will formally integrate proxy data and expert qualitative judgments. For instance, where systematic groundwater metering is lacking, usable estimates of groundwater level trends and extraction pressures can be utilized. This tier ensures that the ICZM process maintains momentum using the best available evidence, rather than being paralyzed by the demand for false precision.
- **Tier 3: Absent Data** Lebanon faces severe blind spots in environmental monitoring, particularly regarding upstream river flows, continuous water quality, and specific socio-economic blue economy indicators. Under this strategy, missing data is not treated as a roadblock but formalized as a strategic intervention priority. By classifying a gap as Tier 3, the Observatory explicitly mandates targeted responses—such as deploying new piezometers for aquifers or integrating community-based "Citizen Science" monitoring networks—to actively generate this data over time.

By anchoring the Unified National Coastal Observatory in this three-tiered strategy, Lebanon can transform environmental monitoring from a purely descriptive, fragmented inventory into a transformative, actionable pillar of coastal governance.

For a synthesized overview of the principal institutional actors and their indicative monitoring roles, see the table in Annex 1.

7. Facilitation, Preparation, and Process Design

One of the clearest practical lessons from the Lebanese application is that the effectiveness of the Climagine methodology depends less on technical complexity alone than on the quality of its process design. Reflections from practice confirm that the method succeeds primarily when the process is structured, disciplined, and rigorously prepared.

8.1 PREPARATION BEFORE WORKSHOPS

Preparation is not merely an administrative detail; rather, it is an integral part of the methodology (often conceptualized as "Step 0" or "Phase 0"). Before a workshop can be expected to produce meaningful outputs, there must be sufficient preparatory work on scope, boundaries, thematic framing, stakeholder mapping, baseline synthesis, and the pre-screening of indicators. The Damour Integrated Management Plan (IMP) case illustrates this effectively. Methodological evaluations demonstrate that the earlier Rapid Stakeholder Assessment (RSA) significantly improved stakeholder mapping and representation, enabled sub-regional differentiation of challenges, clarified tensions between decentralized and centralized governance, and helped translate foresight into grounded planning logic.

This suggests that in future applications, a preparatory stage must be treated as mandatory rather than optional. In most cases, this should include a comprehensive Rapid Stakeholder Assessment (incorporating an analysis of power dynamics), a scoping note defining the geographic and administrative unit of analysis, a short baseline synthesis, and a preliminary filtering of candidate indicators (utilizing a centralized "Climagine Indicator Library") before the workshop itself.

8.2 FACILITATOR PROFILE

The facilitator should not be understood solely as a neutral moderator. The role requires technical literacy, analytical discipline, communication skills, and the ability to conceptually translate between different vocabularies and institutional expectations. In practice, facilitators had to manage disparities in technical and governance perspectives, handle resource conflicts (such as upstream versus downstream tensions), prevent discussions from becoming purely theoretical, and keep outputs strictly tied to indicators, assumptions, and decision relevance. These needs are directly reflected in the facilitator guidance material developed during the process, which emphasizes the necessity of pairing neutral external facilitators with local technical experts to properly manage group dynamics.

Furthermore, ensuring convergence requires sustained commitment from participants, and providing facilitation training for group leaders or delegates represents a critical methodological step. In larger or more heterogeneous workshops, facilitation cannot depend on a single lead moderator. Group-level facilitators or rapporteurs require prior orientation and a thorough methodological briefing.

8.3 SIMPLIFIED TOOLS, TRANSLATION, AND GUIDANCE SHEETS

A major success factor in the Damour IMP process was the preparation of simplified materials and facilitator guidance that made the method accessible to a varied and operationally difficult audience. The supporting documentation on facilitation and group dynamics makes clear that tools such as structured prompts, documentation templates, tiering explanations, and common pitfall notes contribute materially to process quality.

This yields a broader methodological recommendation: Climagine should develop a simplified operational layer tailored for local or mixed-audience settings. While the full conceptual apparatus (e.g., complex Amoeba diagrams) may be retained for technical expert design, participant-facing materials require clearer language, accurately translated key terms, simplified visual logic (such as a 1-to-7 color scale or qualitative multiple-choice assessments), and direct explanatory notes.

8.4 DOCUMENTATION AND TRANSPARENCY

Systematic documentation is an essential component of sound facilitation. Methodological guidelines appropriately mandate that facilitators rigorously document indicator definitions, Band of Equilibrium scores, assumptions, disagreements, and data gaps. Without this structured record, later interpretation becomes weak, and expert consolidation lacks a traceable and verifiable basis. Transparency is especially important in data-poor settings, where the legitimacy of the process depends fundamentally on being open about what is inferred, what is empirically measured, and what remains uncertain.

8. Grounding Indicator Prioritization and System Boundaries

The Lebanese experience suggests that while Climagine is highly effective as a structured foresight and convergence process, its ultimate value depends on what happens after the workshops. This post-workshop phase is where the methodology remains least secure and most vulnerable to the "implementation gap."

Methodological assessments emphasize that integration into statutory planning must be deliberately designed from the outset, or at least that the boundaries and gaps to integration must be made explicit. This is arguably one of the most critical conclusions of the entire exercise. Workshops can produce robust analytical outputs, but those outputs do not automatically translate into legally binding planning tools, governance reforms, or statutory updates without an explicit uptake pathway.

