Part 2.
Roadmap

Content of part 2

Introduction to part 2

2.1 PHASE I: Scope, Map and Share

STEP 1 Form the project core team 35
STEP 2 Identify environmental issues 35
STEP 3 Grasp the socio-ecological system 37
STEP 4 Form the stakeholder forum 41
STEP 5 Gather expert knowledge 43
STEP 6 Build a common culture 45

2.2 PHASE II: Triage, Checkup and Plan

STEP 7 Checkup and triage 51
STEP 8 Select assessment tools and indicators 53
STEP 9 Communicate with the stakeholder forum test 57

2.3 PHASE III: Co-construct the assessment

STEP 10 Build scenarios 61
STEP 11 Gather focus groups 67
STEP 12 Gather socio-economic and environmental data 69
STEP 13 Build models and assessment tools 71
STEP 14 Wrap up the assessment 76
STEP 15 Celebrate 79

2.4 Monitoring

Objectives of monitoring the engagement process
Types of evaluation and tools of monitoring the engagement process
Phasing the monitoring process

In the framework of the ALICE project and in addition to this handbook, a website has been developed where you will find a range of methods and tools addressing the assessment and participatory aspects of the roadmap process.

participatory-assessment.eu/toolbox/

Introduction to part 2

Drawing on the experience of a number of case studies from different European countries addressing different environmental issues, we have developed a fifteen-step roadmap for the co-construction of a participatory assessment. This roadmap is structured in three main phases.

Chapter 2.1 presents the **Phase I - Scope, Map and Share** aim to collectively identify the issues to be addressed in the assessment and to create a common culture within a stakeholder discussion forum.

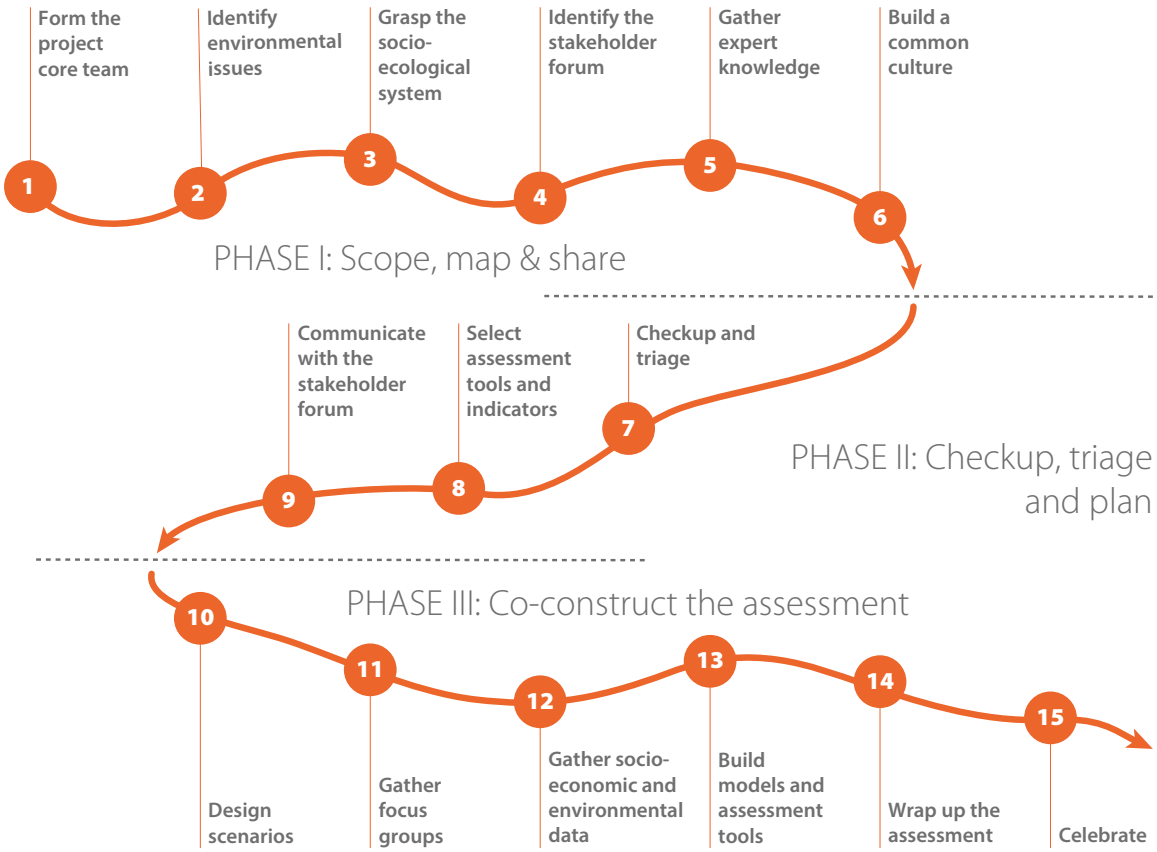
In Chapter 2.2, **Phase II - Checkup, Triage and Plan** is a key moment to check the relevance and finalise the scope of the assessment through the Triage process. At this stage, relevant tools and indicators are identified for the design of the assessment. The finalised choices are presented and explained to the stakeholder forum.

In Chapter 2.3, **Phase III - Co-construct the assessment** develops the assessment using modelling, mapping or valuation methods. Continued engagement in this phase is essential to ensure that the collaborative assessment is credible, relevant and legitimate.

Throughout this roadmap, monitoring the process encourages reflective analysis of the engagement as presented Chapter 2.4.

The roadmap gives general guidelines and must be adapted to each situation.

These steps are general guidelines to run the stakeholder engagement and participatory assessment process. However, in practice, each case application project team will have to adapt to its situation, territory, timeline, policy agenda, issues...



ROADMAP TO A PARTICIPATORY ASSESSMENT - PHASE I

Assessment elements after PHASE I

Knowledge elements
Conceptual maps
Co-constructed diagnosis of needs and opportunities
Common culture

2.1 PHASE I: Scope, Map and Share

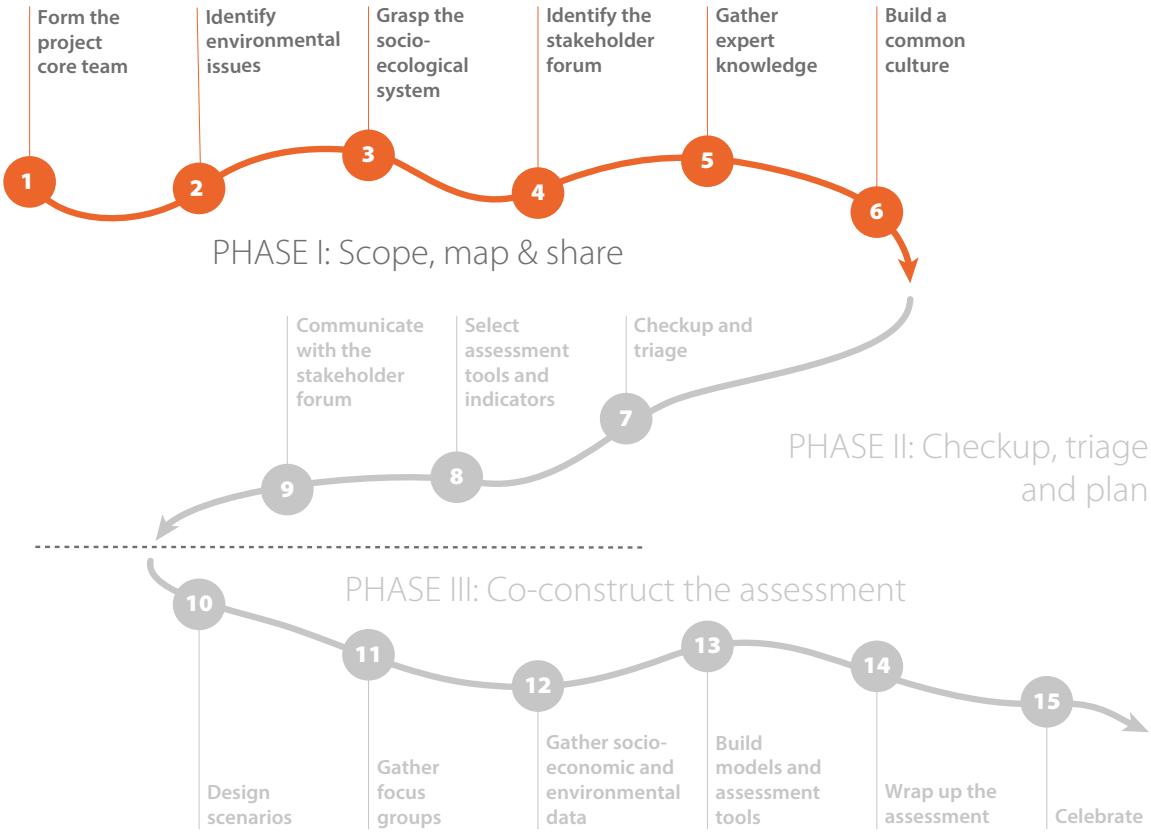
The first six steps of the roadmap are essential to anchor the framework of the participatory assessment process. These steps are underlined by three defining actions: 'Scope', 'Map' and 'Share':

Scope stakeholders' needs and identify the team who will run the assessment and check their legitimacy and standing in the eyes of stakeholders. This avoids the risk of ambiguities and is essential for the process to succeed. Also, determining why an assessment is being undertaken is an essential but often overlooked stage[37].

Map the issue (in terms of territory, stakeholders, governance...) using a "system thinking" approach. It clarifies the interactions between the social, economic and ecological components and the relevant level of complexity to be addressed. This conceptual mapping takes different forms and evolves with knowledge throughout the project, as the diagnosis is co-constructed with different stakeholders.

Share this first scoping and mapping with stakeholders to develop a common culture on the development of possible environmental strategies in the territory. This verifies that the different points of views and perceptions are sufficiently considered to make the assessment relevant and start the co-construction of strategy diagnosis.

The objective of this phase is to build a common culture within the selected stakeholder forum in grasping the environmental strategies and assessment concepts.



Case Studies

A territory-science partnership

Couesnon catchment, France

In the Couesnon catchment case study of the ALICE project[3], an initial partnership was established between two scientists - a geographer and an ecologist - and the local water management body - SAGE Couesnon (water development and management scheme) - to address strategies for Blue and Green Infrastructure Network (BGIN) implementation.

After preliminary discussions, the project team identified that the governmental body in charge of planning BGIN strategies of the territory was the SCOT (Schéma de cohérence territoriale), a strategic planning tool at the inter-municipal scale. The director of the SCOT of the city of Fougères and coordinator of other municipalities of the Couesnon catchment area as well as a representative of a government agency were invited to join the ALICE project process.

This core team of Science-SAGE-SCOT-Government Agency brought a wealth of perspectives to the process to discuss BGIN strategies in the Couesnon catchment. This partnership allowed the scientific team to co-construct landscape management simulation models, particularly regarding the scenario building aspect, with four workshops organised with a large forum involving local managers.

The director of the SAGE Couesnon emphasised the importance of close collaboration between researchers and local partners throughout the process and before the workshops.

The BGIN assessment was finally presented to a panel of more than ninety elected officials, state representatives and various local bodies at a feedback meeting in April 2021.

STEP 1 Form the project core team

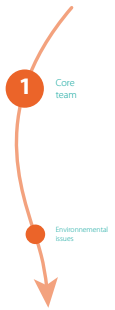
Various reasons or events may lead to address environmental issues such as biodiversity loss, water quality, floods, fires...

For example:

- Issue arising from public awareness
- Development of a land-use plan
- Elaboration or implementation of a public policy
- Recurrent issue dealt with on an ongoing basis by an institution
- Crisis
- Scientific questioning or awareness-raising on a specific issue

Once the need for a management strategy has arisen in an area in response to an environmental issue, the first step is to identify the core project team that will lead the process.

Most European project funding requires stakeholder engagement to ensure that the research is relevant to society. This has meant that many case studies are initiated and led by scientists, with a top-down approach of researchers selecting the environmental issue and presenting their results and solutions to stakeholders with rather nominal involvement[47]. For example, the ecosystem services valuation framework - developed to support sustainable decision-making and trade-offs - has inspired much academic literature but not much 'real-life' application[30].



