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*Accelerating the Restoration of Seagrass Meadows
in the Mediterranean area through Innovative
ecosystem-service based Solutions*
Euro-MED0200867

Protecting, restoring and valorising the natural environment
and heritage

Methodology for co-creating a Seagrass Credit System Cookbook. **Part II**

 **ecoacsa**



Project acronym	ARTEMIS
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INTRODUCTION

Summary

This second part of the Cookbook for Seagrass Credit Generation sets out a **comprehensive methodological framework for designing, implementing, and scaling seagrass restoration projects** linked to emerging nature credit schemes in the Mediterranean. While Part I focuses on ecological and technical dimensions of restoration and measurement, this section addresses the enabling conditions required for such initiatives to function in practice: their legal legitimacy, commercial viability, financial sustainability, and risk resilience.

Seagrass meadows, particularly *Posidonia oceanica* and *Cymodocea nodosa* meadows, **provide critical ecosystem services**, including global climate regulation, coastal protection, biodiversity support, and benefits to fisheries and tourism. However, translating these ecological values into operational restoration projects and marketable credits requires more than scientific knowledge. It demands a structured approach that integrates regulatory clarity, market design, economic planning, and risk management.

The methodology presented here is conceived as **iterative, adaptive, and context sensitive**. It recognizes that seagrass restoration projects are highly site-specific, embedded in complex legal regimes, and exposed to ecological, financial, and social uncertainties. Therefore, the steps outlined do not represent a linear procedure but rather a cyclical process of learning, testing, and refinement through pilot experiences.

- **Step 1 establishes the legal and institutional foundations** necessary for restoration activities and credit generation, clarifying roles, responsibilities, and regulatory requirements across national and regional contexts.
- **Step 2 develops a commercial framework** for defining the value proposition of seagrass credits, building demand, and designing credible market mechanisms.
- **Step 3 translates this commercial ambition into a robust financial plan** capable of ensuring long-term economic sustainability and investor confidence.



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- **Step 4 introduces a structured risk management approach** to anticipate, mitigate, and monitor the diverse risks that could threaten project viability.

Taken together, these four steps form an integrated methodology that bridges science, policy, markets, and finance. They aim to support the emergence of a trustworthy Mediterranean seagrass credit system that can mobilise private and public investment while delivering measurable ecological and societal benefits.

Co-creation process: building the methodology from pilot experience

The development of the methodological framework presented in this Cookbook has been grounded in a **structured and iterative co-creation process** that combined scientific expertise, practitioner knowledge, and local stakeholder perspectives. This collaborative approach has been fundamental in shaping a credit generation system that is technically robust but also socially legitimate and context sensitive.

Stakeholder engagement: Rather than designing the methodology in a purely top-down manner, the process actively incorporated the **voices and experiences of pilot projects across different Mediterranean regions**. Through workshops, participatory meetings, interviews, and interactive tools such as probability-impact matrices, project teams and local stakeholders were able to share their expectations, concerns, and insights regarding seagrass restoration, payments for environmental services (PES) and credit schemes. These exchanges allowed the methodology to be **informed by real-world challenges**, including legal uncertainties, market barriers, ecological risks, and community perceptions. In this sense, the pilots did not merely test a predefined framework; they actively contributed to its construction.

Socio-economic insights: At the same time, the co-creation process extended beyond community participation to include an initial exploration of the **socio-economic implications of seagrass credits**. This involved estimating potential market size, identifying likely buyer segments, and assessing how credit revenues could translate into local economic benefits. By linking ecological restoration with market mechanisms, the process began to illuminate how seagrass credits might influence employment, income generation, and broader territorial development.

Feedback loops: A central principle guiding this co-creation approach was the recognition that **community participation and socio-economic impact are inseparable from credible credit design**. Accordingly,



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engaging with local communities would allow better understanding of how restoration projects could generate tangible benefits such as job creation, skills development, and improved access to marine resources. It would also reveal how projects might affect existing livelihoods, cultural practices, and social dynamics. The degree to which communities feel empowered to participate in decision-making emerged as a key determinant of project acceptance and long-term viability.

Similarly, the socio-economic dimension of the process highlighted that **seagrass credit schemes cannot be evaluated solely on environmental outcomes**. Consideration of direct and indirect employment effects, distribution of revenues, and contributions to local development proved essential for assessing whether credits could support equitable and just transitions in coastal regions. This perspective helped ensure that the emerging market for seagrass credits would **not simply attract investment but also deliver meaningful benefits** to the territories where restoration takes place.

Methodologically, the co-creation process aligned with established principles of **participatory governance and adaptive management**. Knowledge was treated as distributed rather than centralized, with scientists, practitioners, authorities, businesses, and local communities all contributing to problem definition and solution design. Learning was iterative, with feedback from pilots continuously refining assumptions, tools, and procedures. This approach fostered mutual trust, reduced conflict, and increased the likelihood that the resulting framework would be practically implementable across diverse contexts.

In sum, this co-creation process has generated valuable insights across the four key phases of seagrass credit development outlined in Box 1: legal and institutional foundations, commercial design, financial planning, and risk management. By integrating ecological science with stakeholder perspectives and socio-economic analysis, the process has produced a **methodology that is not only technically sound but also socially grounded and adaptable to real-world conditions**. This collaborative foundation will be crucial for scaling seagrass credit schemes from pilot initiatives to a credible Mediterranean-wide system in the years ahead.