The Damour reports capture this issue clearly, particularly when read alongside the preparatory Rapid Stakeholder Assessment (RSA), which provided a more detailed grounding of institutional and territorial conditions. It notes that the transition from analysis to implementation requires alignment with institutional capacities, the precise sequencing of actions, coordination across sectors and administrative levels, and the maintenance of stakeholder engagement beyond the workshop process. The national ICZM report points in the same direction, arguing that the revised strategy and law must go beyond general principles to establish clearer institutional roles (e.g., an Inter-Ministerial Coordination Committee), coordination and enforcement pathways, and a stronger monitoring architecture (such as a Unified National Coastal Observatory).

While the methodology is clearly relevant to planning, the pathway from relevance to policy uptake remains weakly structured. To bridge this gap, future applications must adopt the following systemic adjustments:

- First, there must be an explicit post-workshop consolidation phase (often designated as Step 5). This phase should formally validate indicator definitions, confirm data tiering (using the Three Tiers of Data Evaluation system), clean up assumptions, and clarify which outputs are ready for direct statutory planning use and versus those which remain indicative.
- Second, institutional anchoring must be clarified prior to finalizing the outputs. One reason indicators remain operationally weak is that monitoring responsibility for them is often distributed across fragmented institutions. The final work therefore needs not only an indicator set but also a realistic institutional mapping of who could technically generate, validate, use, or monitor the indicators over time.
- Third, the statutory planning interface should be named from the beginning. In the national ICZM process, the interface was the revised strategy and law. For the Damour area, the interface concerned the IMP, the proposed River Basin Charter, and associated governance mechanisms, and monitoring responsibilities. Future applications should always identify this interface clearly at the outset. Similarly, the precise geographic and administrative boundaries of the analytical area must be strictly delineated.
- Fourth, follow-up and financial integration should be treated as a standard phase of the methodology. In fragile governance contexts, without structured follow-up and financial reality checks (such as Cost-Benefit Analysis and Multi-Criteria Analysis), the method risks producing a temporary shared diagnosis but with limited institutional consequence or investment appeal.

9.1 GROUNDING INDICATOR PRIORITIZATION THROUGH THE DPSIR FRAMEWORK

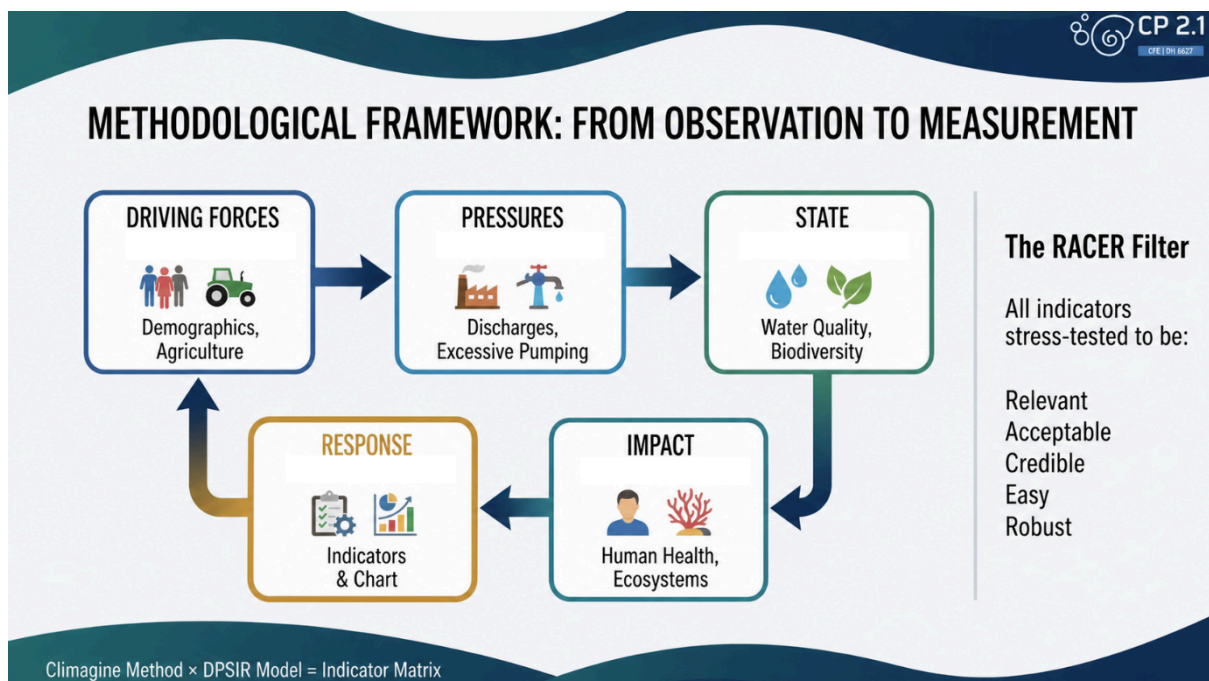
A key methodological lesson emerging from the Lebanese application is that indicator prioritization becomes significantly more meaningful when it is explicitly grounded in the Drivers, Pressures, State, Impact, and Response (DPSIR) framework rather than treated as an isolated technical exercise. Operationally, prioritization cannot rely solely on generic relevance, feasibility, or monitoring considerations (such as the RACER criteria). It must also evaluate where an indicator sits within the system being analysed and whether that position makes it more useful for the specific planning context.