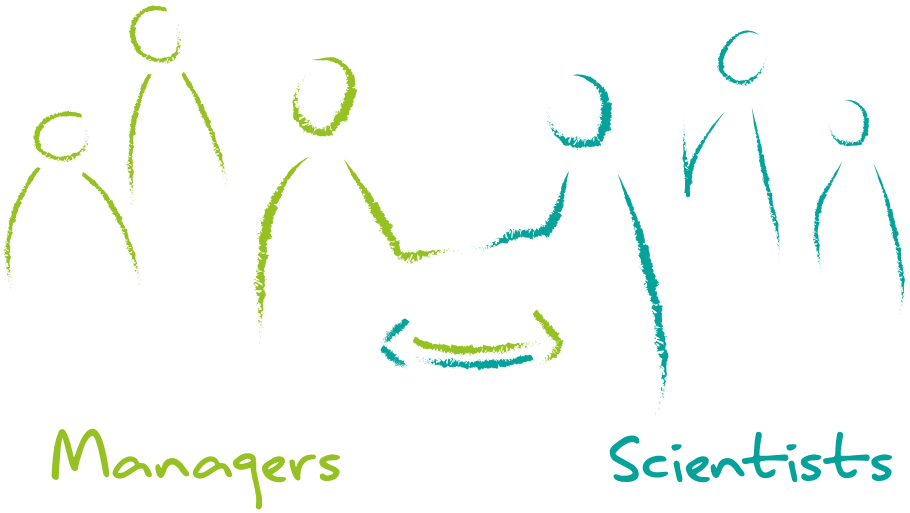
For the participatory assessment to be effective, the leadership of the project should be carefully chosen. It may be a single stakeholder or, more often and more effectively, a partnership between managers – or regulators – and scientists. This group or core project team will lead the participatory assessment and be responsible for involving stakeholders. This core team must be legitimised in its action in the territory for the project to be effective.

Solid and balanced project leadership between management and science is essential to achieve strong stakeholder engagement and relevant perspectives on the issues at stake.

STEP 2 Identify environmental issues

In initial brainstorming sessions, the core project team begins to identify the broad outlines of the issues to be addressed. 'Quick and dirty' but relevant, this step should offer a first scope in terms of issues, stakeholders to be involved,

Quick and dirty but relevant



Case Studies

SUCCESS STORIES

Pas, Miera and Ason, Spain

In the ALICE Pas, Miera and Ason case study[2], an interview with a forest manager revealed successful forest management experiments in the Monte Corona area.

In the Cantabrian region, the landscape structure and vegetation patterns reflect a legacy of severe management practices over the last 400 years. The easternmost part of the region was intensively exploited for 160 years to obtain timber for shipbuilding until 1795. Since then, these watersheds have been continuously deforested for livestock rearing through the combined use of fire and livestock grazing. As a result, a mixture of shrubland and extensive grazing dominates the area, leaving patches of mature forest relegated to the catchment heads and marginal land on the steeper hillsides. With recent climate change, fires are becoming a serious hazard to the population as well as leading to severe erosion.

In Monte Corona, green filters have been developed and tested. These are essentially regenerated riparian forests, made up of all types of native trees, which regenerate spontaneously. They serve as a filter to prevent erosion of material after logging and after rainfall, which can lead to erosion of material from bare soil into watercourses. They also maintain existing biodiversity of the area; avoid extensive monocultures and provide recreational activities. The land is therefore well compartmentalised between logging separated by a combination of native forests.

It was through discussion with stakeholders that such success stories can be extrapolated to other areas and explored in all the ALICE project case studies.

Click here to the ALICE Youtube Channel on sucess stories

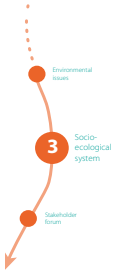
geographical area, timeframe,... and will be refined in the following steps of the process.

The choice of environmental issue can be fixed in this step or left open for further discussion with a panel of stakeholders.

Different tools can be used for this scoping process.

For example:

- Organise a first round of exploratory interviews with a few stakeholders who may have expertise or a legal or moral claim on the environmental issues involved. This can provide a lot of in-depth information about the different knowledge and views on the territory. It also allows for a first round of stakeholder engagement and presentation of the project. Additional interviews can be conducted in STEP 5 - Gathering expert knowledge - with a wider range of stakeholders.
- Brainstorm with a panel of stakeholders or among the core group. This is a powerful and dynamic process for identifying opportunities and options.
- Draw conceptual maps – within the core group or during semi-structured interviews – to help identify links between issues, options, governance, etc. Used at this stage, it promotes a system-thinking approach that will be refined throughout the process (cf.STEP 3).



STEP 3 **Grasp the socio-ecological system**

A conceptual model can be defined as a drawing of the parts of a system connected by arrows showing the functional or cause and effect relationships between the parts.

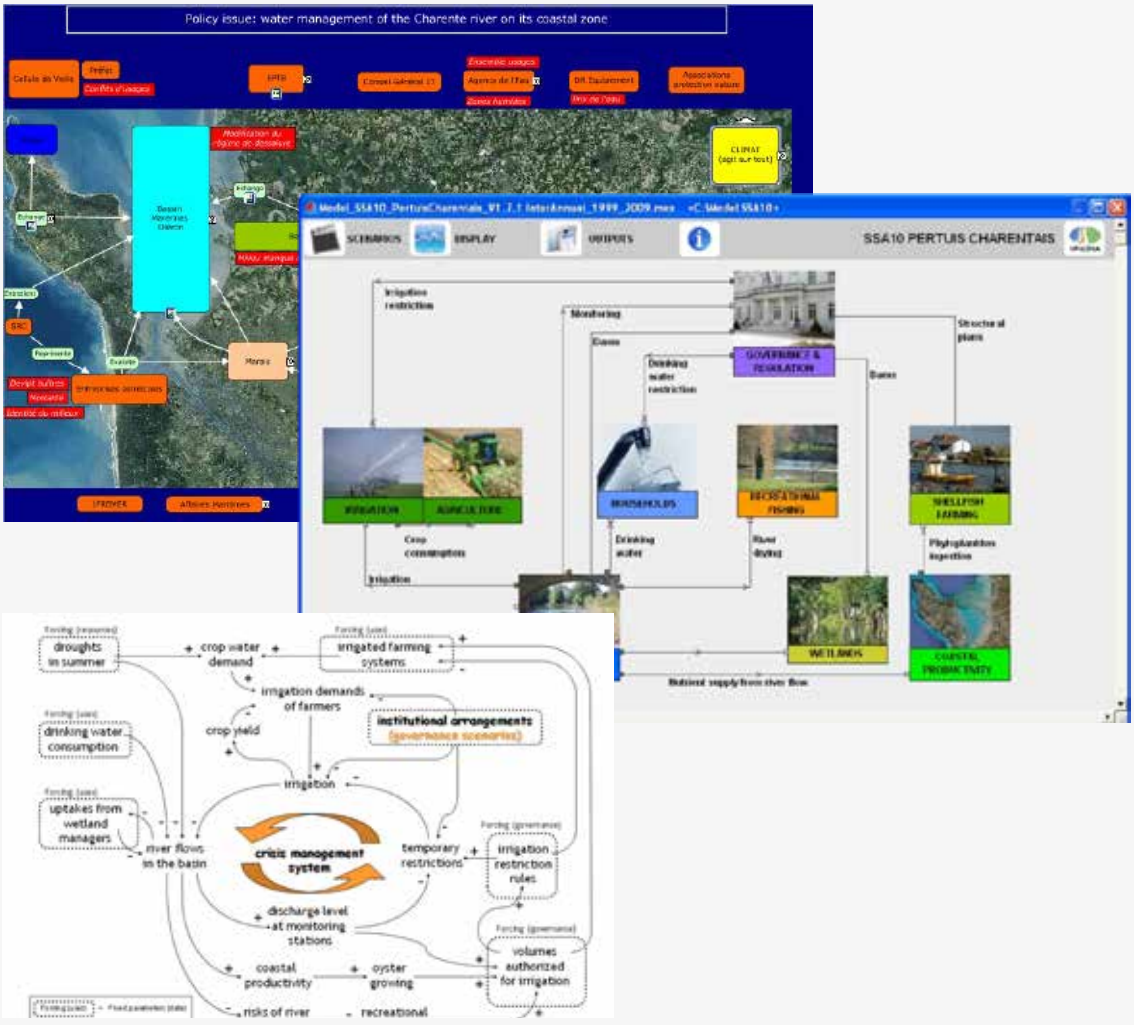
Representing the social and ecological system from different conceptual or cognitive perspectives promotes system thinking. The whole is more than the sum of its parts: conceptual mapping ensures that all components of the system are put into perspective, and it helps select the most relevant system parts and identify those that are missing.

Case Studies

Mapping water mitigation issues

Charente river, France

The Charente River case study from the SPICOSA project dealt with water shortage due to farmers irrigating from the watershed and impacting the oyster farming activities downstream. In the first representations of the water mitigation issue, the components of the system were represented following a geographic upstream to downstream scheme along the Charente River. Even while representing the stakeholders and institutions, it was difficult to integrate management options in the representations. By using a Resources / Uses / Governance framework representation (Mc Ginnis and Ostrom), the governance system became much clearer. A final representation following 'Forrester' system schematics offers the management levers for water mitigation and give a dynamic view of the institutional arrangements (Mongruel et al.). These new representations became the structure of a simulation model of the Charente River water mitigation issue [3].



légende

Initial concept maps can be messy and dense. Start thinking in terms of interactions; focus on the dynamics rather than the detailed structure of components. Think simply and hierarchically and seek a simplified view of complex systems.

The mapping exercise can be carried out as a group within the core project group, during a stakeholder interview or a stakeholder workshop.

Geographical maps

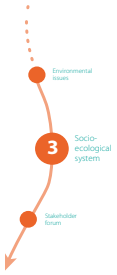
The use of a geographical map of the territory as a background can be interesting as a first exercise that will help stakeholders identify the issues by grounding them in their context. Geographic maps are also useful in identifying the spatial components of data that may be relevant.

However, the spatial dimension may become limiting in the representation of stakeholder interactions or governance systems and geographic mapping needs to be complemented by other representations of the system.

Use system thinking and assessment frameworks

To foster the integration of the natural, economic and social components of the system, analytical frameworks can be used at this stage to draw new conceptual views (DPSIR, Ecosystem services, Resources-uses-governance,...).

When addressing environmental issues, the natural tendency is to represent the system around natural processes or geographical perspectives (e.g. upstream to downstream of a catchment), which can lead to the omission of activities or governance bodies. To move from a geographical to a systemic view, it may be useful to use the 'Resources or risks – Uses - Governance' representation [McGinnis and Ostrom]. These representations should focus on the management or governance options – existing or to be defined.



In this approach, the previously identified resources or risks are first detailed (e.g., fires, floods, loss of connectivity for biodiversity, water quality problems, ...). The activities impacted by or impacting the resource or risk are then described. Finally, the relevant governance structures (regulations, management plans, local management organisations, etc.) are described.

The 'Resources or risks – Uses - Governance' representation is also a useful step for a detailed identification of the stakeholders to be involved in the process.

Case Studies

Administrative structures versus catchment scale thinking

Carlingford Lough, Northern Ireland and Republic of Ireland

During the ALICE workshops in the Carlingford Lough case study, stakeholders highlighted that the catchment is divided into a considerable range of administrative structures. In addition, some administrations are based mainly outside the catchment and therefore activities within the catchment are allocated a proportionally small number of resources.

Many of these areas are governed by different land use restrictions and drivers. Landscape character areas for example are used within planning (undertaken at the Council level) to encourage specific landscape characteristics to be retained, and each area has specific principles for accommodating new development (which includes natural features such as woodland and hedgerows). This can result in conflicts with ideal BGIN placement, which vary throughout the catchment, and which are not captured within any one council area. Some administrations include public land and are allocated budget to access creation such as 'greenways' which are pathways encouraging public access. Several lower catchment areas include areas which are uniquely (for Northern Ireland) open to public roaming access with no fixed pathways. Other administrations include only private land which, in both Northern Ireland and the Republic of Ireland, has no right of public access.

Administrative structures within the Carlingford catchment add considerable complexity to any catchment scale BGIN planning, they create unequal potential to deliver recreation as a resultant Ecosystem Service from BGINs, and the sheer number of administrations and overlapping responsibilities makes it difficult for both stakeholders and BGIN providers to know who to speak to for official advice and for the coordination of activities. Careful stakeholder, administrative and institutional mapping was therefore essential in this case study to identify potential barriers to the development of BGINs.

From: Burgess, D., Finney G., Fustec, K. and Ballé, J. (2023). "Participatory assessment in Carlingford Lough, Northern Ireland and Republic of Ireland". In Ballé, J., Bailly, D. and Fustec, K., (Eds.). (2023). Participatory assessment in practice: Blue and Green Infrastructures Network Strategies in the Atlantic Area. pp. 105-134.

Stakeholder and institutional mapping

Stakeholder and institutional mapping is a useful focus of the overall system map. It is a process of analysis to identify the rules governing the relationships between organisations, groups and individuals, which can eventually lead to a diagram.

This process avoids the pitfalls of excluding key stakeholders who might later undermine the legitimacy of the project, or of an ill-informed and therefore less effective assessment[45].

At this stage, it is important to identify the key knowledge experts. For example, "technicians" or "engineers" from government institutions or environmental management bodies usually have a thorough knowledge of the issues in the territory and often have collected a lot of data. In addition, being involved in day-to-day management, they are often very interested in being involved in participatory assessments and management projects.