Box 1: Phases and key actions to set a carbon and/or biodiversity credit project (also correspond to the four elements to set a business plan)



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Phase	Key Actions
Definition	Define scope, type, and goals of the project
Due Diligence	Select restoration actions; baseline structuring
Monitoring	Create biodiversity monitoring scheme; define impact milestones
Legal	Land tenure analysis, government consultation, collaboration agreements
Financial	Develop financial model, investment plan, and fiduciary trust
Commercial	Build sales plan, marketing, and commercialization strategy
Risk	Design risk management tools and identify mitigation strategies
Registration	Finalize and register the project



STEPS TOWARDS NATURE CREDIT PROJECTS GENERATION IN MARINE ENVIRONMENTS

Step 1: Legal & Registry foundations

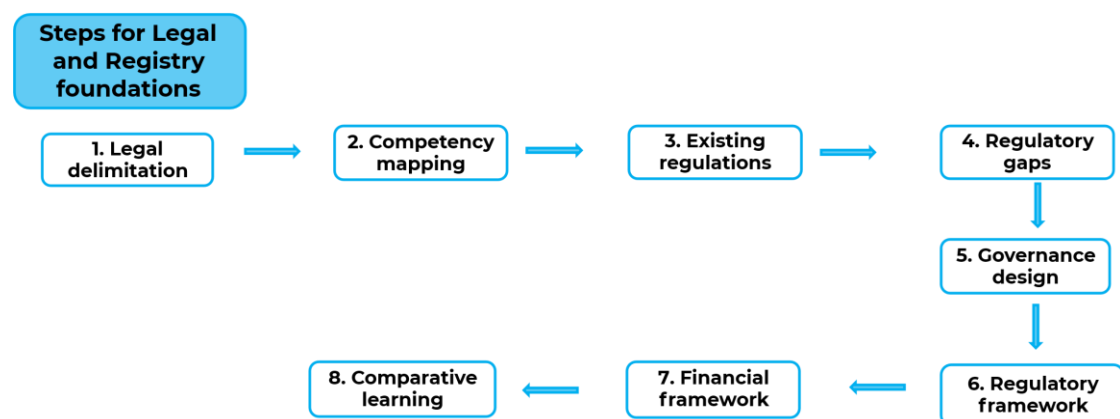
This step defines the legal and institutional setup required to implement the project. It involved:

- Identifying applicable local, national, and international regulations governing marine habitat restoration.
- Defining roles and responsibilities among project proponents, land/sea managers, regulators, and verification bodies.
- Determining permitting and compliance requirements relevant to restoration activities.
- Assessing compatibility with existing and emerging nature credit frameworks, including eligibility criteria and registry requirements.

The output of this step is a **clear mapping of legal obligations, stakeholder roles, and registry alignment conditions** that must be met before project implementation.

The technical methodology based on evaluation of the Extent and Condition of seagrass meadows, besides the assessment of pressures affecting ecosystem characteristics and services, that has been established in the first part of this cookbook, is aimed at **reinforcing potential legal requirements**.

The objective of this methodology is to establish a structured, iterative process for identifying, analyzing, and constructing a **robust legal and regulatory framework** applicable to marine ecosystem restoration activities, with a specific focus on *P. oceanica* and *C. nodosa* meadow restoration.





1. Legal delimitation

The legal delimitation of the object and scope of the activity has the purpose of establishing a clear legal understanding of the **activity or activities included in the restoration project that needs to be regulated**. This step includes:

- Definition of seagrass restoration activities, which helps to define permits needed for the different phases of the project: i.e., scientific research, active or passive restoration activities, monitoring, or maintenance.
- Definition of the spatial scope of application for restoration activities, including public domains, or protected areas, which may need different permits or present particular requirements.

2. Competency mapping

The institutional and competency mapping step must integrate the definition of the **role and responsibilities of any authority**, to distinguish their legal requirements in seagrass restoration projects. The comprehensive map of competent authorities and their respective roles must include:

- Identification of all public authorities with jurisdiction over environmental protection, public property management, protected areas, or scientific activities, among others.
- Analysis of the distribution of competences across national, regional and local levels, determining overlaps, gaps or ambiguities in mandates.

3. Existing regulations

The previous step will allow the inventory of any existing applicable regulations. **Assessing existing legal instruments**, either direct or indirectly, that may already apply to seagrass restoration project locations must be performed to consolidate any applicable legal provisions and regulatory precedents. Some examples of potential instruments are:

The ARTEMIS project has already identified key regulatory initiatives, from global conventions and regional agreements to European Union legislation. The Table 1 below summarizes these key provisions, indicating how they



refer to restoration in general and to *Posidonia oceanica* meadows in particular.

Table 1. Regulations and topics

International Conventions	Explicitly mentions <i>Posidonia oceanica</i> / Seagrass Ecosystems	Explicitly mentions restoration	Implicitly mentions restoration
The Convention on Biological Diversity	x	✓	x
The Kunming-Montreal Global Biodiversity Framework	x	✓	x
Ramsar Convention	x	x	✓
Bern Convention	✓	✓	x
Convention on the Conservation of Migratory Species of Wild Animals – Bonn Convention	✓	x	✓
The United Nations Framework Convention on Climate Change (UNFCCC)	✓	✓	x
Paris Agreement	x	✓	x
High Seas Treaty (BBNJ Agreement)			✓
Regional (Mediterranean) Conventions			
Barcelona Convention	✓	x	✓
EU policy and legislation			
The Environment Action Programme to 2030	x	✓	x
EU Biodiversity Strategy 2030	x	✓	x
The EU Nature Restoration Regulation	✓	✓	x
EU Habitats Directive	✓	✓	x
Water Framework Directive	x	x	✓
Marine Strategy Framework Directive	x	x	✓
The EU Nature Restoration Regulation	✓	✓	x
The Common Fisheries Policy	x	✓	x
Council Regulation (EC) No 1967/2006	✓	x	✓



concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea			
Ocean Pact	✓	✓	x

4. Regulatory gaps

The main goal of the identification of legal and regulatory gaps is to explicitly **understand what is missing or insufficiently regulated**, and which roles and responsibilities should be clarified to reduce risk related to the absence of competencies in the project life cycle (e.g: Posidonia-specific operational restoration frameworks are largely absent at national and sub-national levels; and enforceable site-level procedures for authorization, permitting, and technical standards remain underdeveloped)

The following tasks should be carried out to analyze regulatory needs for the restoration project success:

- Identify the absence of specific authorization procedures for restoration, legally defined project developers or responsible entities, mandatory post-restoration monitoring regulations, rules governing the protection and use of restored areas, and financial and private-sector participation frameworks.
- Classify gaps into legal (i.e., lack of norms), institutional (i.e., lack of responsible bodies), and operational gaps (lack of procedures).

5. Governance design

The designing of a **solid governance structure** will ensure oversight, legitimacy, and continuity of the restoration project in the future.