The Lebanese experience showed that this is particularly important in data-constrained and institutionally fragmented settings. Where Data is incomplete and governance systems are weakly integrated, indicator lists can quickly become descriptive inventories rather than analytical tools. The DPSIR framework helps correct this by forcing a contextual reading of indicators: whether they capture underlying pressures, the current condition of the system, immediate impacts, or the sphere of response and intervention. This, in turn, makes prioritization more grounded, more strategic, and more honest about what the selected indicators can actually reveal.

In the Lebanese case, it became increasingly clear that not all DPSIR dimensions were equally useful for prioritization at the workshop stage. Driving Forces, while conceptually important, often remained too broad, politically loaded, or structurally over-analysed to function well as priority workshop indicators. They frequently describe deep macro-level dynamics—such as demographic pressure, urbanization patterns, economic decline, or governance deterioration—which are real but difficult to operationalize through short participatory processes. In contrast, Pressure, State, and Impact (PSI) indicators were generally more useful for structuring discussions around visible environmental and territorial conditions, while Response indicators were especially important where the objective was to connect diagnosis with statutory strategy, legal reform, or institutional action.

This suggests that the DPSIR model should not be used only as a classification tool after indicators are chosen; rather, it should guide the prioritization itself. In practical terms, some contexts may benefit from deliberately prioritizing PSI and Response dimensions over Driving Forces, especially where the latter are already well understood in general terms but do not help stakeholders move toward clearer intervention pathways. In Lebanon, this was particularly relevant because participants could more readily engage with indicators that reflected observable pressures, current conditions, tangible impacts, and realistic response options, rather than abstract structural drivers that were difficult to translate into action.

Furthermore, this approach reinforces the link between analytical prioritization and policy relevance. A Response-oriented lens, when combined with a Pressure-State-Impact logic, makes it easier to identify which indicators are useful not only for describing degradation or imbalance, but also for orienting governance measures, institutional responsibilities, or legal and strategic follow-up. In this sense, DPSIR becomes a critical bridge between diagnosis and action (effectively mitigating the "implementation gap"), rather than merely a conceptual frame in the background.



The broader methodological implication is that indicator prioritization must remain strictly contextual. A perfectly balanced DPSIR distribution is neither necessary, nor desirable, in every application. What matters is whether the selected indicators adequately reflect the decision-making space of the planning process. Consequently, this justifies a deliberate emphasis on Pressure, State, Impact, and Response (PSIR), while treating overarching Driving Forces as background explanatory conditions rather than as the core focus of workshop prioritization.

In short, the Lebanese experience suggests that indicator prioritization becomes significantly more robust when the DPSIR model is used as a contextual prioritization logic, not merely as a post hoc classification framework.¹

9.2 CLEAR DELINEATION OF SYSTEM BOUNDARIES AND SCALE AS A PRECONDITION FOR MEANINGFUL APPLICATION

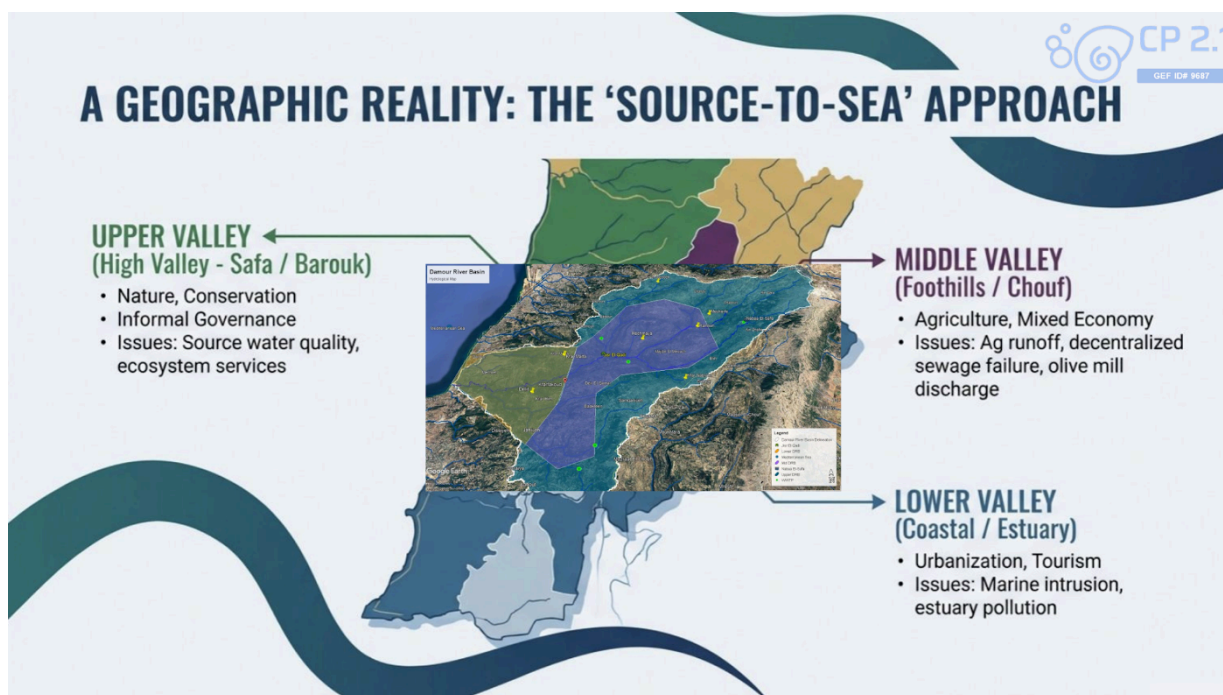
A second major methodological lesson concerns the absolute necessity of clearly defining system boundaries and operational scales from the outset of the process (i.e., during Phase 0 preparatory work). This issue proved especially critical in the

¹ Detailed insight into how this was done practically can be found in respective Climagine workshop reports.