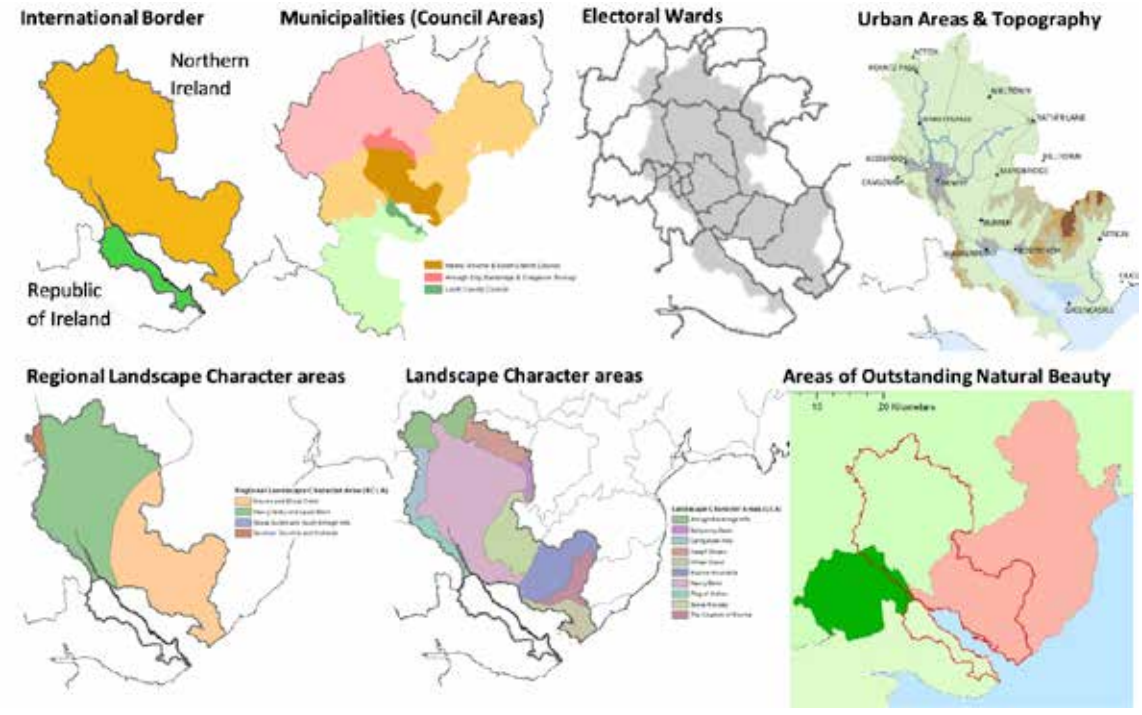
STEP 4 Form the stakeholder forum

After the first steps of the process, initiated by the core team, comes the time for sharing with a wider stakeholder forum and for external communication.

Based on the mapping of actors and institutions (STEP 3), the core project team can identify stakeholders with a vested interest in the pre-identified environmental issues in the territory. This list is not definitive and will evolve during the process as new stakeholders are identified as knowledge of the system advances.

Research should be part of this forum, involving scientists from both natural and social disciplines. If possible, it is beneficial to use an existing forum involved in environmental management issues in the area.

At this stage, the core team is invited to assess the dimension of the partnership with each actor. It is not only about who is concerned about the issue, but who is open to a new



Administrative areas within Carlingford Catchment: a highlight of the diversity of structures including local council areas, landscape character areas and areas of outstanding natural beauty.

Case Studies

Stakeholder forum for river biodiversity conservation

Paiva river, Portugal

The first step was a stakeholder mapping exercise based on a collective discussion to define a set of criteria to support it: diversity, relevance and added value.

A stakeholder forum was created in the Portuguese case study that involved the main stakeholders of the Paiva river basin. The invitation of stakeholders was based on a snowball approach – someone who knows someone else extends the invitation.

An assessment of participants' profile took place during the first stakeholder workshop. The group was composed of 27 participants. Of these, 83% did not live permanently in the Paiva catchment area, and only 41% worked in the area, with over 60% employed in the public sector. 75% of the participants had a higher education (Master). With regard to their income bracket, 72% of the participants were in the €1000-2499 bracket.

In the second workshop, the group was composed of 30 participants with a similar profile.

For the third workshop, there were 39 participants - the higher number of participants can be explained by the fact that the workshop was held online. However, being online required a larger facilitation team to ensure the quality of the work. The profile of participants was consistent with previous workshops, with one group not previously present: students.

Stakeholder Forum (Cabecinha et al., 2021).

perspective on the issue, who has an interest in collecting and sharing evidence on the issues raised, who is willing to get involved in the project and who the core team is willing to involve. By doing this kind of diagnosis, you can identify the skills, willingness and abilities of each stakeholder and the potential roles in the project.

STEP 5 Gather expert knowledge

In preparation of inviting the Stakeholder Forum to a first common culture meeting, the existing knowledge on environmental issues identified in the first round of mapping should start to be collected and organised. This knowledge should cover the natural science aspects, but also give a historical and socio-economic understanding of the territory.

This knowledge can be found in existing databases and in the scientific or general literature. At this stage of the process, it is not a question of extensive data collection or launching new data collection. It is about gathering contextual knowledge and identifying existing or missing data. The detailed identification of the data to be collected will be done in PHASE II of the roadmap once the objectives of the project have been stabilised.

Conducting exploratory interviews with relevant stakeholders can be an effective way to gather knowledge and expert opinion.

Stakeholders can be involved in ...	Scientist	Managers	Policy makers	NGO's	Economic & leisure activities
Share the issue?					
Provide knowledge useful to deal with the question?					
Can play a role to inform or raise awareness about the issue of the question?					
Is or can be involved in designing and creating tools, models, scenarios to deal with the question?					
Engage stakeholders (beyond the core team)					
Contribute or make the decision, implement the management					
Monitor and evaluate the efficiency of the tools, models, scenarios in improving management					

Identification table of potential stakeholders for the stakeholder forum

Case Studies

Semi-structured interviews guidelines in the context of Blue and Green Infrastructures Networks

ALICE project

Question to ask	What we want to know	Possible formulations
1. Your relationship to this territory?	Type of expertise held by the person, level of commitment	*'The first theme is your relationship with this territory, can you tell me about it?' or 'How long have you been in this territory?'*
2. How is the territory structured?	What entities are present in the territory? Are there any ecological sub-groups that emerge? (Identify the BGINs in the discourse).	*'According to your experience, how is the territory organized, how does the territory work? Are there subsets in this territory?'*
3. How are the components of the territory connected to each other?	Question of networks, ecological connectivity, connection between actors and economy.	*'Are these entities connected to each other and how?'*
4.Transformations, main drivers for change?	Locate and characterise pressures. Local or global effects which affect certain compartments of the territory.	*'What do you think are the main drivers of change affecting the territory, past period or in the future?'*
5. Are BGIN discussed on the territory? In which context?	Degree of interaction and social vivacity, 'social visibility', liveliness of issues and of worries, identify forums and actors.	*'Are these questions are discussed? And if so, where, when and between whom and who?'*
6. Who are the key players?	Verify who are the relevant stakeholders.	*'Can you identify key stakeholders? You mentioned this and that important player, do you know anyone else?'*
Conclusion	Offer an open space of expression..	*'Have we addressed all the important issues for you?'; 'Do you have questions about the ALICE project or questions you would like to ask me?'*

Semi-structured interviews are commonly used in policy and environmental research to collect qualitative data. An interview allows for the collection of three types of information: 1) expert knowledge and data, factual data or accounts of specific events; 2) positions and arguments reflecting collective stake holding; 3) specific features of personal trajectories.

These interviews allow respondents to express their views on a range of selected topics, but also to raise issues that the core project team may not have considered and to bring in new ideas. Interviews are also a very effective way to start involving stakeholders. It is a good opportunity to present a project and to capture individual views.

STEP 6 **Build a common culture**

Environmental issues are complex and involve a very wide range of activities and governance. To ensure fruitful discussion and co-construction, the people brought together by the project - each with a different background - need to build a common language and culture of the issues. In the scientific sector alone, very different academic sectors need to be involved, from the natural sciences to the economic and social sciences, and so understanding needs to be developed among the different disciplines.

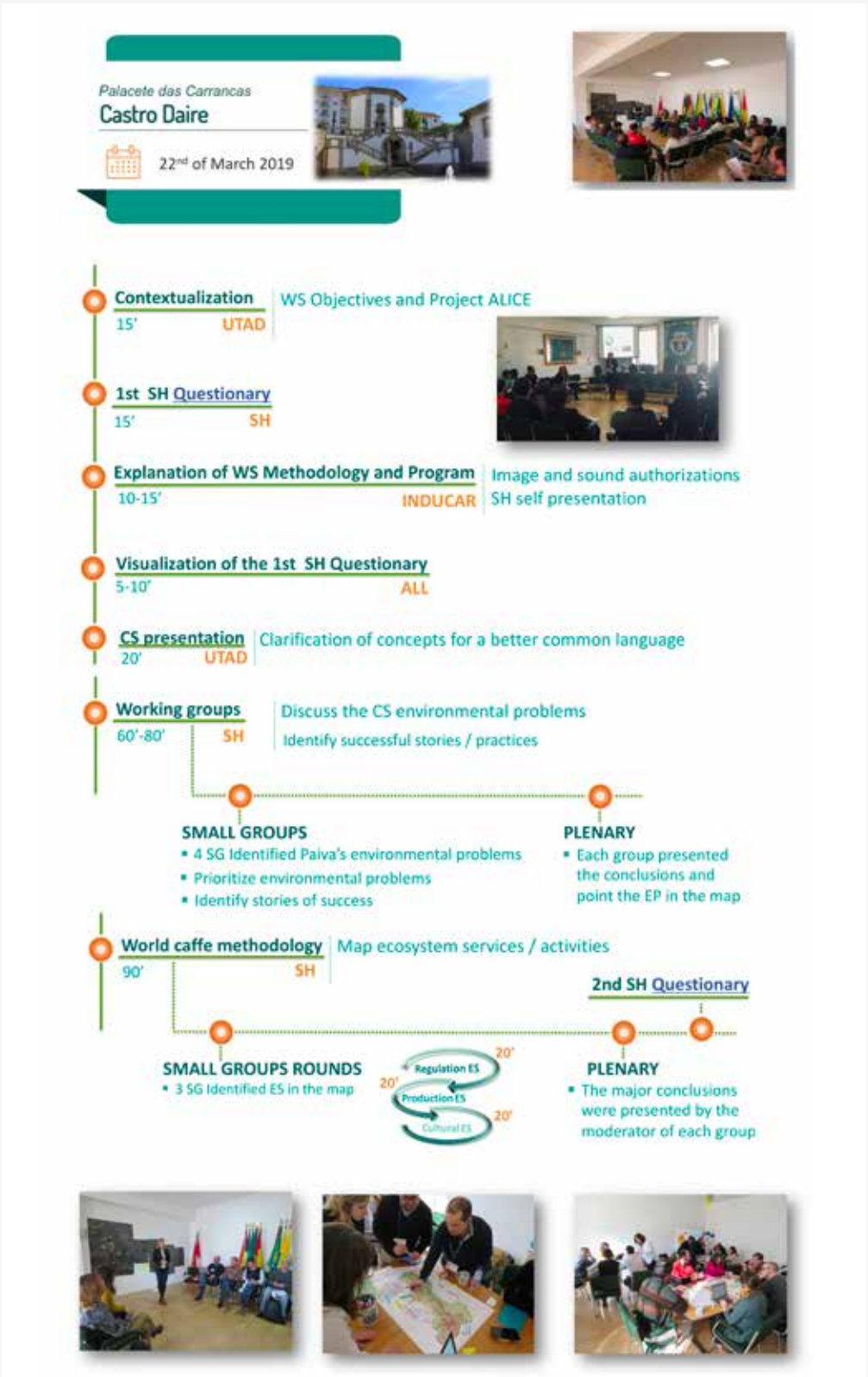
Having delimited and mapped the scope within the core project team, the key moment has come to share and build this common culture with the identified stakeholder forum. This is usually done in a "common culture" workshop that brings together the stakeholder forum. The aim of this meeting is to share views and knowledge from all perspectives. The number of participants should not be large, but all identified relevant sectors and actors should be invited.

This workshop, convened by the core project team, should be organised around a number of participatory activities, such as brainstorming or mapping, to ensure that all stakeholders

Case Studies

Common culture stakeholder workshop programme

Paiva river, Portugal



légende

are fully and actively involved in the co-construction process.

Careful selection of the person who will issue the invitations is essential for the success of the meeting and for the legitimacy of the project. The invitations should be sent out by the core team partner who is most legitimate to engage the stakeholders on the issues under study and who knows the invited actors best.

Organising a stakeholder workshop requires prior preparation and a facilitator with expertise in participation in order that all participants can express their views, the discussion be fruitful and new perspectives explored.

This role can be taken on by managers or scientists, but they need to be trained in participation techniques. Being stakeholders themselves, they could also influence the debates with their vision. Also, social science background should not be confused with facilitation expertise, and the project's social scientists should not be systematically called upon for this function. The involvement of professional facilitators can greatly improve the quality of discussions in a workshop.

During the workshop, the core team should take care not to dominate the floor and should encourage everyone to take part in the discussion. During these workshops, try to avoid jargon and acronyms and invite everyone to ask for clarification on terms or concepts that are not clear.

Depending on the size of the stakeholder forum panel, different common culture activities can be considered, such as focus group meetings or creation of a glossary.