To achieve that, the need for a dedicated governance body for the restoration project must be defined, including its composition and functions to support the legal and operational framework:



- The composition of the governance body must ensure participation of competent ministries, involvement of protected area authorities, and representation of scientific expertise.
- The functions of the governance must include validation of restoration projects, approval of methodologies, supervision of monitoring and evaluation activities, and periodic revision of guidelines.

6. Regulatory framework

The complete definition of the regulatory framework involved in seagrass restoration projects will **guarantee the robustness of the whole project's process**. It must be developed ensuring that covers all stages of the restoration project, considering it as a lifecycle rather than a one-off intervention:

- Requirements for the pre-restoration phase: type of authorization required, competent authorities, eligibility criteria for project proponents, and scientific baseline assessments.
- Requirements for the implementation phase: operational conditions, supervision mechanisms, and safeguards for protected species and habitats.
- Post-restoration phase obligations: mandatory monitoring (duration, responsibility, funding), protection measures for restored sites, and adaptive management mechanisms.

7. Financial framework

Financial mechanisms are crucial to enable the **viability of the restoration project** while safeguarding public interest. Apart from the Seagrass credit framework here detailed (see the part I of this Cookbook), **additional financial mechanisms must be identified**, such as payments for ecosystem services, and/or private sector participation.

These financial mechanisms must be compatible with national fiscal and financial laws, EU competition and state aid rules, and public ownership of restored ecosystems.

A financial plan is suggested as part of this cookbook.

8. Comparative learning



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Finally, this whole framework must be strengthened through **continuous improvement** by:

- Comparing emerging frameworks with experiences from other jurisdictions
- Validating assumptions and procedures through consultation with authorities
- Incorporating lessons learned from other pilot projects.
- Updating legal and procedural elements as new evidence becomes available.

The methodology is inherently iterative. Findings at any step may require revisiting earlier steps to ensure coherence, legal certainty, and practical applicability. This iterative logic allows the framework to evolve from pilot initiatives towards formal regulation and long-term institutional adoption.



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Box 2: Legal and registry requirements learnt from ARTEMIS pilot project locations

Across the three pilot sites—Menorca (Spain), Monfalcone & Sardinia (Italy), and Crete (Greece)—seagrass restoration is embedded in heterogeneous legal and institutional contexts, yet several common structural issues emerge. All pilots highlight the central importance of clearly defining the role of the Project Developer as the entity responsible for implementation, permitting, monitoring, and long-term stewardship beyond the project lifecycle.

Menorca represents a comparatively mature regulatory environment, where restoration is framed within established instruments such as the Posidonia Decree, Natura 2000 regulations, and regional technical guidelines. Italy shows a more fragmented but operational system, strongly influenced by regional autonomy and the presence of Marine Protected Areas, while Crete operates in a transitional setting where restoration is not yet legally recognized as a distinct project category. These differences directly affect permitting pathways, institutional responsibilities, and long-term accountability.

Across all pilots, a distinction between short-term authorizations for restoration actions and longer-term concessions for sustained use or economic activities (e.g. credit generation) is either explicit (Spain and Italy) or emerging as a policy gap (Greece). Passive restoration measures are increasingly acknowledged as essential in all contexts, though their legal definition and formal guidance remain uneven, particularly in Greece. Active restoration is generally permitted, but often subject to stricter controls or limited to research frameworks.

Monitoring is universally recognized as critical for environmental integrity and credibility, yet legal obligations vary significantly. In Menorca and Italy, monitoring is typically embedded within the initial authorization process, whereas in Crete it remains largely voluntary, with limited institutional capacity for enforcement. These discrepancies underscore the need for adaptable governance models that can accommodate different levels of legal maturity while ensuring long-term responsibility, transparent permitting, and robust monitoring across all sites



Step 2: Commercial design

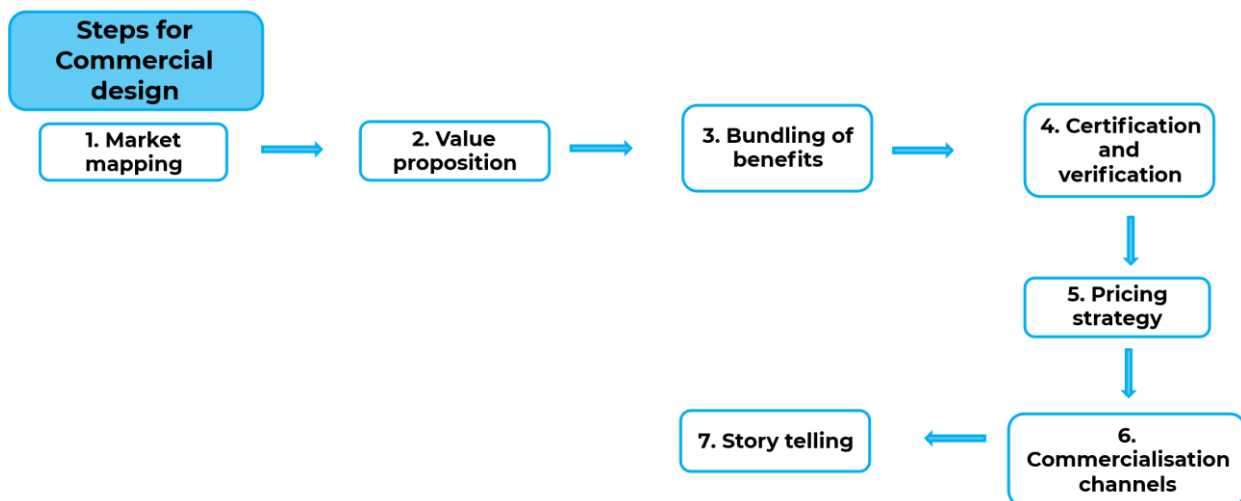
To define a credible value proposition for Mediterranean seagrass credits and progressively build reliable demand through an iterative learning process that aligns ecological reality, buyer expectations, and market feasibility.

The commercial direction of seagrass credits in the Mediterranean will **steer the blue economy and hopefully will accelerate business commitment** to safeguarding the meadows.

In this early development stage, is recommended to design credits by i) developing Mediterranean Seagrass Credit Standard (With the Mediterranean Posidonia Network as a strong candidate); ii) starting with voluntary but regulated credits in pilot scenarios; iii) bundling co-benefits and de-risking activities, and iv) building and enlarging buyer pipelines.