Lebanese application because sustainability problems are experienced differently across various governance levels and geographic contexts, while; consequently, workshop participants do not necessarily relate to the same “system” unless that system has been clearly framed in both spatial and institutional terms.

At a general level, the Climagine methodology assumes that participants are discussing a shared socio-ecological system. In practice, however, this assumption can be misleading unless the boundaries of that system are made rigorously explicit. At the national scale, the system may be understood in broad strategic terms, conceptualizing the coastal zone as a unified policy and management space. Conversely, at the sub-regional or territorial scale, this delineation becomes markedly more complex. Natural hydrological systems, administrative boundaries, governance arrangements, and lived geographies do not necessarily overlap neatly. Without precise clarification, discussions risk becoming too broad, excessively abstract, or internally inconsistent.

The Damour Integrated Management Plan (IMP) experience showed that sub-regional applications benefit significantly from further internal spatial stratification rather than treating the whole area as homogeneous. Distinct portions of the territory—such as the Upper, Middle, and Lower valley geo-zones—face distinct ecological conditions, different governance constraints, unequal infrastructure coverage, and types of pressures or stakeholder interests. These variations are not merely secondary details; rather, they fundamentally shape which indicators are meaningful, which problems are visible, and which forms of response appear realistic. A methodology that ignores such internal differentiation risks flattening the territorial reality and producing generalized outputs that are less usable for statutory planning.



This is also a question of stakeholder relatability. Participants engage far more effectively when the system under discussion corresponds to concrete places, observable pressures, and governance conditions they directly experience. In sub-regional and bottom-up settings, this often requires more explicit geographic framing, including the deployment of detailed maps, territorial subdivisions, upstream-downstream distinctions, and the clarification of the "Source-to-Sea" continuum that help participants situate the discussion. Ultimately, such rigorous delineation transcends simple communication. It directly improves the analytical quality of the foresight exercise by making it easier to identify where pressures are concentrated, where ecological conditions differ, and where targeted solutions (such as localized Nature-based Solutions) may need to vary.

This principle applies equally to institutional frameworks: scale encompasses not only geographic boundaries but also administrative and governance dimensions. National actors typically operate within sectoral or broad policy paradigms, whereas local stakeholders focus on concrete service deficits, land-use pressures, or immediate environmental exposures. If the workshop design does not address this scale discrepancy explicitly, participants risk talking past one another. Precise system delineation helps mitigate this risk by clarifying which scale of analysis is being prioritized and how it intersects with other jurisdictional levels.

Consequently, the workshop architecture must deliberately reflect these scalar realities. At the territorial level, it is methodologically preferable to organize discussions in ways that acknowledge internal spatial variation rather than assuming a single, uniform system. This can include dividing the area into smaller geographic or socio-ecological subspaces (e.g., the Upper, Middle, and Lower basin geo-zones), tailoring empirical examples to different parts of the territory, or structuring group work so that distinct contexts can be compared rather than merged too early. This approach was particularly relevant in the Damour Integrated Management Plan (IMP) process, where smaller-scale geographic differentiation made the foresight process more realistic and more intelligible to participants beyond the expert level.

The broader methodological lesson is therefore clear: scale and system boundaries should not be treated as implicit background assumptions. Rather, they should be explicitly addressed as part of the methodology itself, including in Phase 0 preparatory materials, workshop framing, spatial mapping support, and facilitation design. A more explicit treatment of scale improves both participation and analytical coherence, while also making the resulting indicators and strategic response pathways more grounded in actual territorial and governance realities.

Executive Argument: Transforming the Lebanese ICZM Strategy into Bankable Investments

To overcome Lebanon's chronic "implementation gap," the National Integrated Coastal Zone Management (ICZM) Strategy must shift its paradigm from purely scientific monitoring to "observation for investment". Multi-Criteria Analysis (MCA) and Cost-Benefit Analysis (CBA) serve as the critical financial reality checks required to make this transition possible.

- **MCA as a Strategic Filter:** The MCA systematically filters the broad, unrefined list of coastal adaptation solutions proposed by communities. It evaluates each measure's ability to enhance climate resilience, protect biodiversity, and improve governance, applying strict "knock-out" criteria to ensure that only measures with sufficient data and positive social equity impacts advance to financial testing.
- **CBA as the Ultimate Reality Check:** For the shortlisted measures, the CBA verifies socio-economic viability. It rigorously compares the total costs of investment and long-term maintenance against the expected economic returns, such as the monetary value of gained ecosystem services or avoided damages to coastal assets.