Focus group meetings

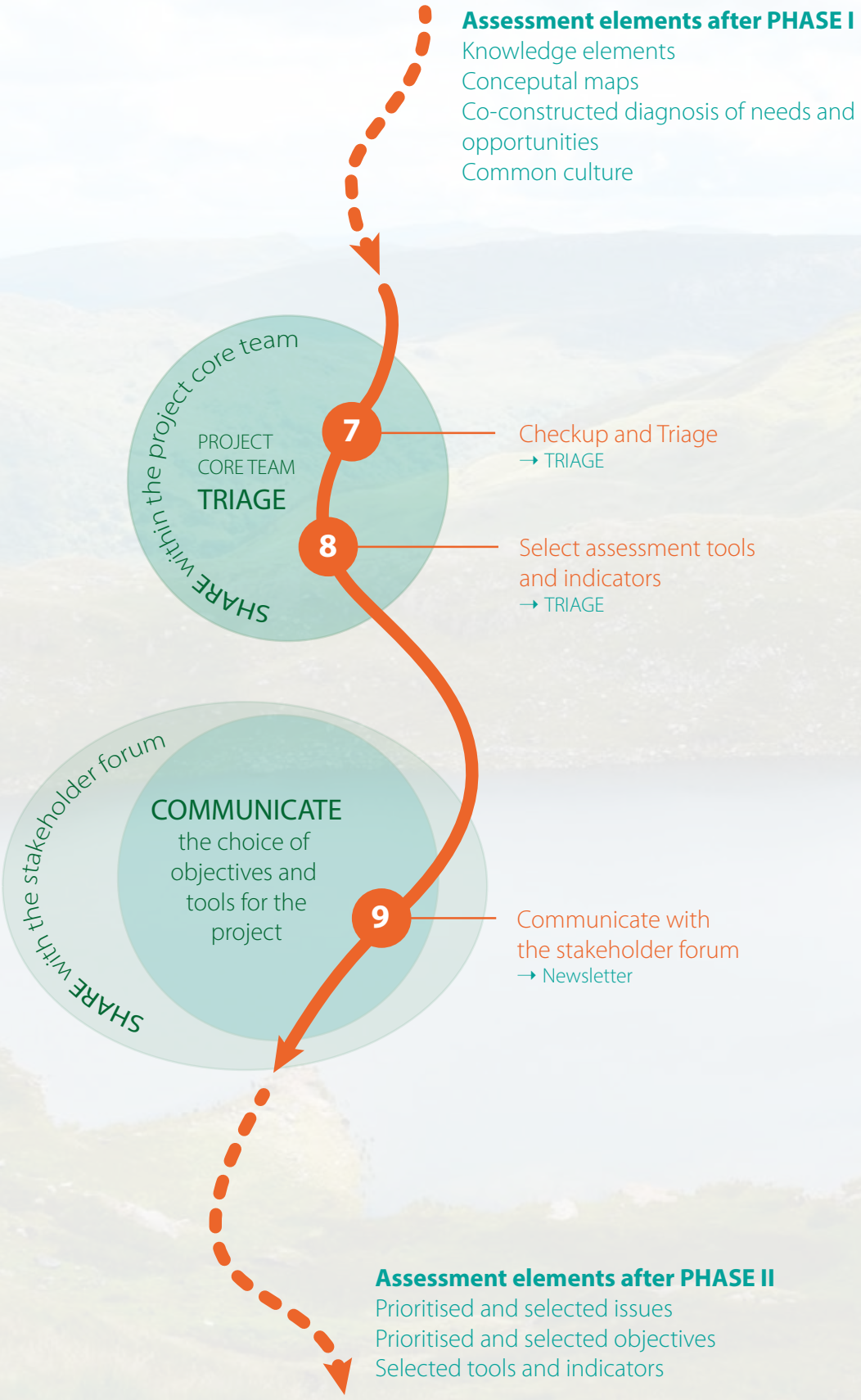
In complex cases, it may be necessary to meet with some sectors in separate meetings to better understand certain aspects of the system. These meetings are complementary to the workshop on common stakeholder culture. They can be organised according to the same structure.

Glossary

Discussions around environmental strategies involve terms and jargon that cover a wide range from European directives and strategies, to economic and leisure activities, as well as science from different academic backgrounds. A glossary developed by the core project team and checked with stakeholders can be a very useful tool to facilitate the discussion.

The objectives of the common culture are to present the project, scope and map the opportunities of environmental management and the problematic of the territories with the extended forum, as well as build a common language.

ROADMAP TO A PARTICIPATORY ASSESSMENT - PHASE II



2.2 PHASE II: Triage, Checkup and Plan

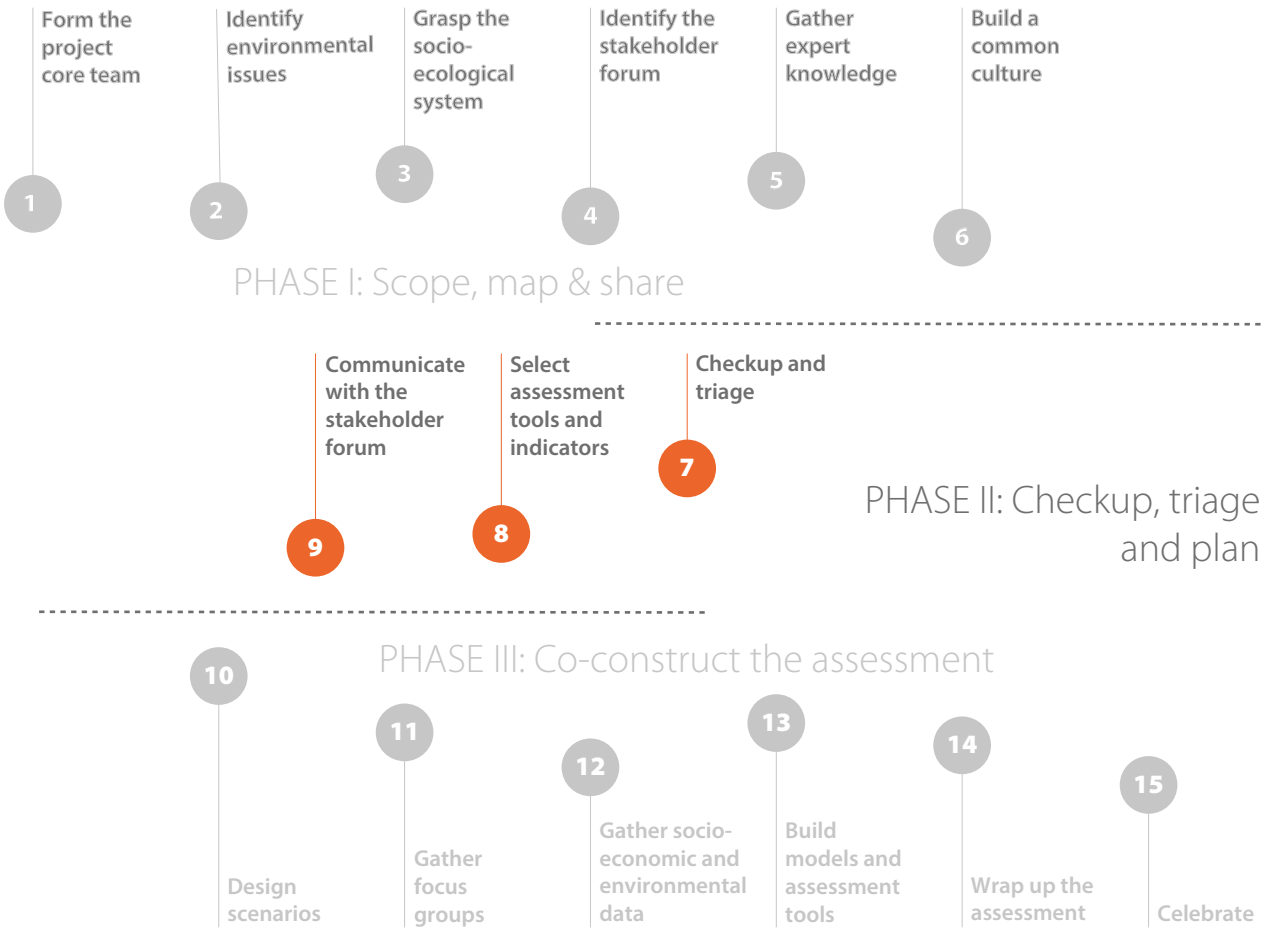
The previous phase (PHASE I – Scope, Map and Share) of the roadmap is fundamentally a brainstorming process. It leads to a broad qualitative range of issues that the stakeholder forum would like to address.

The shared exploratory process can be exciting in terms of collective energy and open possibilities. However, this may raise unachievable expectations within the stakeholder forum. This concern needs to be addressed through clear communication to the stakeholder forum after the completion of a refined TRIAGE process.

At the end of each mapping and scoping cycle, within the core project team or with the stakeholder forum, various checks should be made to ensure that the project is relevant to the territory and to clearly identify the objectives. This can be organised using a triage process developed by Pendleton et al.[37] in 2015 and tested in the six case studies of the VALMER project.

Keep objectives throughout the assessment process

The following TRIAGE check-ups descriptions are principally an excerpt of the Pendleton et al. publication: "A triage approach to improve the relevance of marine ecosystem services assessments." [37].



Case Studies

Management of activities affecting seagrass beds

Gulf of Morbihan, France

In the Gulf of Morbihan (France)[3], the VALMER project tested if an ecosystem services assessment of the seagrass beds in the Gulf of Morbihan could support the management of these ecosystems[38]. The core team of the project, consisting of a strong partnership between local managers and a scientific team, identified through the preliminary TRIAGE that the objective was "raising awareness".

The core team ran an ecosystem services assessment, however, there was little available data for these local seagrass beds. Different ecosystem services were identified but few could be quantified. In particular, the identified services were mainly regulating and cultural services which were difficult to assess in the realm of the project.

To follow its objective of raising awareness, the core team strongly engaged local stakeholder through interviews, questionnaires, focus group meetings, common culture workshop, scenario workshop and produced different communication products: booklets, cartoons… A final event gathered more than 125 stakeholders around the issue of seagrass management.

During the project, a marine management plan for the Gulf of Morbihan was being revised. The core team expected the project outputs to be taken into account by the policy makers, thus deviating from the initial objective of "raising awareness" to the level of "designing policy options". However, the policy makers did not explicitly embrace the adaptive management that had been devised in the project.

Following this drift in the project, the research team finished the project with a feeling of not having accomplished their objectives not realizing that they had shifted their expectancies to "a fully documented and advocacy ecosystem services assessment for seagrass beds and support of policy making".

However, four years later, feedback from the local environmental managers was that the VALMER project had had a very strong impact on the territory, that most stakeholders had heard about it, that several monitoring and management actions had been undertaken around the seagrass beds. And that even though the policy plan had evolved little around the seagrass beds, the project had made the territory highly aware of the importance of this sensitive ecosystem.

STEP 7 Checkup and triage

Based on the material and knowledge gathered in the first steps of the roadmap, the TRIAGE process calls for an initial verification of the need for and scope of an environmental assessment. Following this process, the core team decides on the issues that the project will address and its objectives.

Checkup 1. For which purposes is an environmental assessment needed in the area?

This question focuses on the operational needs of stakeholders who are considering using an environmental assessment. The following list of possible objectives can help prioritise project actions.

1. **Informative uses,** such as knowledge improvement, knowledge integration, initial diagnosis of key environmental issues in the area, and raising awareness.
2. **Decisive uses**, such as anticipating future changes, facilitating trade-offs, and comparison of management options.
3. **Technical uses,** i.e. mainly the design of management options.

During the course of the project, the team may be tempted to deviate from the objectives set. For example, a shift from the objective "Improve and integrate knowledge" to the objective "Design management options" may occur when developing tools. However, this may not be accepted by managers or the stakeholder forum if it has not been agreed beforehand.

Checkup 2. What are the most important environmental issues?

For this check, prioritise the different management or policy issues and opportunities identified during the process.

Checkup 3 Which parts of the case study's socio-ecosystem are concerned by these environmental issues?

Verify that the conceptual mapping represents all the concerned parties in the socio-ecosystem in relation to the environmental problems and management strategies identified.

The following stages of TRIAGE refine the scope of the assessment, identify the potential of management actions and test those with the greatest potential for effectiveness and likelihood of implementation.

Checkup 4. What is the potential for the status or value of the targeted ecosystem functions and services to change?

This checkpoint may seem obvious, but experts and stakeholders sometimes focus on ecosystem functions or services that are highly relevant to a specific issue but have very little potential for change and therefore should not be addressed by a management strategy.

Checkup 5. How do the envisaged interventions influences these changes?

This is a check on the effectiveness of potential strategies to change the targeted ecosystem services. If the potential for change is low, the strategy may not be adopted by policy makers.

Checkup 6. Which other factors affect the status and value of the considered functions and ecosystem services?

This question aims to test the influence of wider social, economic and environmental factors on the issues being targeted and how the strategies designed fit with external factors or established policies. For example, the implementation of an environmental strategy may run counter to policy at national or European level and therefore be very difficult to implement.