Overall, Mediterranean countries that offer the strongest leverage to kick off the commercialization of credits will certainly facilitate upcoming targeted interventions in Nature-based Solutions while shaping their future.

The **methodology is conceived as cyclical and adaptive**: each step informs the next, while feedback from pilots and early transactions refines the overall approach.





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1. Market mapping

The commercial process begins with a comprehensive **assessment of the potential seagrass credit market**. This involves identifying who the possible traders are and understanding their motivations.

Increasing interest is observed **among companies with ESG and CSRD reporting obligations**, particularly in sectors such as energy, tourism, maritime transport and port management. Impact investors and, in some cases, public authorities interested in blended finance also emerge as relevant actors.

This initial mapping must distinguish between purely philanthropic buyers and those seeking strategic, reputational or compliance-related value from their investment. Also, conduct early consultations with the local community and supply chain actors to validate the enterprise model and stewardship concept.

2. Value proposition

Once the potential market is understood, the next step is to **articulate a clear and compelling value proposition** for seagrass credits.

These credits are not limited to blue carbon but encompass multiple co-benefits, including coastal protection against erosion, biodiversity recovery, and improvements in other ecosystem services linked to fisheries and tourism.

A key element is differentiating seagrass credits from other nature credits by emphasizing their **Mediterranean exclusivity and their direct connection to high-value marine ecosystems**, such as *Poseidonia oceanica* and *Cymodocea nodosa* seagrass meadows.

3. Bundling of benefits

At this stage, it is relevant to **identify how ecosystem services are packaged and marketed**.

Although the interview initially focused on PES rather than nature credits, both function as financial mechanisms to support conservation, incentivize protection, and help close funding gaps. In the Cookbook I from the pilot



projects chose for credits that integrate ecosystems services rather than treating them separately. This approach **better reflects ecological reality and reduces the risk of double counting**.

The emerging consensus is that credits should be **voluntary but regulated, attracting private investment while maintaining credibility**.

In parallel, there is a growing argument for **developing a dedicated Mediterranean Seagrass Credit Standard**, potentially coordinated through the Mediterranean Posidonia Network.

4. Certification and verification

Market **credibility depends on robust, independent third-party certification**. This requires defining clear monitoring indicators of the ecosystem Condition, such as EBQI and MediSkew indexes (see Cookbook, part I), but also for ecosystem services like carbon storage, sediment retention, coastal protection and biodiversity maintenance.

Equally important is **requiring transparent reporting** that allows investors to verify the real-world impact of their investment. Without such a system, trust in seagrass credits would remain fragile and limit market growth.

5. Pricing strategy

Determining the price of seagrass credits is a critical and delicate step. As established in the pricing section included in part I of the Cookbook, **pricing must reflect ecosystem conservation, restoration costs, long-term monitoring expenses and the range of co-benefits** delivered, among others.

Other markets, such as blue carbon markets might provide a **useful reference point**, as their prices are linked to ecosystems with similar characteristics than seagrass meadows.

However, rather than fixing a rigid price early on, monitoring activities and ecosystem-based estimations should be used to **test different price ranges and refine the pricing model over time or develop a pricing strategy** by buyer segment, incorporating any conservation contribution component and benchmarked against comparable products



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6. Commercialisation channels

Bringing credits to market requires defining appropriate sales pathways. One route is through **voluntary nature marketplaces** such as Nature Credit Alliance or other emerging platforms.

Another is through **direct agreements with companies** using insetting models, where firms finance restoration in areas linked to their own operations, which is one of the main goals for the ARTEMIS project (Figure 1).

Sector-specific approaches, particularly involving ports or tourism clusters, are also explored as viable commercial pathways, or engage prospective buyers to secure indicative agreements for sales (in the form of letters of interest)

7. Story telling

A strong commercial strategy must be accompanied by **effective storytelling**. Visual narratives of seagrass restoration, combined with traceable evidence of ecological recovery, help translate scientific outcomes into business and societal value. Including, design visitor experience, operational protocols, certification pathway, and environmental safeguards.

Clear, accessible communication is essential to overcome low trader's familiarity and to build confidence in Seagrass credits as a legitimate sustainability instrument.

Box 3: Commercial dimension across the ARTEMIS pilot projects

Workshops were carried out involving the three ARTEMIS pilots in Menorca (Spain), Sardinia and Monfalcone (Italy), and Crete (Greece). In them, the commercial potential of Seagrass credits emerged as promising but still experimental. While local contexts differ, the pilots reveal shared patterns in demand, market readiness and operational challenges. In fact, the analysis of the potential credit market carried out and published at the State-Of-The-Art report in early stages of the ARTEMIS project showed the following magnitudes (in million EUR) for conservation niche (scenario 1), marine momentum (scenario 2), and marine restoration markets (scenario 3):



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In Menorca, strong commercial interest has been observed from hotel chains and tourism operators seeking to strengthen their sustainability profile. The island's branding around marine biodiversity makes seagrass restoration particularly attractive for hospitality-based traders looking for place-based impact. Here, demand appears tangible, but traders require clear metrics and credible certification before committing to large-scale purchases.

In Sardinia, project partners are exploring bundled credits combining blue carbon and biodiversity maintenance. This reflects a broader Mediterranean trend: traders are less interested in single-issue credits and more attracted to integrated nature solutions. However, the absence of a standardized methodology complicates pricing and comparability with other markets.

In Monfalcone, the municipality is considering port-linked credit schemes, where industrial and maritime actors could invest in nearby seagrass restoration as part of their environmental responsibility. This illustrates the potential for sector-specific inseting models rather than generic voluntary markets.

In Crete, NGOs have emphasized the need for transparency, robust monitoring and clear community benefits. Trader's trust is seen as fragile in the absence of strong verification systems and long-term guarantees of meadow permanence.

Across all pilots, common commercial challenges persist:

- Limited trader familiarity with Seagrass credits compared to forest carbon credits.

- Uncertainty around pricing and acceptable cost ranges.

- Risk of double-counting carbon and biodiversity benefits.

- Weak existing market infrastructure (registries, platforms, standards).