By systematically running proposed measures through this sequenced MCA-to-CBA process, the ICZM Strategy ensures that coastal interventions are ecologically restorative, socially accepted, and highly realistic. This rigorous financial validation is what transforms theoretical planning into "bankable" project pipelines. Ultimately, applying these tools proves to stakeholders that the measures are economically sound, making them capable of attracting green finance, blended capital, and international private investment

9. Climagine and the UN Sustainable Development Goals

This final assessment also evaluates the application of the Climagine methodology in relation to the UN Sustainable Development Goals (SDGs). This relationship must be treated analytically and carefully.

Climagine is not, in itself, an SDG reporting framework; it does not produce formal SDG reporting metrics automatically, nor does it replace national statistical systems. Its value lies in a participatory and structured method for interpreting sustainability challenges in an integrated way and for translating them into indicator-based and governance-relevant discussions. In that sense, it is highly compatible with SDG-oriented planning.

In the Lebanese experience, the strongest links are with SDG 6 (Clean Water and Sanitation), SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action), SDG 14 (Life Below Water), SDG 15 (Life on Land), SDG 16 (Peace, Justice and Strong Institutions), and SDG 17 (Partnerships for the Goals). This is evident from the substantive themes treated in both the national ICZM and Damour Integrated Management Plan (IMP) tracks: water stress, wastewater and pollution, public-space management, ecosystems, climate and coastal risks, institutional fragmentation, and multi-actor coordination.

There is also selective relevance to SDG 5 (Gender Equality) and SDG 8 (Decent Work and Economic Growth), particularly where gender inclusion, youth participation, public livelihoods, and blue economy questions arise. Methodological assessments record explicit stakeholder feedback around women’s role in water governance and youth inclusion, showing that social participation dimensions were substantively integrated into the process.

Still, analytical caution is warranted. If the method is described too broadly as an SDG tool, it risks overstating its empirical function. A more accurate conclusion is that Climagine can serve as a critical intermediary planning and dialogue framework that helps contextualize global SDG ambitions within actual institutional and territorial realities.

Table 4. Indicative link between Climagine outcomes and selected SDGs

SDGs	Relevance to Climagine application in Lebanon	Type of contribution
SDG 16 – Peace, Justice and Strong Institutions	Highly relevant given recurring institutional fragmentation, overlapping mandates, and lack of transparency in coastal zone governance.	Helps reveal that governance quality is a cross-cutting condition for sustainability action and critical for bridging the implementation gap, operationalizing Targets 16.6 (Effective, accountable institutions) and 16.7 (Responsive, inclusive, participatory decision-making) by tracking the number of public consultations, the adoption of ICZM laws, and the creation of unified public coastal data platforms.
SDG 6 – Clean Water and Sanitation	Strong relevance in both the national ICZM and Damour Integrated Management Plan (IMP) tracks through indicators measuring water stress, wastewater management, groundwater extraction, and river basin governance.	Facilitates an integrated discussion of water management priorities, environmental pressures, and governance gaps (e.g., integrating the Water - Energy - Food - Ecosystems (WEFE) Nexus), linking directly to Targets 6.3 (Improve water quality), 6.4 (Water-use efficiency), and 6.5 (Integrated Water Resources Management) by setting measurable thresholds for wastewater treatment rates, groundwater abstraction, and water-efficient irrigation, as well as establishing multi-stakeholder monitoring for surface and groundwater conjunctive management.
SDG 11 – Sustainable Cities and Communities	Relevant through rapid urban sprawl, land-use change, public-space management, and statutory territorial planning dimensions.	Helps connect environmental degradation with settlement patterns, infrastructure planning needs, and resilience concerns. This directly supports Targets 11.3 (Sustainable urbanization) and 11.7 (Access to public spaces) through established indicators aimed at halting unregulated urban

		expansion, tracking land reclamation, and maximizing the length of publicly accessible beaches.
SDG 13 – Climate Action	Relevant through long-term foresight, climate vulnerability, adaptation logic (such as Ecosystem-based Adaptation), and resilience-oriented planning.	Encourages future-oriented and scenario-based thinking under uncertainty to proactively mitigate climate risks, contributing to Target 13.1 (Strengthen resilience to climate hazards) by monitoring the occurrence rate of climate-related disasters and the implementation of coastal protection infrastructure.
SDG 14 – Life Below Water	Relevant particularly in the coastal and ICZM context through marine pollution, coastal habitat degradation, and unsustainable fishing practices.	Supports a structured Source-to-Sea interpretation and the systemic integration of coastal environmental concerns. It enforces Targets 14.1 (Reduce marine pollution) and 14.4 (End IUU fishing) by actively tracking median beach marine litter density and the Illegal, Unreported, and Unregulated (IUU) Fishing Index.
SDG 15 – Life on Land	Relevant through ecosystems, land degradation, biodiversity loss, the integrity of river basins and rural-environment linkages.	Encourages attention to ecological functions, the deployment of Nature-based Solutions (NbS), and the cumulative effects of land-based pressures, addressing Targets 15.1 (Conserve ecosystems) and 15.5 (Halt biodiversity loss) by measuring the area of restored coastal habitats and tracking invasive species.
SDG 17 – Partnerships for the Goals	Relevant through the core methodology of the Climagine participatory and multi-actor foresight process.	Supports multi-level institutional dialogue, coordination, and cross-sectoral engagement, actualizing Target 17.17 (Effective partnerships) by establishing multi-actor coordination platforms (ministries, municipalities, NGOs, CNRS) to co-design and monitor these indicators.
SDG 5 – Gender Equality	Directly relevant where women’s participation, representation, and differentiated engagement in governance and planning are structurally recognized (e.g., through gender-sensitive climate risk assessments).	Can support more inclusive planning discussions when participation is deliberately designed accordingly. It contributes to Target 5.5 (Women’s full participation) by formally monitoring the Gender Inequality Index (GII) and female labor force participation within the blue economy, and tracking gender representation in ICZM governance.
SDG 8 – Decent Work and Economic Growth	Selectively relevant through discussions of the Sustainable Blue Economy, local livelihoods, agriculture, eco-tourism, and sustainable resource use.	Helps frame sustainability not only as environmental protection but also as intrinsically linked to viable economic pathways and green job creation. This links to Targets 8.3 and 8.4 by measuring the percentage of the coastal population employed in blue economy activities and tracking compliant ecotourism initiatives.