Case Studies

TRIAGE process applied to ecosystem services assessments

Examples of VALMER case studies across the Channel

Example of Checkup 1: For which purposes is a environmental assessment needed in the area? Priorisation in the VALMER project case studies.

Expected uses of marine ecosystem service assessment	Golfe Normand-Breton	Parc Naturel Marin de la Mer d'Iroise	Golfe du Morbihan	Poole Harbour	North Devon	Plymouth Sound-Fowey
Improve knowledge		2	2	1	3	3
Integrate knowledge	2		2			
Initial diagnosis	1				2	
Raising awareness	2		1	3	3	1
Anticipating future changes	1					3
Facilitate trade-offs	2	3	3			
Designing management options	2		3	2	1	
Compare management options		1				2

1 = main purpose ; 2 = secondary purpose ; 3 = complementary purpose

Checkup 4, 5 & 6: *Criteria for scoring marine environmental services (ES) in the TRIAGE process*

Usefulness of ES assessment	Potential for ES value to change	Influence of management on ES	Other factors affecting ES
High	Service is sensitive to impacts and value change will be large	Management will have a large influence on value, a strong probability of coming into effect and is locally driven	Local environmental factors have the strongest influence on value
Moderate	Service is sensitive to impacts and value change will be small OR Service is robust and value change will be large	Management will have a large influence on value and at least a reasonable probability of coming into effect, but is not locally driven OR Management will have a moderate influence on value, at least a reasonable probability of coming into effect and is locally driven	Other factors (social, economic, political, global environmental change) have a similar influence on value to that of local environmental factors
Low	Service is robust and value change will be small	Management will have a small influence on value and/or a low probability of coming into effect	Other factors have the strongest influence on value

Pendleton L, Mongruel R, Beaumont N, Hooper T, Charles M (2015) A triage approach to improve the relevance of marine ecosystem services assessments. Mar Ecol Prog Ser 530:183-193.

STEP 8 Select assessment tools and indicators

From participatory issue identification to participatory modelling

Phase I of the roadmap results in a co-constructed diagnosis of needs and opportunities that includes: identified and prioritised problems, identified project objectives, and conceptual maps and knowledge elements.

At this stage, a number of pitfalls need to be circumvented for this Science-Policy-Society integration to succeed. Modelling or analytical tools cannot explain all the complexity of the different issues, especially with the time and resources available for a single project. Moreover, the time needed for research on such complex socio-environmental issues often does not match the urgency of the political agenda. For this reason, it is really important to build a strong partnership between science, management and policy to mitigate the impacts of different agendas and short-term research projects.

At this stage, it is essential to stick to the objectives identified in the first step. If, for example, the objective was to raise awareness or integrate knowledge, the models should not be expected to address the testing of management options. This should be made clear to the stakeholder forum along with the questions ultimately selected.

On the modellers' side, science should be wary of trying to explain all the complexity through a model or imposing scientific perspectives due to the design limitations of the available numerical models.

As the complexity of most of the issues under consideration is generally high, participatory modelling should not aim at building a model from scratch trying to optimise a solution by representing the full complexity of social-ecological systems. To support policy and decision-making, the role of participatory modelling is to provide a set of tools - conceptual and numerical models, bio-physical assessments, socio-economic assessments, scenarios - that have been co-constructed with a forum of stakeholders and that will support deliberation for management and decision-making.

The final checks in the TRIAGE process will be particularly relevant in selecting methods, models, tools and means of evaluating potential environmental management strategies.

Checkup 7. What indicators and metrics would be meaningful in terms of the drivers of change to be addressed?

This question is to identify a set of indicators or metrics describing changes in biophysical aspects or social perceptions that would best inform policy decisions or management actions. These indicators and metrics should be chosen or at least tested with the stakeholder forum, they are an important part of the common culture and will form the basis of the assessment results and outputs. They should be meaningful to the target audience of the assessment.

Checkup 8. Which methods and tools could be used to obtain such metrics?

The methods, models and tools chosen will depend on the purpose of the assessment, the stage of the management process it is intended to support, and the degree of confidence stakeholders and decision-makers have in the results of different methodologies. Broad objectives associated with the early stages of management, such as initial diagnosis and policy design, may require broad-based assessment methods, while more operational objectives, such as comparing management options, may require more focused methods[37].

Checkup 9. Is the envisaged assessment method feasible?

Finally, the cost in time and money of developing and operating the various modelling and

Case Studies

Example of Checkup 4, 5 & 6: Scores assigned for ecosystem services (ES) affected by kelp harvest in the Iroise Marine Natural Park (PNMI). Scores assessed the usefulness of carrying out an assessment and were assigned as follows: 3 = high, 2 = moderate and 1 = low use- fulness. See Table 2 for criteria for scoring

ES Category Specific ecosystem functions and services	Potential for ES value to change	Influence of manage-ment	Other factors	Final score
Provisioning services				
Food provision				
Abalone commercial fisheries	2	3	2	2.3
Commercial fin fisheries (pollock and seabass)	1	2	3	2.0
Lobster commercial fisheries (fish pots)	1	1	3	1.7
Kelp used in alginates for food industry	3	3	1	2.3
Aquaculture				
Biotic materials and biofuels				
Biofuel				
Crop fertilizer and pest management	3	2	1	2.0
Kelp used in alginates for other industries	3	3	1	2.3
Medicinal uses (non alginate)	2	1	3	2.0
Cosmetic uses (non alginate)	2	1	3	2.0
Disservice: Bycatch (*Saccorhiza polyschides*)	2	2	2	2.0
Maintenance and regulation services				
Coastal protection				
Natural coastal defense	2	2	1	1.7
Ocean nourishment				
Strong primary productivity	2	2	1	1.7
Life-cycle maintenance				
Improvement of kelp resilience	2	2	2	2.0
Key habitats that support a strong biodiversity:	2	3	1	2.0
for commercial fishes	1	2	3	2.0
for abalone	2	3	2	2.3
for European lobster	1	1	3	1.7
for bottlenose dolphins	2	2	2	2.0
for grey seals	2	2	2	2.0
for seabirds	2	2	2	2.0
Cultural services				
Symbolic and aesthetic values				
Traditional activity	3	1	2	2.0
Charismatic seascape	2	2	1	1.7
Charismatic species	2	3	1	2.0
Recreation and tourism				
Recreational fishing (shellfish, crustaceans and finfish)	3	2	1	2.0
Boating	1	1	2	1.3
Kayaking	1	1	2	1.3
Sealife watching (ecotourism)	2	3	2	2.3
Cognitive effects				
Material for research	3	2	1	2.0
Material for arts	1	1	3	1.7
School excursion / awareness campaign	2	1	3	2.0

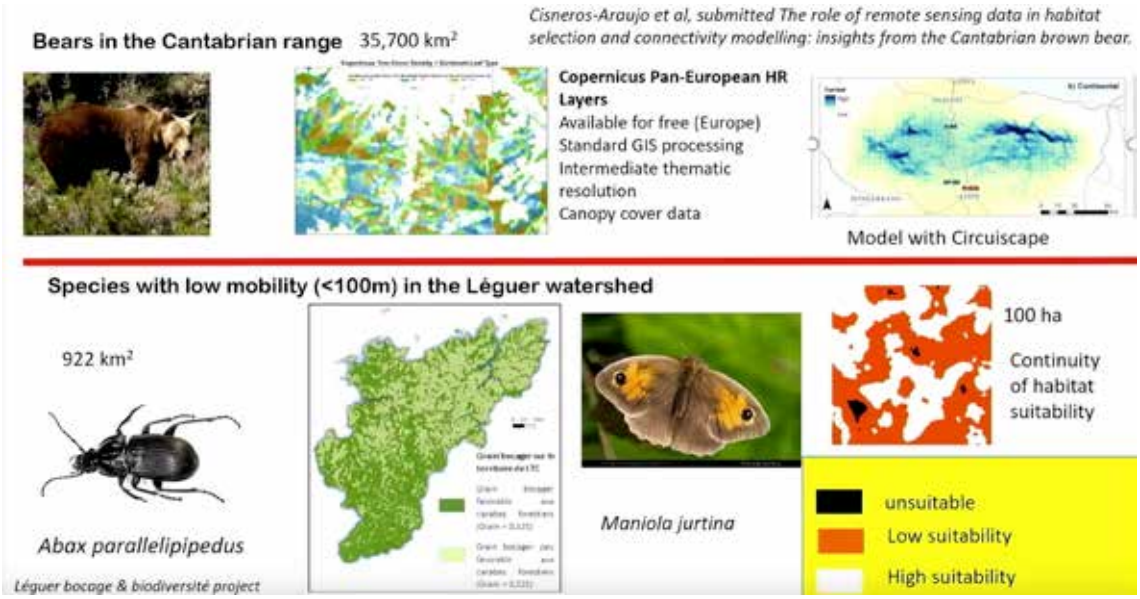
ES with highest score ES with second best score and targeted by PNMI Management Plan
Moderate score Lowest score

Pendleton L, Mongruel R, Beaumont N, Hooper T, Charles M (2015) A triage approach to improve the relevance of marine ecosystem services assessments. Mar Ecol Prog Ser 530:183-193.

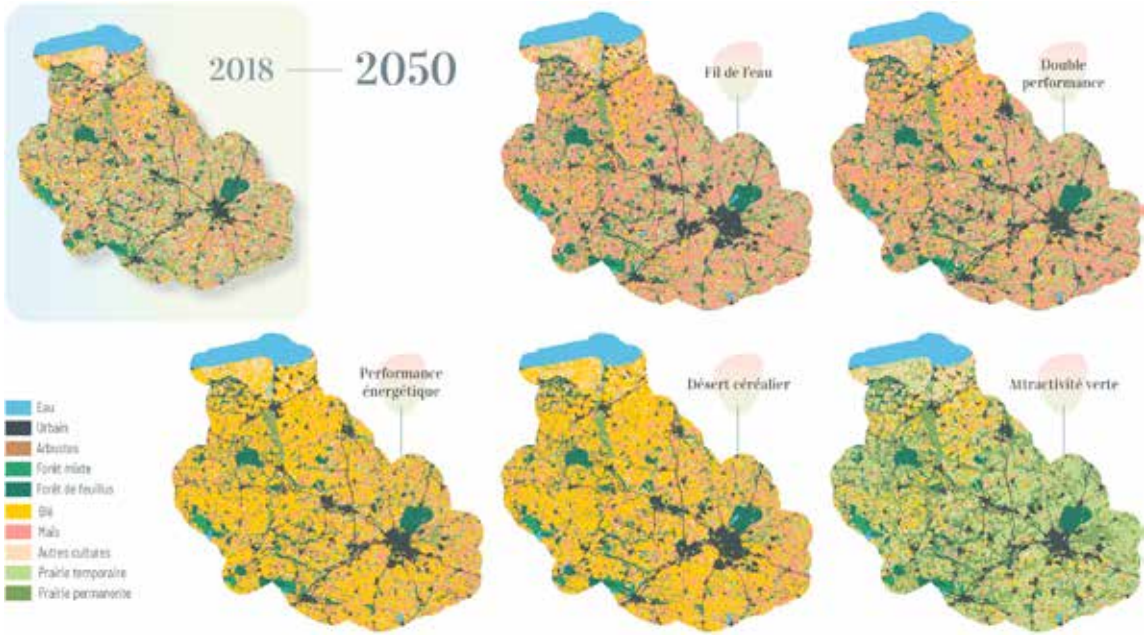
assessment tools needs to be assessed, and some choices will need to be made.

The questions that have been prioritised during the brainstorming process with the stakeholder forum may not be in the area of expertise of the scientific team involved in the project or the science on these questions may not be sufficiently advanced to make the assessment.

In this case, the core team can either choose a less important issue in which it has expertise, with a clear explanation to the stakeholder forum. Alternatively, the core team may decide to assess the priority issue and call in external experts. This will depend on the level of expertise needed within and outside the core team.



Exemple of model results and biodiversity indicators,
extract from J. Baudry presentation in ALICE final congress



Exemple of model results from the ALICE Couesnon case study from "Couesnon 2050 : Evolutions des paysages & impacts possibles sur la biodiversité et les ressources en eau", 2021
www.sage-couesnon.fr

Case Studies

Newsletters

Pas, Miera y Ason, Spain

BOLETÍN INFORMATIVO

Cantabria

¿POR QUÉ UN BOLETÍN INFORMATIVO DEL PROYECTO ALICE EN CANTABRIA?

by IH Cantabria

El Proyecto ALICE, como muchos ya sabéis, tiene como principal **objetivo** promover inversiones sostenibles en **soluciones basadas en la naturaleza** a través de la identificación y restauración de Servicios Ecosistémicos y sus beneficios para la sociedad. Es un proyecto financiado en el 75% por el Fondo Europeo de desarrollo regional (FEDER) bajo el paraguas de INTERREG Área Atlántica.

En España, el caso de estudio seleccionado se sitúa en Cantabria y abarca tres cuencas fluviales: Pas, Miera y Asón, incorporando las zonas terrestre, fluvial y estuarina. Las tres son cuencas atlánticas que drenan en el mar Cantábrico una superficie total de 1737 km².