At the same time, common opportunities are visible. Key sectors—tourism, shipping, energy and ports—show growing interest driven by ESG and regulatory pressures. Potential traders consistently highlight that their willingness to pay depends on transparent monitoring, verified biodiversity indicators, and clear evidence of local benefits.

Overall, the three pilots suggest that a viable Mediterranean Seagrass credit market is possible, but it must start with voluntary, regulated credits, strong certification, bundled co-benefits, and a carefully cultivated portfolio. Early success will likely depend more on credibility and storytelling than on volume.

Figure 1. Box 3: Commercial dimension across the ARTEMIS pilot projects



Step 3: Financial Aspects¹

When designing any new restoration project, it is very important to build a financial plan, whose main goal is to **ensure the economic sustainability of the project**. The financial analysis focuses on the estimation of the **social and ecological benefits generated by the project**, and the financial needs **to guarantee its durability over time**.

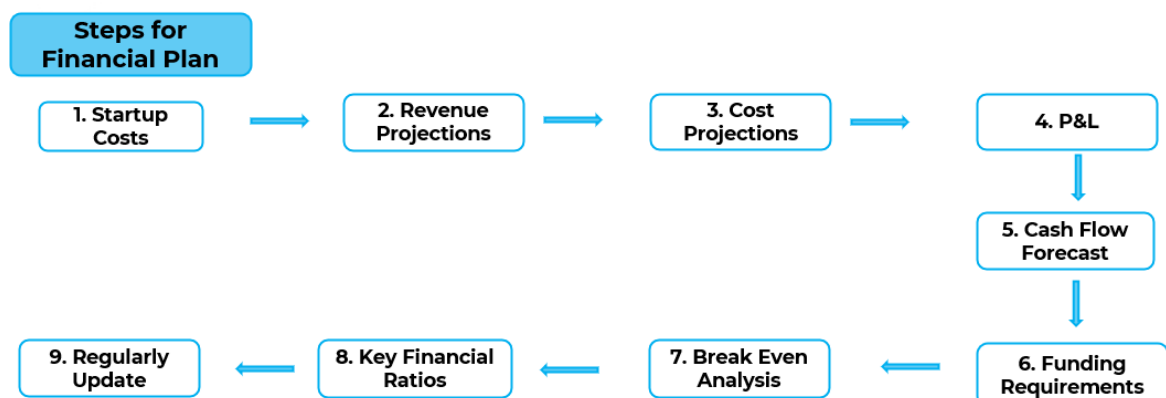
A financial plan must reflect **transparency and traceability** about the use of funds to build trust. This may influence the fact that more investments can be available in the future, which will produce higher improvements and benefits. Finally, this can help attract additional investment in the future, leading to greater improvements and benefits.

The case of Seagrass Credit system for Mediterranean meadows restoration, is important to show the relevance of the restoration for nature, but also that the investments and funds are allocated to reach restoration goals, in a transparent, and eventually profitable manner. In other words, restoration projects must **demonstrate both ecological benefits and economic sustainability** to be durable.

It is notable that restoration project investors are interested in its profitability, in addition to the environmental recovery of nature.

In sum, a rigorous financial plan ensures feasibility, transparency, and credibility. This plan connects ecological performance with cash flows for investor confidence, certification readiness, and long-term stewardship.

A financial plan must be guided by the following steps:



¹ See example in the cookbook I



1. Startup Costs

As a first step, **Start-up Costs should be estimated**. These costs are understood as the payments needed for conducting technical studies, legal requirements screening, nursery of species, transplantation activities, third-party certification and verification. These costs should be **clearly identified and quantified at the beginning of the project**. As determined in previous reports produced within the ARTEMIS project framework, the main cost categories for seagrass restoration projects include:

- Administrative/Management Costs.
- Site Monitoring Costs.
- Scientific Monitoring Costs.
- Educational and Public Activities Costs.
- Visitor Reception and Maintenance Costs.
- Use Management Costs.
- Restoration Interventions.
- Conservation Projects.

2. Revenue Projections

As a second step, **Revenues² must be projected, based on price and quantity estimations**. Revenues in restoration projects are produced by the sale of Seagrass Credits, which in the current methodology are related to biodiversity and blue carbon ecosystem services.

Incomes are therefore estimated from the number of sold credits and their price. A **minimum of 10 to 20 years** (1 to 2 monitoring periods, see Cookbook part I) **should be projected**.

After projections are calculated, the viability of the plan must be considered.

3. Cost Projections

The third step consists in projecting **ongoing and recurring costs**, related to project activities, permits and taxes, that will be **incurred over the years**

² Credit issuance occurs only after monitoring and verification, therefore revenue is delayed. This affects cash flow projections significantly.



for the implementation of restoration projects and Seagrass Credits generation. Again, 1 to 2 monitoring periods must be determined.

Costs are divided into **fixed costs**, which are incurred regardless of the level of project activity (and even when no revenues are generated), and **variable costs**, which depend on the generation of revenues.

In the case of seagrass restoration projects performed in pilot sites; the following costs were identified:

- Administrative/Management, which include payroll costs for administrative tasks related to managing the protected area. It might refer to the preparation and implementation of management plans, which need to be tailored to the specific ecological and territorial needs of the areas.
- Site Monitoring, including land and sea monitoring, as well as the costs associated with maintaining an alert system for sea monitoring. Monitoring costs also cover the labour required for various scientific monitoring activities, such as water quality, temperature, marine flora and fauna observation, fish stock, acoustic monitoring, and visitor traffic surveys.
- Scientific Monitoring for both external and internal studies, including outsourcing research organizations and in-house payroll for scientific research and monitoring.
- Educational and Public Activities, such as activities for schools and universities, summer activities, and the creation of educational documents and stories. This includes the cost of interpretive staff as well.
- Visitor Reception and Maintenance, linked to information points, underwater trails, mooring areas, signs, and general upkeep of beaches and boats. It involves both investment and operational costs, along with payroll and maintenance.
- Use Management, related to assessing site traffic, monitoring and managing fishing quotas, issuing permits for activities like recreational fishing and underwater diving, and monitoring compliance with these permits.
- Restoration Interventions due to specific projects aimed at restoring degraded habitats or addressing issues such as coastal erosion, which may require significant investments.
- Conservation Projects based on investment initiatives for the protection of local fauna and flora, which may include repopulation programs or projects aimed at safeguarding endangered species.