10. Recommendations for Method Refinement and Future Application

The Lebanese experience supports a constructive refinement agenda aimed at optimizing the Climagine methodology to be more usable, transparent, and institutionally relevant in complex contexts such as Lebanon.

1. Build a tiered indicator logic into the method more explicitly

Tiering proved highly useful in practice because it distinguished between indicators that were directly usable, those that required proxy treatment, and those that remained strategically important but not yet measurable. This approach should be formalized (e.g., as the Three Tiers of Data Evaluation system) rather than treated as an ad hoc adjustment. In data-poor contexts, tiering is not a workaround; rather, it is a fundamental component of sound methodology.

2. Allow greater methodological fluidity in data-poor settings

The method should more openly incorporate proxy indicators, expert judgment, qualitative convergence, and transparent assumption-tracking where environmental monitoring systems are weak or highly fragmented.

3. Develop a simplified local-application version

For local or mixed-audience settings, a simplified participant-facing methodology should be prepared. This must include clearer language, contextually translated key concepts, example-based explanations of Band of Equilibrium and Amoeba logic (such as utilizing the Doughnut Economics model), and short facilitator notes. Evidence from the Damour Integrated Management Plan (IMP) process confirms that these materials were not cosmetic additions but were central to successful facilitation.

4. Strengthen facilitation guidance and training

Facilitation must be treated as a core technical workstream. Guidance should cover balanced participation, conflict structuring, grounding of discussions, documentation of assumptions and data gaps, and convergence management. Group-level facilitators or rapporteurs must receive prior briefing and methodological training where needed.

5. Require stronger preparatory grounding

Applications should begin with a clearer definition of geographic and administrative scope, baseline synthesis, stakeholder mapping (e.g., via a Rapid Stakeholder Assessment), and the early identification of scale-specific constraints during Phase 0. The Damour experience strongly suggests that this preparatory stakeholder and territorial work significantly improved the quality of the foresight exercise.

6. DPSIR for Indicator Refinement / Prioritization / Contextualization

Future applications must evaluate which categories are most useful for the planning context at hand. In Lebanon, Pressures, States, Impacts, and Responses (PSIR) were generally more operational for workshop prioritization than Driving Forces, which often remained too broad or over-analysed to support realistic convergence around statutory action.

7. On scale and boundaries

Another important lesson concerns the need to define system boundaries and scales explicitly from the outset. At the sub-regional level, the relevant system cannot be assumed to be homogeneous. Internal geographic, ecological, and governance variation affects both the relevance of indicators and the realism of proposed responses. Clearer territorial delineation (e.g., through distinct geo-zones) therefore improves both participation and analytical robustness.

8. Clarify the planning and implementation interface from the outset

The method must explicitly identify the statutory instrument the process is feeding (e.g., a formal ICZM Law, an IMP, a River Basin Charter, or an investment roadmap). Without this clarity, policy integration remains weak and vulnerable to the implementation gap.

9. Add an explicit post-workshop phase

The methodology must include a standard post-workshop stage for consolidation, validation, expert review, clarification of institutional roles, and formulation of next-step actions (including Cost-Benefit Analysis for financial reality checks). This is essential to bridge the gap between participatory foresight and institutional uptake.