Este boletín pretende difundir conocimientos y recursos de utilidad para que vosotros, agentes clave del territorio de Cantabria, podáis tomar parte a lo largo del proyecto en los distintos talleres de trabajo y encuentros que están previstos contando con cierta información previa que os ayudará a entender sus desarrollos y aportar las mejoras pertinentes.

Pinchando aquí tendrás acceso a la web del proyecto y a toda la información generada

NOMENCLATURA

Este apartado tiene como finalidad la familiarización con conceptos clave del proyecto, explicados con un lenguaje divulgativo que permita analizar y debatir ideas partiendo de conocimientos mínimos, sea cuál sea nuestra profesión y nuestro nivel desde el punto de vista científico. Para el primer número del Boletín Informativo del Proyecto ALICE en Cantabria, hemos elegido los conceptos de **SERVICIOS ECOSISTÉMICOS** y **SOLUCIONES BASADAS en la NATURALEZA**.

Los **SERVICIOS ECOSISTÉMICOS** son los muchos y variados beneficios que los humanos obtienen libremente del entorno natural y de los ecosistemas. Esos ecosistemas incluyen, por ejemplo, agroecosistemas, ecosistemas forestales, pastizales y sistemas acuáticos. Colectivamente, estos beneficios son conocidos como "servicios de los ecosistemas", y a menudo son parte integral del abastecimiento de agua potable, la descomposición de los desechos y la polinización natural de cultivos y otras plantas.

Las **SOLUCIONES BASADAS en la NATURALEZA (SbN)** son un concepto nuevo que abarca acciones que se apoyan en los ecosistemas y los servicios que estos proveen para responder a diversos desafíos de la sociedad como el cambio climático, la seguridad alimentaria o el riesgo de desastres. Las SbN se pueden considerar como un concepto paraguas que incluye una serie de enfoques diferentes como la *Adaptación Basada en Ecosistemas*. Estos enfoques nacen de distintas disciplinas, pero comparten un mismo interés en utilizar las funciones de los ecosistemas para resolver los problemas que enfrentamos en lugar de depender solamente en soluciones convencionales.

Si quieres saber más, pincha aquí

dos ámbitos en los que es necesario llevar a cabo actuaciones que los contrarresten.

En el siguiente video de la UICN (Unión Internacional para la Conservación de la Naturaleza) se explica muy claramente.

ALICE AL DÍA

El día 27 de marzo de este año 2019 se celebró en las instalaciones del IH Cantabria el primer Workshop, o taller, del proyecto ALICE en Cantabria. Durante el mismo, hubo espacio para el debate abierto entre los agentes locales, se elaboró un análisis DAFO (Debilidades-Amenazas-Fortalezas-Oportunidades), simplificado de manera colectiva, y se realizó una tormenta de ideas con el fin de identificar los factores más relevantes que afectan en la actualidad a las cuencas del Pas, Miera y Asón. De este taller se extrajeron varias conclusiones que nos han permitido reajustar nuestra percepción sobre el territorio, por lo que agradecemos a los asistentes sus muchas y buenas ideas para seguir trabajando.

¿SABÍAS QUE...?

Aunque gran parte de la ciudadanía no está familiarizada con ellas, las **Soluciones Basadas en la Naturaleza** pueden ser muy útiles para mitigar los impactos derivados del cambio climático y muchos otros problemas que sufrimos en la actualidad. Las inundaciones y los incendios, dos eventos con grandes repercusiones negativas para la sociedad, cada vez más frecuentes en el territorio regional, son buenos ejemplos de

De hecho, este boletín informativo surge como respuesta a alguno de los retos allí planteados, principalmente el de implicar a todos los agentes que sea posible y divulgar conceptos y conocimiento relacionados con el proyecto. Por ello nos gustaría poder contar con vosotros en futuros talleres (el próximo está previsto para marzo del 2020) en los que desarrollar conjuntamente nuevas

2

y valiosas aportaciones. Os iremos informando a través de sucesivos números de este boletín.

Actualmente, estamos trabajando en desarrollar modelos sobre el funcionamiento de distintos componentes de las cuencas de estudio. Entre otros, los caudales, las dinámicas de la cobertura vegetal, la biodiversidad fluvial, la calidad de las aguas o los usos del suelo. De ese modo, podremos hacer proyecciones para saber cuál será su evolución de aquí al año 2050 y qué estrategias de gestión serán las mejores para afrontar los efectos del cambio climático.

CASOS DE ESTUDIO

Para que podáis ampliar vuestras referencias en lo que se refiere a servicios ecosistémicos, en este apartado os vamos a recomendar algunos proyectos muy interesantes acerca de la implantación de infraestructuras verdes y azules:

El Anillo Verde de Vitoria-Gasteiz es uno de los ejemplos de infraestructura verde urbana más conocidos en España

Pincha aquí para saber más sobre la experiencia de Vitoria

Cuenca del río COUESNON en Francia, que es uno de los casos incluidos en ALICE por parte de nuestros socios franceses

Pincha aquí para saber más sobre la experiencia del río Couesnon

HEMEROTECA

Aquí os ofrecemos el enlace (pinchando en la noticia) a algunas noticias que están relacionadas con los objetivos del proyecto y que hemos recopilado procedentes de distintos medios de comunicación:

3

- "El municipio afectados por las inundaciones en Cantabria y casi 80 personas evacuadas". DIARIO ALERTA, 24 de enero de 2019
- "Restauración del cauce del Arga en Funes para evitar el riesgo de inundación". NOTICIAS DE NAVARRA, 30 de noviembre de 2018
- "El Asón se desborda y anega el centro de Ampuero y el polígono industrial de Marrón" EL DIARIO MONTAÑÉS, 25 de enero de 2019

II Workshop del Proyecto ALICE en Cantabria	Marzo de 2020
III Workshop del Proyecto ALICE en Cantabria	Junio de 2020
Congreso Internacional ALICE con todos los socios europeos	Septiembre de 2020

ENLACES DE INTERÉS

A continuación, hemos seleccionado algunos documentos para que podáis profundizar en distintas estrategias públicas para potenciar los servicios ecosistémicos a través del fomento de infraestructuras verdes y azules:

- Estrategia Estatal de Infraestructura Verde y de la Conectividad y Restauración Ecológicas
- Plan Director de la Infraestructura Verde de Zaragoza
- Conclusiones Grupo de Trabajo de Infraestructuras Verdes y Azules del Congreso Nacional de Medio Ambiente (CONAMA) 2014

CALENDARIO PREVISTO

A lo largo de 2020, además de nuestra labor científica, vamos a desarrollar diversas actividades en las que nos gustaría contar con tu presencia. Aunque aún no disponemos de las fechas exactas, queremos que dispongas de la información para que vayas haciendo hueco en tu agenda:

4

STEP 9 Communicate with the stakeholder forum test

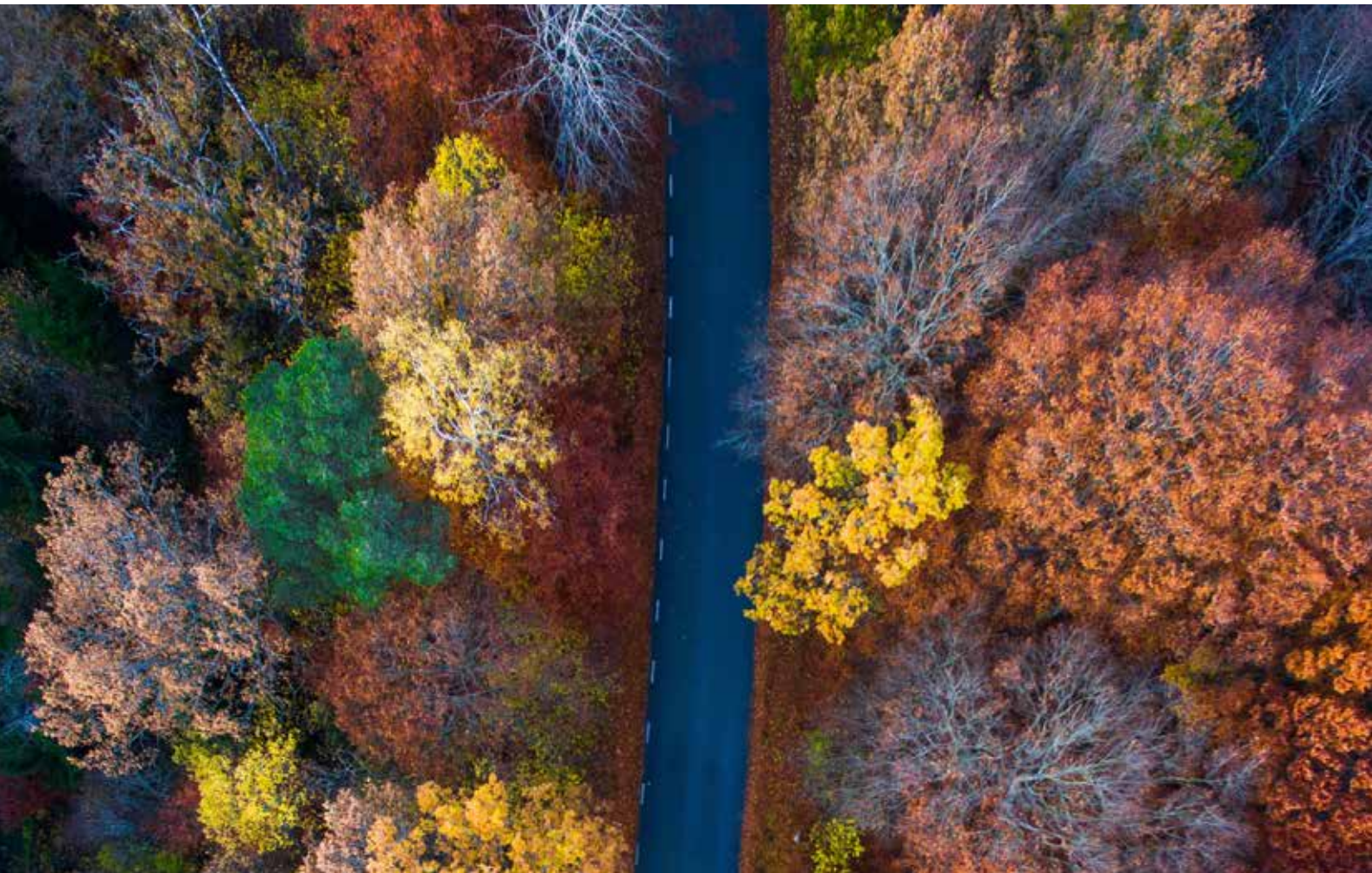
After this refined TRIAGE phase, it is essential to communicate the results and identified choices to the stakeholder forum with an explanation of why these choices have been made.

It is also important to give feedback to the stakeholder forum on the first common culture workshop. This feedback is a delicate task, the common culture workshop often provides abundant brainstorming material, and some material might be sensitive and should not be communicated to a wider public.

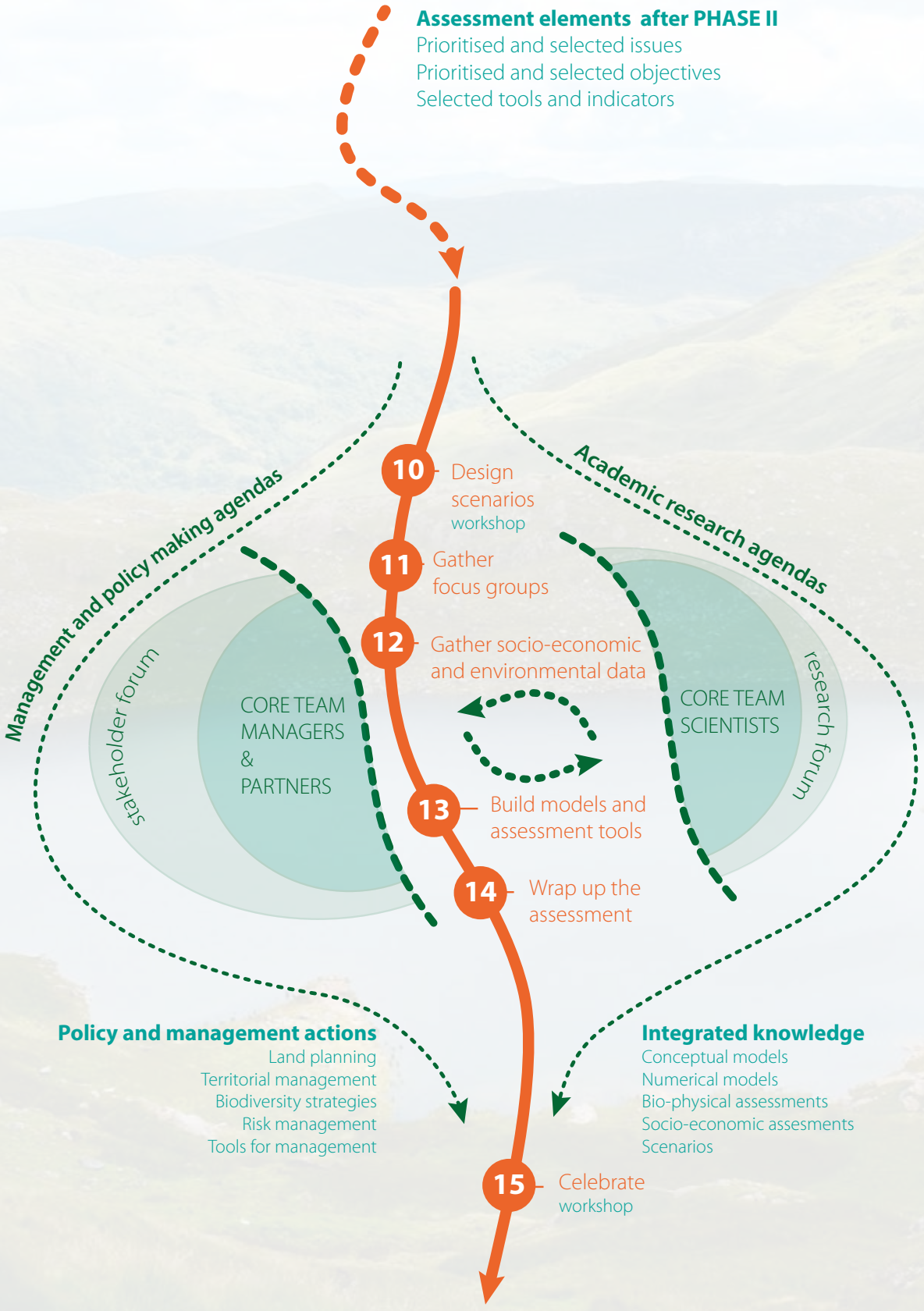
A possible feedback format could be articulated around:

- A reminder of the assessment concepts and common culture vocabulary
- The list of issues prioritised during the workshop
- The final choice of issues to be tackled by the project and selected through the TRIAGE process, supported by an explanation of these choices.
- The next steps planned for the engagement of the stakeholder forum, announcement of the following workshop (a date need not necessarily be set at this stage).