**4. P&L****Profit & Loss (P&L)**

Considering the information gathered in previous steps, the fourth step must set a *Profit & Loss (P&L) statement*. This statement is a report showing **income, expenses, and project profitability**. With this P&L, conclusions can be drawn to see the **economic viability of the project**.

It shows annual performance: revenues, operating costs, and margins. It also tracks Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA), Earnings Before Interests and Taxes (EBIT), and net income to evidence operational efficiency and profitability.

A suggestion of the P&L structure is shown:

**5. Cash Flow Forecast**

Additionally, a **Cash Flow forecast** must be carried out to analyze when funds will be needed. This exercise must be defined as a timeline, identifying **when money comes in and goes out**. The forecast is essential to demonstrate liquidity and investability over the project lifecycle.

Cash Flow projections allow to draw further conclusions, for example whether the project has enough funds to carry out specific activities, meeting its payment obligations when required.

Typical Cash Flow components can be divided into:



- Operating Cash Flow: includes cash received from Seagrass credit buyers and cash paid to suppliers and employees.
- Investment Cash Flow: includes cash received from investors and cash paid to purchase equipment or other assets.
- Financing Cash Flow: includes cash received from borrowing money or issuing new stocks and cash paid to repay loans or pay dividends to shareholders.

Cash Flow Pilots			
	Year 0	Year 1	Year 2
Operating Cash Flow	- Transplantation Costs - Certification Costs - Verification Costs - Legal Costs	+ Sale of Credits - Maintenance Costs - Monitoring Costs	+ Sale of Credits - Maintenance Costs - Monitoring Costs
Investment Cash Flow	- Purchase of Assets		
Financing Cash Flow	+ Loan Received	- Loan Repayment (1st installment)	- Loan Repayment (2nd installment)
Cash Balance			

6. Funding Requirements

The next step is required to **determine potential financial deficits during the project lifetime and estimate further funding requirements**, which are the resources needed to ensure the restoration project viability. This step is critical for the success of the whole project.

This must be **determined before the project begins, together with the identification of potential repayment** mechanisms for these funds, which must also be reflected in the cash flow projections. Funding sources are identified as loans, equity or public funds from for initiatives such as the LIFE, Interreg, and Horizon Europe programs. Also, define a blended funding structure combining seed grant for capex and capacity building, working capital, and concessional or impact capital for growth.

7. Break Even Analysis



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In Step Seven, the *breakeven point* must be analyzed, which is understood as the point where **cumulative revenues equal cumulative costs, so there is neither profit nor loss**. Knowing this point is useful to analyze how many credits are required to reach the break evenness and make sensitivity analyses. From this point onwards, the restoration project will generate financial benefits, and before its losses must be assumed.

8. Key Financial Ratios

Other **Key Financial Indicators** must be analyzed, including:

- Liquidity Ratios (Short-term payment capacity).
- Profitability Ratios (Profit generating capacity).
- Debt Ratios (long term debts).
- Efficiency Ratios (Operational management).

9. Regularly Update

Financial plans are other than static assessments, and must be **updated over time so unexpected changes, seasonal variations or market trends** are tracked. Once the project is launched, the model must be refined with real financial data to improve its accuracy.

Finally, the **following recommendations** must be considered when designing a financial plan are:

- A financial plan is not just an accounting exercise; it's the backbone of trust and investment.
- Ecosystem restoration must demonstrate both ecological results and financial sustainability.
- Knowing start-up costs, credit prices, and annual expenses is critical to identifying the financial magnitude of the project.
- Investors and partners are more familiar with financial indicators such as P&L and cash flow forecasts, rather than ecological indicators.
- Considering extra margin for unexpected issues (contingencies) increases credibility and adaptability.
- It is important to model different pricing scenarios.



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Box 3: Financial aspects across the ARTEMIS pilot projects

Workshops were carried out involving the four ARTEMIS pilots in Menorca (Spain), Sardinia and Monfalcone (Italy), and Crete (Greece).

Across all pilots, the session focused on financial planning for the project emphasizing the importance of the identification of organizations that could provide funding. The importance of a comprehensive financial plan to provide transparency and trust to stakeholders and ensure the long-term sustainability of restoration projects was stressed.

Crete would likely adopt a roadmap approach rather than formal agreements due to its limited experience with payment for ecosystem services. The necessity of engaging the Ministry of Environment and other stakeholders was stressed.

Menorca emphasized the availability of Balearic funds available for conservation projects. The importance of *Menorca Preservation* as a key partner for this search and of a commercial approach to fundraising was highlighted. Also, the importance of the government involvement in ensuring the long-term sustainability of restoration projects was raised.

Due to the co-creation process carried out within the ARTEMIS project, a common tool has been developed to account any specific cash flow, in order to align the three pilot projects with these guidelines, summarized as follows:



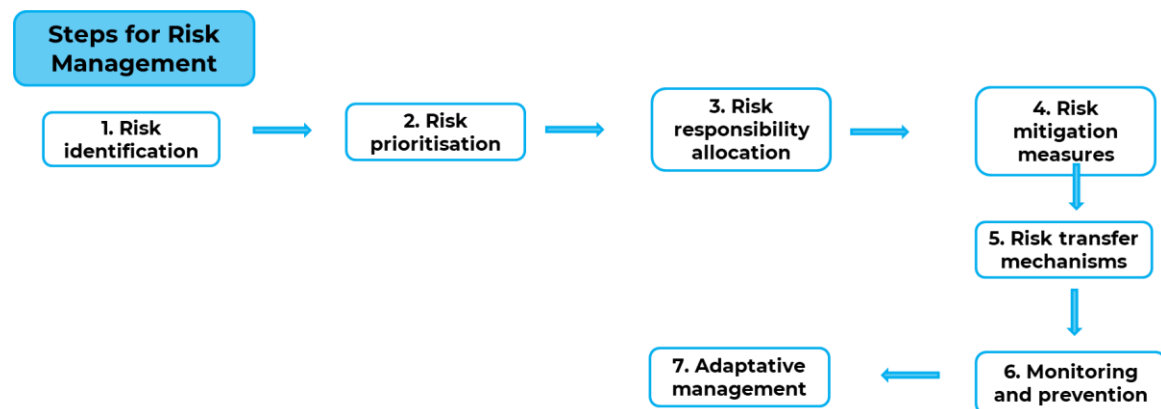
Step 4: Risk management

Seagrass restoration projects operate in a **highly complex context of environmental uncertainty, regulatory fragmentation, market immaturity, and multiple stakeholder interests**. Climate change, anthropogenic pressures, governance gaps, and limited buyer familiarity can all undermine project outcomes if risks are not proactively managed.