Table 5. Recommendations for Methodological Refinements

Recommendation	Rationale	Suggested practical action
Formalize indicator tiering	Not all indicators are equally ready for quantitative threshold-based use	Distinguish clearly between operational, proxy, and strategic indicators (e.g., 3-Tier Data system)
Increase flexibility in data-poor settings	Rigid quantitative expectations are unrealistic where monitoring is weak	Allow transparent qualitative judgment, proxy use, and assumption tracking
Develop a simplified version for local application	Mixed and non-expert audiences struggle with abstract tools and terminology	Prepare simpler participant-facing materials with direct examples (e.g., Doughnut Economics visuals)
Improve translation and concept alignment	Misunderstanding is often conceptual as much as linguistic	Standardize key terms and provide bilingual glossaries or annotated guidance
Strengthen facilitation guidance	Outcomes are highly dependent on facilitation quality	Develop facilitator manuals, briefing notes, and convergence templates
Train group leaders or rapporteurs	Large workshops cannot depend only on one lead facilitator	Introduce short training or orientation sessions before workshops
Require stronger pre-ground preparation	Local and territorial applications need contextual grounding to function well	Include Rapid Stakeholder Assessment (RSA), baseline synthesis, and scale clarification as standard Phase 0 steps
Clarify the planning interface from the start	Outputs are stronger when linked to a concrete strategy, law, plan, or roadmap	State early what statutory planning or governance instrument the process is feeding
Build in post-workshop consolidation	Raw workshop outputs often need refinement before they become usable	Include a formal technical review and validation stage after workshops
Reinforce implementation follow-up	Without uptake, the method risks remaining an isolated exercise	Add a follow-up phase focused on institutional anchoring, monitoring roles, and financial reality checks (CBA/MCA)
Improve visual tools for bottom-up settings	Some tools are analytically useful but not intuitively accessible	Use simpler visuals and examples before applying full BoE or amoeba exercises
Encourage multi-scale application	National and territorial applications showed different but complementary strengths	Design future applications so that local and national processes inform one another

11. Conclusions

The Lebanese application demonstrates that the Climagine methodology holds real potential for national-level applications, but that potential depends heavily on how the method is applied, adapted, and followed through. It should not be treated as a rigid template. In practice, it functioned best as a structured yet flexible framework that helped organize systemic complexity, connect local stakeholder knowledge to formal indicator logic, and create a pathway from broad sustainability concerns toward decision-relevant discussions and policy interventions.

The comparison between the national ICZM process and the Damour Integrated Management Plan (IMP) process is particularly instructive. At the national level, Climagine contributed to strategic coherence, policy framing, and the structuring of a monitoring-oriented indicator architecture. At the territorial level, it contributed to grounded diagnosis, stakeholder engagement, and a more operational appreciation of real resource constraints and socio-ecological trade-offs. The lesson is not that one scale is preferable to the other. The stronger lesson is that the methodology gains value when used across complementary scales and when national and local applications are allowed to mutually inform one another.

At the same time, the experience also exposed structural limitations that should not be understated. Data scarcity, fragmented monitoring systems, abstract analytical tools, mixed participant capacities, weak implementation pathways (the "implementation gap"), and under-specified facilitation all affected the process. These limitations call for rigorous methodological refinement rather than dismissal.

A final point deserves emphasis. The success of Climagine depends less on methodological elegance in the abstract than on disciplined Phase 0 preparation, strong facilitation, transparent handling of data uncertainty, and explicit linkages to statutory planning and governance instruments. Where these conditions are present, the methodology can serve as a valuable bridge between sustainability dialogue and strategic action. Where they are absent, it risks remaining an insightful but weakly integrated foresight exercise.

For Lebanon, the overall conclusion is therefore positive yet qualified. Climagine can support national-level sustainability planning and can meaningfully contribute to SDG-related strategic thinking. Its strongest role, however, is as a participatory, cross-sectoral, and adaptive framework that helps actors make sense of complexity, identify statutory priorities, and move toward more coherent planning under operationally difficult conditions.

Annexes

ANNEX 1. MAIN ENVIRONMENTAL MONITORING ACTORS AND INDICATIVE FUNCTIONS RELEVANT TO CLIMAGINE AND ICZM APPLICATION IN LEBANON

Actor / institution	Main thematic areas of contribution	Indicative role in the monitoring chain	Main limitation or gap observed
Ministry of Environment (MoE)	Air quality, marine pollution, biodiversity, environmental compliance, selected pollution sources, and environmental policy oversight	National environmental oversight, policy interface, environmental monitoring coordination in principle, and linkage to environmental regulation	Coordination remains incomplete (e.g., lacking a formal Inter-Ministerial Coordination Committee); monitoring does not consistently translate into integrated datasets or statutory enforcement action
Ministry of Energy and Water (MoEW) and related water authorities (e.g., EBML)	Surface water, groundwater, water infrastructure, and selected wastewater and abstraction-related issues	Sectoral responsibility for water-related monitoring and management functions across the Source-to-Sea continuum	Monitoring is often fragmented by subsector and institution; integration with broader ICZM and ecosystem monitoring (such as the WEFE Nexus) remains limited
CNRS-L	Climate, marine systems, hydrology, biodiversity, and selected environmental research and observation	Major technical and research-based producer of environmental data and analysis	Much work remains heavily project-based or insufficiently embedded in a long-term interoperable national system (such as a Unified National Coastal Observatory)
LARI	Agricultural systems, soils, pesticides, agro-environmental conditions, and selected water-quality and land-related issues	Technical monitoring and research support relevant to agricultural pressures and land-based pollution pathways (e.g., diffuse agrochemical runoff)	Coverage is purely thematic rather than fully integrated with coastal and multi-sectoral planning needs
Municipalities and local authorities	Local waste issues, nuisance and pollution complaints, land-use change, and localized environmental pressures	Local observation, reporting, and first-line identification of environmental pressures and localized resource conflicts	Capacity, staffing, equipment, and reporting channels remain highly uneven and generally weak, highlighting the need for formalized community-based observatories
Ministry of Public Health (MoPH)	Environmental health risks, microbiological contamination, and public health-related exposure pathways	Health-related monitoring and interpretation of environmental hazards affecting populations	Epidemiological and environmental-health linkages are not always integrated into broader ecosystem or ICZM monitoring frameworks
Ministry of Industry (Moi)	Industrial activities, industrial pollution sources, and industrial wastewater in a regulatory context	Potential role in oversight of industrial environmental performance and compliance interface (e.g., enforcing wastewater pre-treatment standards)	The monitoring and enforcement linkage is often weak or indirect unless formally coordinated with other regulatory authorities
LIBNOR	Environmental standards, thresholds, quality norms, and selected methodological references	Standard-setting and reference framework for parameters and thresholds	Standards do not by themselves ensure routine monitoring, data generation, or regulatory enforcement, thereby perpetuating the implementation gap