A newsletter type communication or web forum discussion can be set up to keep the momentum of the engagement and provide elements of discussion.



ROADMAP TO A PARTICIPATORY ASSESSMENT - PHASE III



2.3 PHASE III: Co-construct the assessment

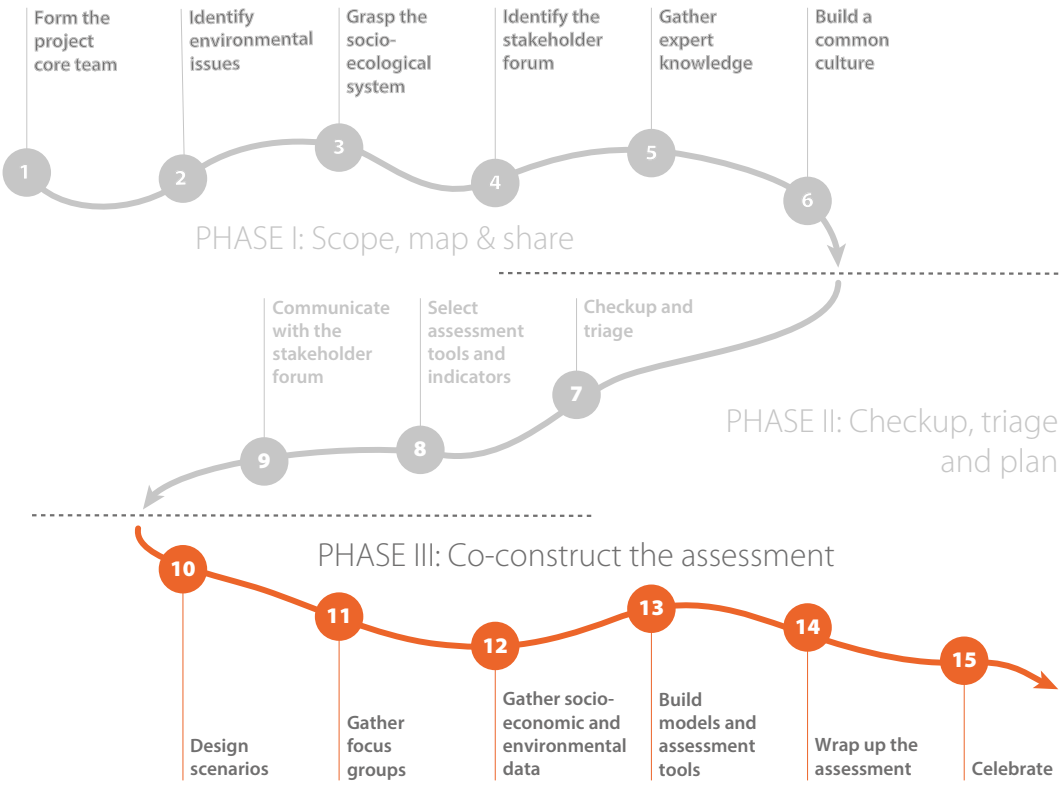
Meshing models and stakeholder engagement

In this chapter, we explore the most sensitive part of a participatory assessment: the moment when tools and models come into play. At this stage, researchers and stakeholders tend to part ways and go back each to their sectorial activities. We propose here a methodology to keep the assessment process participatory throughout, thus enhancing collective knowledge and ensuring the legitimacy of the assessment.

In 2016, the IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services)[27] delivered three high-level messages on the use of scenarios and models, the first one being that "Scenarios and models can contribute significantly to policy support, even though several barriers have impeded their widespread use to date." They highlight that there is: "insufficient involvement of, and interactions between, scientists, stakeholders and policymakers in developing scenarios and models to assist policy design and implementation."

In 2023, Elsawah et al.[16] discuss the needed competencies in Participatory Modelling and observe that "because of the broad theoretical and methodological basis on which Participatory Modelling can be grounded, there is no specific blueprint of what Participatory Modelling may look like".

Throughout this chapter, we stress how modelling to support environmental management needs to be highly adaptive, and interlock at different levels with stakeholder engagement as well as employ a variety of tools to offer efficient Deliberation Support Tools for decision-making.



Case Studies

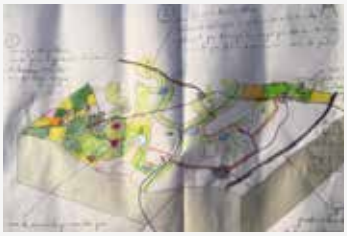
Scenario co-construction with a stakeholder forum

Couesnon river watershed, France

In the ALICE Couesnon case study[2], two stakeholder workshops were dedicated to scenario development to feed the land use model.

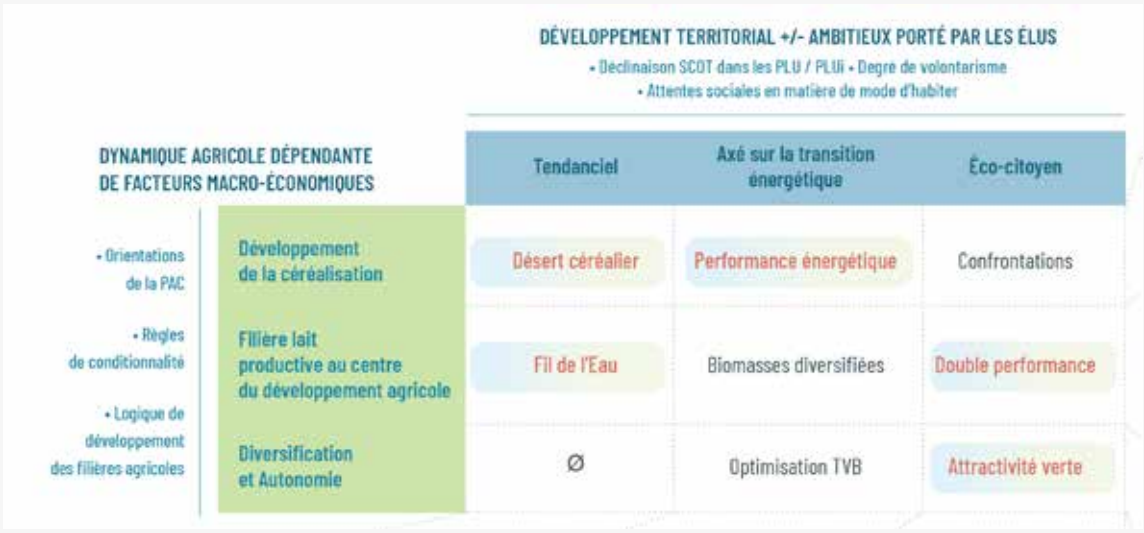
In a first half-day workshop, the stakeholder forum was asked to investigate ecosystem services linked to Blue and Green Infrastructure Networks in the territory.

In a day long workshop, a month later, five scenarios had been prepared by the scientific team from the material of the first workshop. The stakeholders were asked to work in groups on each scenario linking hypothesis about agricultural and territorial development. Different steps were proposed:



- write the scenario's general philosophy
- reflect on how agriculture and territorial development can interact (or not) in the management of BGIN
- translate the results of these interactions into drawings, where BGIN elements are represented on diagrams and maps of the watershed

Among these possible scenarios, five were selected as the most tested ones to draw the boundaries of possibles implications for ecosystems services. The scenarios were then presented to the stakeholder forum in the form of stories, maps and simulation results in order to refine and validate the scenario assumptions.



Couesnon 2050 : Evolutions des paysages & impacts possibles sur la biodiversité et les ressources en eau, 2021
www.sage-couesnon.fr

STEP 10 **Build scenarios**

The scenario guidelines that are presented here were developed during the Interreg IV A Channel VALMER project by Herry et al.[25] and supplemented by the IPBES assessment of scenarios and models[27]. Scenarios can be built either as a stand-alone participatory assessment process, or to feed into model development. They can also be used in parallel with model development.

For participatory scenario building, stakeholders can be involved in building the pathway to possible outcomes or in developing "scenarios". Scenario building is an effective engagement tool that is best developed in workshops with stakeholders.

The method is simple: it invites the 'audience' to react to a plausible set of future events, or to construct these events themselves, and then to test them against a series of criteria.

The criteria may be, for example, the degree of realism, the effectiveness of achieving an outcome or the consideration of all factors. The audience may wish to introduce their own criteria as they develop their scenario. The initial hypothetical scenario can then be translated into a scenario that represents a situation that can be achieved in reality by putting in place a series of policy decisions or actions. In this way, it is possible to make the scenario process results-oriented, which is an important driver for any participatory activity.

Scenario building can be a very flexible and adaptive process, in that it can be used to develop new ideas from a very basic starting point or to take up and improve existing ideas. It is an effective way of moving from a theoretical framework to policy development.

We present here what we mean by “scenario”, a typology of scenarios and tools for scenario building.

What do we mean by “scenarios”?

According to a review of scenario planning and their effectiveness (Cordova Pozo, 2023), scenarios can be defined as a set of narratives describing different alternative futures, constructed with an iterative approach based on the uncertainties of the context, with the aim of raising awareness of plausible futures and increase performance of the organisation. They are designed to systematically explore, create and test possible and/or desirable future conditions[27].

Scenarios are a useful tool, often used to address complex management issues (e.g. environmental management, climate change, urban planning, etc.). Transdisciplinary and collaborative scenarios can support community-based management.

They offer a number of advantages. They make it possible to:

- Combine qualitative and quantitative information
- Identify uncertainties and gaps in knowledge
- Organise and interpret our thinking about the future
- Help us understand how to create the conditions in which the desired future can be achieved
- Support decisions that are more likely to be implemented successfully
- Generate long-term policies, strategies and plans

Scenario-building exercises can help people to process and interpret complex knowledge and information associated with multiple issues. Scenarios are also useful tools for creating a range of possible futures by combining different elements in different ways. Typically, many scenarios are developed in parallel (for example, 3 or 4 narrative stories).

Different types of scenarios

There are three major types of scenarios: exploratory, normative and predictive scenarios. They can take many forms: a narrative story consisting of a few lines of text to many pages,

with maps, graphics, drawings, pictures, etc. Models and/or simulations can also either accompany scenarios or test them.

- **Exploratory scenario: What might happen?**

The exploratory scenario describes events and trends as they could evolve based on alternative assumptions on how these events and trends may influence the future. They provide several plausible futures that include external factors (the ones we do not have any influence on) and internal factors (elements it is possible to affect).

- **Normative scenario: How can a specific target be reached?**

Normative scenarios explore the pathways that need to be taken to reach a desirable future situation or target. Normative scenarios are very effective for decision support, as they permit the exploration of strategies to achieve the desired objective[46]. This objective can be considered as the vision for the future.

- **Predictive scenario: What will happen?**

The predictive scenario attempts to predict the future at a given date. It is based on science and probabilities. The usefulness of such scenarios is to facilitate the planning and adaptation to situations that are expected to occur. Predictive scenarios are mainly based on modelling and try to calculate the most probable evolution of a situation under certain conditions. It is often used by managers to anticipate the question "What...if...?"

Sometimes different types of scenarios can be also combined. This is the case, for example for the Intergovernmental Panel on Climate Change (IPCC) scenarios on climate change, which are both exploratory and predictive scenarios.