This methodology provides a structured and iterative risk management process that allows project developers, authorities, and investors to **identify and prioritize risks across multiple categories**, design mitigation and risk-sharing mechanisms, monitor emerging risks over time, and adapt project design and governance accordingly.

Therefore, the objective of this methodology is to minimize risks that could compromise the ecological, financial, legal, and social viability of seagrass meadow restoration projects, including those linked to Seagrass credit schemes.

Furthermore, the risk management methodology remains scalable across any initiative across the Mediterranean basin.





1. Risk identification

The first step of the risk management process consists in identifying all **relevant risks that may affect the seagrass restoration** project viability and success.

A comprehensive risk inventory must cover at least the following categories:

- Environmental risks, which include storms, floods, pollution events, temperature increase, acidification, invasive species, and low seedling survival.
- Technical risks, considering inadequate restoration design, insufficient monitoring capacity, and methodological weakness.
- Financial risks, including volatility in Seagrass credit demand, delayed or defaulted payments at any project stage, and cost overrunning. The financial plan will help to reduce this risk category (see the financial plan section).
- Legal risk, such as regulatory changes, insufficient legal backing, and conflicts over maritime space use. The legal and regulatory section will help to identify and understand potential legal risks.
- Governance risks, which could derive in weak enforcement, lack of oversight, or unclear roles and responsibilities.
- Socio-economic risks, linked to conflicts with fisheries or tourism, lack of local acceptance, and opposition to perceived privatization of nature.

Apart from these risk categories, interactions between climate, biodiversity, policy and economic system must be recognized.

2. Risk prioritisation

Once all potential risks have been identified, an exhaustive assessment must be carried out to **focus attention and resources on the most critical risks**. This assessment will priorities among risk categories, distinguishing among high, medium and lower priority risks.

The risk prioritization categories must be obtained according to the probability of occurrence of the risk and its potential on the project viability (through tools such as the Standard Risk Matrix: probability x impact). This process must engage project stakeholders by using participatory tools, to ensure a shared understanding of risk severity.



3. Risk responsibility allocation

After critical risks have been prioritized, the methodology focuses on **clarifying the responsibility for managing each risk**, among project developers, public authorities, governance bodies, financial or insurance partners, or shared responsibility mechanisms.

Also, risks must be identified within the sphere of influence of the project (e.g. technical design) versus those requiring external governance or policy action (e.g. legal stability), including those potential cross-border or regional risks that might require coordinated approaches.

4. Risk mitigation measures

The **design of risk mitigation measures** reduces both the probability of occurrence and the magnitude of impacts within the perimeter of the project. These measures apply through:

- Environmental issues: site selection criteria, adaptive restoration techniques, redundancy in planting, and buffer zones.
- Financial issues: contingency funds, diversified revenue streams, and Seagrass credit issuance.
- Legal and governance issues: alignment with policy frameworks, early engagement with authorities, and clear permitting strategies.
- Market issues: investor education, simplified communication, alignment of Seagrass credit with investor time horizons.
- Social issues: stakeholder engagement plans, co-benefits for local communities.

These measures must be included in a **structured risk mitigation plan**, linked to each high-priority risk. The plan will promote multiple benefits (biodiversity, coastal protection, carbon absorption, tourism value) to reduce dependency on a single revenue source.

5. Risk transfer mechanisms

Once the risk mitigation plan has been designed, **risk transfer and risk-sharing mechanisms must be defined to enhance financial and operational resilience** by sharing unavoidable risks.



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The risk-sharing mechanisms must assess the feasibility of environmental or parametric insurance, contractual risk-sharing agreements, blended public-private funding structures, and performance-based payments.

The mechanisms must be compatible with public ownership of marine ecosystems, EU competition and state aid rules, and emerging standards for nature markets.

6. Monitoring and prevention

The main goal of this step is to maintain **trust and detect emerging risks early through monitoring, transparency and fraud prevention**.³

For that reason, the risk management plan must:

- Establish a robust monitoring system to track ecological performance, assess delivery of claim benefits, and detect deviations from expected outcomes.
- Ensure transparent and timely communication of monitoring results to investors and authorities.
- Introduce independent auditing, third-party verification, and clear standards for measurement and certification.
- Address fraud and mismanagement risks through traceability and oversight.

7. Adaptive management

The risk management plan must **ensure that the framework remains effective under changing conditions**, reason why it must have an adaptive system capable of evolving over time.

The plan must include regular review of emerging environmental risks, regulatory developments, and market signals and investor behavior. Updating risk assessments and mitigation measures accordingly must be also incorporated.

This process may not be linear. New risks may emerge at any stage, requiring a return to earlier steps. Through iteration, pilot testing, and stakeholder engagement, the risk management framework becomes progressively more robust, enabling scaling and long-term viability of seagrass restoration and associated with Seagrass credit markets.

³ More information see Cookbook I



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Box 4: Risk management in practice: lessons from Mediterranean seagrass restoration pilots

The three ARTEMIS pilots in Spain, Italy and Greece, seagrass restoration proved to be exposed to a similar set of interconnected risks despite different local contexts. The pilots show that restoration is not only an ecological challenge but also a legal, financial and social one.

From an environmental perspective, all sites are vulnerable to climate-driven pressures such as rising temperatures, extreme storms, and sediment disturbance. Ecological unpredictability—particularly seedling survival, pollutant disturbances, and biological interactions with herbivores, pathogens or invasive species—was consistently identified as a high-impact risk.

Technical risks were considered somewhat more manageable, as project teams have influence over restoration design and monitoring. Nevertheless, weak design or insufficient monitoring capacity was recognized as a risk that could undermine ecological outcomes and confidence in Seagrass credits.

Across all three pilots, legal risks ranked highly, especially regulatory instability and conflicts over maritime space use with tourism, fishing, boating or aquaculture. Competing claims on marine areas were seen as a major threat to restoration continuity.