Third-party laboratories and consultants	Water quality, microbiological parameters, industrial and municipal wastewater, and site-specific pollution assessments	Technical testing, project-based monitoring, analytical support, and compliance sampling	Outputs are often fragmented, short-term, and not consistently integrated into national systems due to a lack of standardized interoperability protocols
Civil society organizations and local initiatives	Awareness, community-based observation, localized monitoring, advocacy, and citizen-generated evidence	Supplementary evidence generation, local alert function (e.g., Citizen Science), and support to environmental visibility	Contributions remain parallel to formal state systems and are rarely institutionalized or integrated into statutory planning
Universities and academic institutions	Research on ecosystems, hydrology, pollution, coastal processes, biodiversity, climate, and land-use change	Knowledge production, thematic studies, methodological innovation, and technical support	Research outputs are often episodic, project-based, and insufficiently translated into routine Decision-Support Systems (DSS) for adaptive management

ANNEX 2. METHODOLOGICAL REQUIREMENTS AND PRACTICAL IMPLICATIONS ACROSS THE CLIMAGINE PHASES

Phase	Requirement	Why it matters	Practical implication
Pre-works hop	Clear delineation of scope and unit of analysis	Participants need to know whether the exercise concerns a national, coastal, river basin, municipal, or area-based system (e.g., utilizing the Source-to-Sea continuum)	Prepare and circulate a formal framing note before the workshop
Pre-works hop	Baseline synthesis and data pre-classification	A robust, common evidence base is needed for meaningful discussion, mitigating the risk of methodological overconfidence	Circulate a concise scientific diagnostic in advance and apply the Three Tiers of Data Evaluation system to identify gaps early
Pre-works hop	Stakeholder mapping and power analysis	Participation quality depends on balanced, demographically representative representation (including gender and youth)	Conduct a formal Rapid Stakeholder Assessment (RSA), especially in local applications
Pre-works hop	Indicator pre-screening and filtering	Workshops cannot realistically build all indicators from scratch without exhausting participants	Prepare a candidate list from a centralized "Climagine Indicator Library," utilizing RACER criteria to distinguish between core and secondary indicators
Pre-works hop	Conceptual translation and terminology alignment	Misunderstanding begins with language and concept ambiguity between technical experts and local actors	Prepare bilingual or simplified glossaries and explanatory materials where needed
Workshop design	Appropriate and balanced group composition	Group outputs depend heavily on who is in the room and how groups are formed, mitigating institutional dominance	Avoid grouping only by institution; aim for balanced perspectives mixing experts, local authorities, and civil society where useful
Workshop design	Trained and neutral facilitators or rapporteurs	Group dynamics and synthesis quality are highly facilitation-sensitive	Pair neutral external facilitators with local technical experts, and brief all group leaders in advance on the process, outputs, and documentation needs
Workshop design	Simplified participant-facing materials	Complex analytical tools (e.g., full Amoeba diagrams) can fail if they are not understood quickly and clearly	Provide short guidance sheets for BoE scoring, utilize simplified visuals (e.g., Doughnut Economics), and offer qualitative multiple-choice assessments for non-experts

Workshop design	Time discipline with space for structured convergence	Too little time leads to superficial outputs; too much unstructured time leads to theoretical drift	Use timed steps with clear expected deliverables (e.g., mapped dimensions, scored BoE) per session
During workshop	Rigorous documentation of assumptions and disagreements	Later expert consolidation becomes weak and lacks a verifiable basis if reasoning is not captured	Mandate the use of standardized templates to record assumptions, data gaps, and contested points
During workshop	Management of dominant institutional voices	Mixed audiences can easily become unbalanced due to unequal power dynamics	Facilitators should actively moderate participation and redirect discussion when needed to ensure marginalized groups are heard
During workshop	Constant return to statutory decision relevance	Discussions can easily become generic or overly theoretical complaints	Facilitators should repeatedly connect outputs to specific indicators, statutory strategy, planning, or governance use
Post-works hop	Technical consolidation and validation	Raw workshop outputs often need methodological refinement, clarification, and data cleaning	Plan a formal post-workshop expert consolidation phase to finalize the BoE and Amoeba analyses.
Post-works hop	Institutional follow-up and financial integration	Outputs have little value if no institution is likely to use them or fund them	Identify who will own, monitor, or apply the results, and perform financial reality checks (e.g., Cost-Benefit Analysis)
Post-works hop	Integration into statutory planning instruments	The method gains value and bridges the "implementation gap" only if linked to actual legally binding policy or planning processes	State from the outset which statutory strategy, law, plan, or roadmap the process feeds into