On the financial side, the immaturity of Seagrass credit markets emerged as a shared concern. Low investors familiarity, unclear standards, volatile demand and potential payment delays create uncertainty for long-term project viability, particularly when projects rely heavily on credit sales.

Finally, social risks appeared in all sites. While local communities value healthy seagrass, concerns persist about possible restrictions on traditional activities and perceptions of “privatization of nature,” which could trigger opposition if not carefully managed.

Overall, the pilots highlight that the most critical risks are systemic rather than purely technical—rooted in environmental uncertainty, legal instability, market immaturity and conflicts of use—underscoring the need for proactive, iterative risk management in future seagrass restoration initiatives.



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CONCLUSIONS

The methodological framework presented in this second part of the Cookbook demonstrates that the successful development of Seagrass credit schemes in the Mediterranean depends on more than ecological restoration techniques. It requires a coherent alignment between legal certainty, market design, financial planning, scientific robustness, and proactive risk management.

On legal foundations (Step 1), the ARTEMIS experience confirms that **regulatory fragmentation is the single most significant barrier to market entry for marine nature credits across the Mediterranean**. No EU Mediterranean Member State currently has a complete, coherent legal framework for marine restoration credit generation. Closing this gap requires action at multiple levels: ministerial guidance in the short term, legislative reform in the medium term, and harmonisation at the EU level through NRR implementing regulations in the long term. Project developers cannot wait for perfect regulatory clarity — they must engage proactively with competent authorities and build transparent, documented agreements that provide de facto legitimacy while formal frameworks are established. The ARTEMIS pilot sites — particularly Menorca, with the most mature legal context — demonstrate that progress is possible within existing frameworks when the right institutional relationships are in place.

On commercial design (Step 2), the ARTEMIS pilots confirm that **demand for Mediterranean seagrass credits is real, growing, and multi-sectoral**. Tourism, port management, marine transport, and financial services are the most immediately accessible buyer segments. However, demand must be actively cultivated — potential buyers are largely unfamiliar with seagrass and require significant investment in education, storytelling, and relationship building before they are ready to transact. The development of a Mediterranean Seagrass Credit Standard, coordinated through the Mediterranean Posidonia Network or an equivalent regional body, would substantially accelerate this demand-building process by providing a recognised, trusted brand for the product. The bundled co-benefit structure of the Seagrass Credit — combining biodiversity, blue carbon, coastal protection, and fisheries values — provides a richer and more defensible value proposition than single-service instruments.

On financial planning (Step 3), the ARTEMIS Natural Capital Balance Sheets (D.2.3.1) confirm that the **ecosystem service values generated by Mediterranean seagrass restoration are more than sufficient to support financially viable credit** projects at the pilot sites — Total Asset Values range



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from €255/m² (Crete) to €11 370/m² (Sardinia). The challenge is not the magnitude of the value but the timing: *P. oceanica* grows extremely slowly, and the gap between investment and first credit issuance can be over 10 years. Bridging this gap requires patient capital instruments — blended finance structures, green bonds, LIFE co-financing, and corporate pre-purchase agreements — that are designed for multi-decade ecological investment horizons. Financial models that assume rapid returns are structurally misaligned with the biology of the ecosystem and are likely to generate investor disappointment and reputational damage. Adjustment of the financial evaluation to the indicators suggested in this cookbook must be accomplished in order to move towards a robust Credit System.

On risk management (Step 4), the ARTEMIS experience confirms that the **most critical risks facing Mediterranean seagrass restoration projects are systemic** rather than operational: climate change, regulatory instability, market immaturity, and social conflict over the commodification of marine public space. These risks cannot be managed through better transplantation techniques or more sophisticated monitoring protocols — they require structural responses: genetic diversity in donor material, dynamic crediting baselines that account for climate trends, regulatory advocacy, market-building investment, and genuine community co-ownership of restoration outcomes. The buffer pool and adaptive management provisions in Cookbook Part I provide the technical infrastructure for risk management; the co-creation processes and stakeholder engagement mechanisms described in this Part II provide the social infrastructure.

From a measurement perspective, there is moderate but growing confidence in carbon and biodiversity assessment methods. Robust parameters such as sediment carbon stocks, biomass productivity, carbon sequestration, and permanence provide a solid scientific basis for evaluating carbon outcomes, while biodiversity indicators such as the EBQI (Personnic et al., 2014) allow for structured ecological assessment. Nonetheless, **risks related to seedling survival, long-term permanence, and external pressures remain significant** and must be explicitly accounted for in project design and monitoring strategies. A realistic timeframe of over 30 years is necessary to meaningfully evaluate restoration success.

Taken together, the four steps of this Cookbook map a pathway from the current situation — ecological urgency, partial funding, fragmented regulation, nascent markets — to the vision articulated in the ARTEMIS project: **a functioning, trustworthy Mediterranean seagrass credit market that mobilises private and public capital** at the scale required to meet EU Nature Restoration Regulation targets for *Posidonia oceanica* and



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Cymodocea nodosa. The pathway is not short or simple. It requires the kind of sustained, multi-actor commitment that characterises successful transformative change in complex socio-ecological systems.

The ARTEMIS project has demonstrated that this commitment exists — in the scientific expertise of partner research institutions; in the governance capacity of marine areas management bodies in Menorca, Sardinia, Crete, and Monfalcone; in the growing interest of corporate buyers across Mediterranean coastal economies; and in the policy ambition of the EU Nature Restoration Regulation and the emerging European Nature Credits framework. This Cookbook provides the tools. The Mediterranean seagrass credit market will be built through the collective will of those who choose to use them.



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REFERENCES

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Community participation is fundamental for guaranteeing the legitimacy of any action. As the project addresses seagrass in our ocean, a global common good, it is indispensable to consider and include the voices of local actors for shaping the future of the Mediterranean seagrass market together.

The socio-economic impact of generating such a market is yet to be discovered, as it is emerging and thus the impact remains to be seen. However, some pilot testing has been conducted during these two years (2024-2026), and it is undeniable that the socio-economic effects from the seagrass credit markets will be profound and will contribute to the beginning of nature markets in European (and African) Mediterranean countries.



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