The predictive models developed in the case of predictive scenarios can be used to explore two other types of scenarios [27]:

- "policy-screening scenarios", also known as "ex-ante scenarios", which represent various policy options under consideration.
- "retrospective policy evaluation" (also known as "ex-post evaluation"), where the observed trajectory of a policy implemented in the past is compared to scenarios that would have achieved the intended target.

Participatory building of scenarios

The scenario building process involving stakeholders is a way to:

- Better understand longer-term issues.
- Develop perspectives together on possible futures (exploratory scenarios).
- Compare these perspectives and choose the best one.
- Develop an action plan (normative scenario).
- Inform decisions and actions that need to be taken to achieve the desired future.

The scenario building process can take several months but can be longer or shorter depending on the methodologies chosen, resources available and the required level of stakeholder participation.

The aims, and consequently the type of scenarios developed, will be different depending on:

- The management question studied.
- The governance and environmental contexts of the case study sites
- The legitimacy and skills of the case study team (e.g., implementation of measures)

In this roadmap, scenario building is based on the preliminary stages of PHASE I, having a clear statement as to "why the scenario should be built" and "what participants and

those leading the process seek to achieve through it"[34].

EXAMPLES OF SCENARIO TRANSCRIPTIONS

- POSTCARDS

An imaginary postcard sent by someone to their parents explaining that due to the sea level rise, they have explored some underwater heritage (diving). The photo shows possible changes on the coastline with a city under the water.

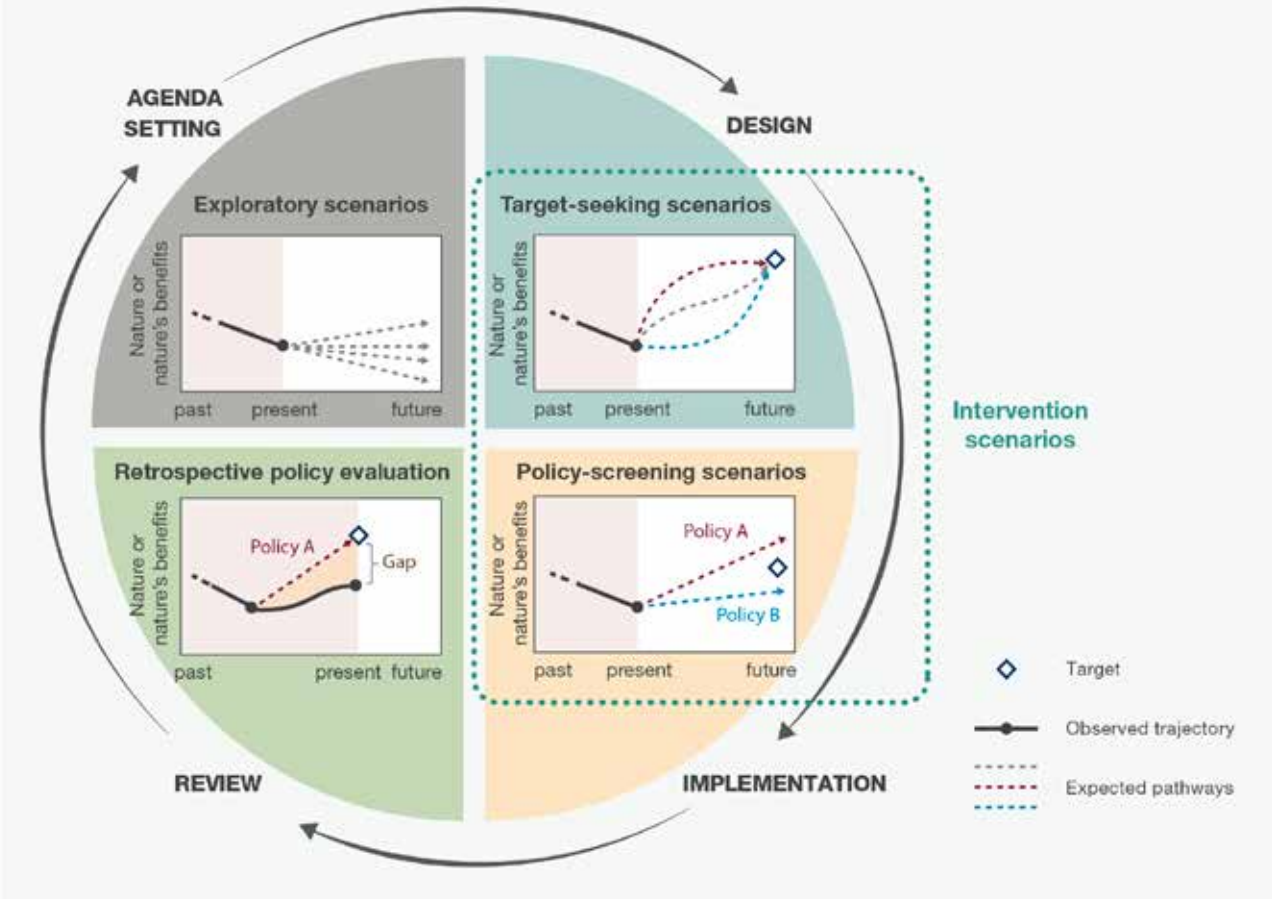
- TIMELINE

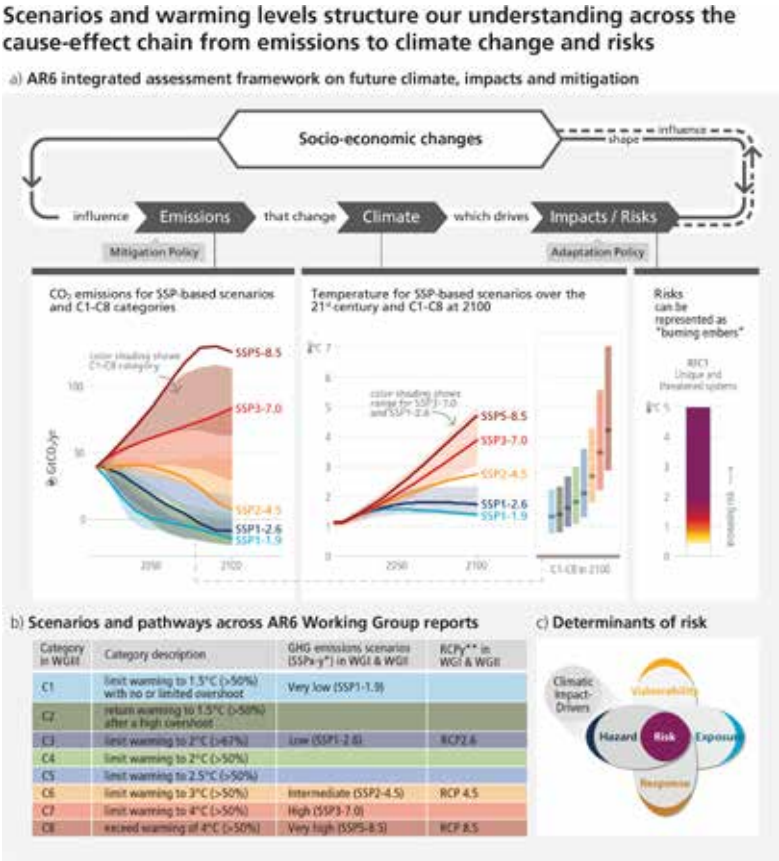
Scenario for a management plan dealing with a marine protected area and possible events.

- DRAWINGS

The designer Maxime Aubinet, a French illustrator, has developed these diagram blocks from diving observations. They illustrate the effect of anchorage on seagrass beds. More simple drawings can also be used depending on the skills in the case study team.

This figure shows the roles played by different types of scenarios corresponding to the major phases of the policy cycle. Types of scenarios are illustrated by graphs of changes in nature and nature's benefits over time. The four major phases of the policy cycle are indicated by the labels and grey arrows outside the coloured quarters of the circle. In "exploratory scenarios", the dashed lines represent different plausible futures, often based on storylines. In "target-seeking scenarios" (also known as "normative scenarios"), the diamond represents an agreed-upon future target and the coloured dashed lines indicate scenarios that provide alternative pathways for reaching this target. In "policy-screening scenarios" (also known as "ex-ante scenarios"), the dashed lines represent various policy options under consideration. In "retrospective policy evaluation" (also known as "ex-post evaluation"), the observed trajectory of a policy implemented in the past (solid black line) is compared to scenarios that would have achieved the intended target (dashed line).

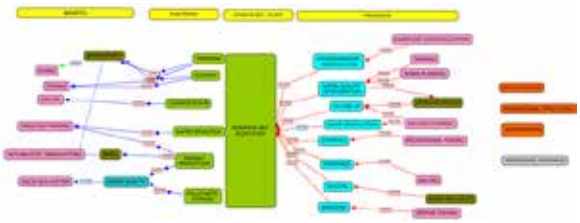




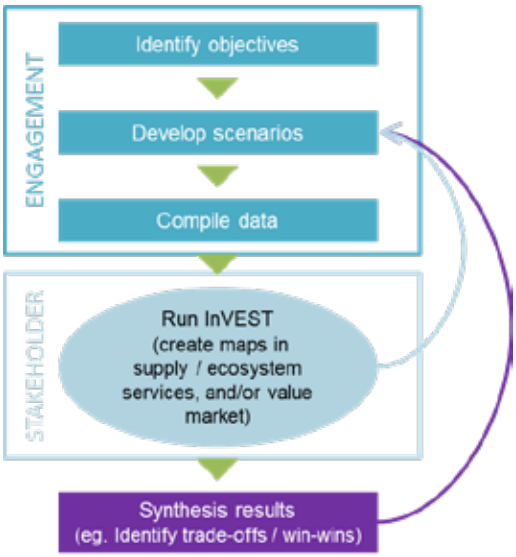
IPBES (2016) [27]

- Interviews with stakeholders and/or experts
- Stakeholders matrix
- Brainstorming
- Delphi
- Regnier's abacus
- Tools to represent the system, present and combine information, synthesize knowledge
- Ardi method
- DPSIR
- Pestle and matrices to classify the possible changes
- Bayesian analysis
- Backcasting
- Invest

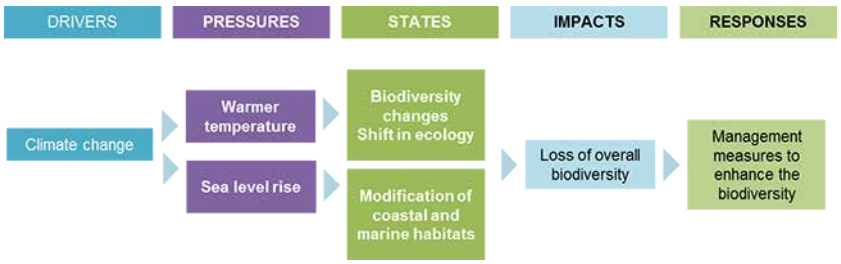
For details, find out more: https://participatory-assessment.eu/thematics/toolbox/



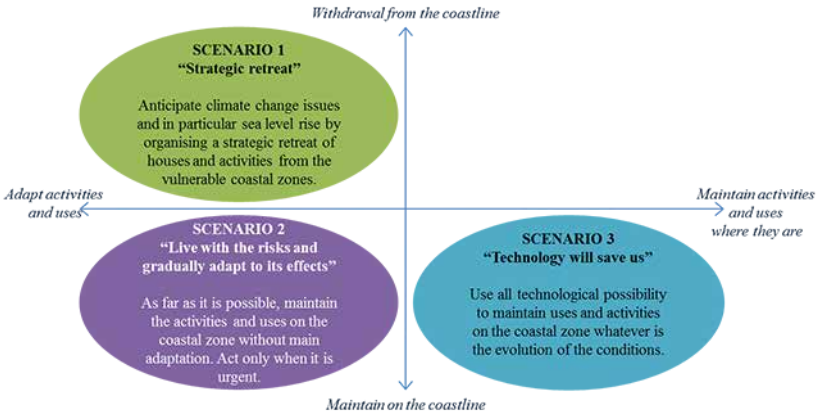
Brainstorming diagram



Invest



DPSIR



Scenario

Case Studies

Expert knowledge for management of seagrass beds

In the Interreg VALMER project[3], we tested how an ecosystem services assessment could support effective and informed management of seagrass beds in the Gulf of Morbihan, France. Seagrass beds are supposed to be among the most studied coastal ecosystems[38]. The seagrass beds in the Gulf of Morbihan are the second largest in France (metropolitan France), but no recent mapping of the extent of the seagrass beds was available, nor of the state of the beds. In particular, the potential impacts of human activities such as anchoring, oyster farming or shellfish harvesting had scarcely been assessed.

Faced with practical management challenges in an area with many marine and coastal activities, existing knowledge was not sufficient to make management decisions. Data acquired and developed in response to a specific question may not be suitable to respond to the questions.

To answer the questions raised by the project, thirty scientists from all over France were invited to share their knowledge of seagrass beds during a two-day workshop. The core team took care to invite a number of environmental managers and government officials to this focus group to keep the scientific discussion centred on management issues.

A further six focus group meetings were held with each of the main human activities that interact with seagrasses.

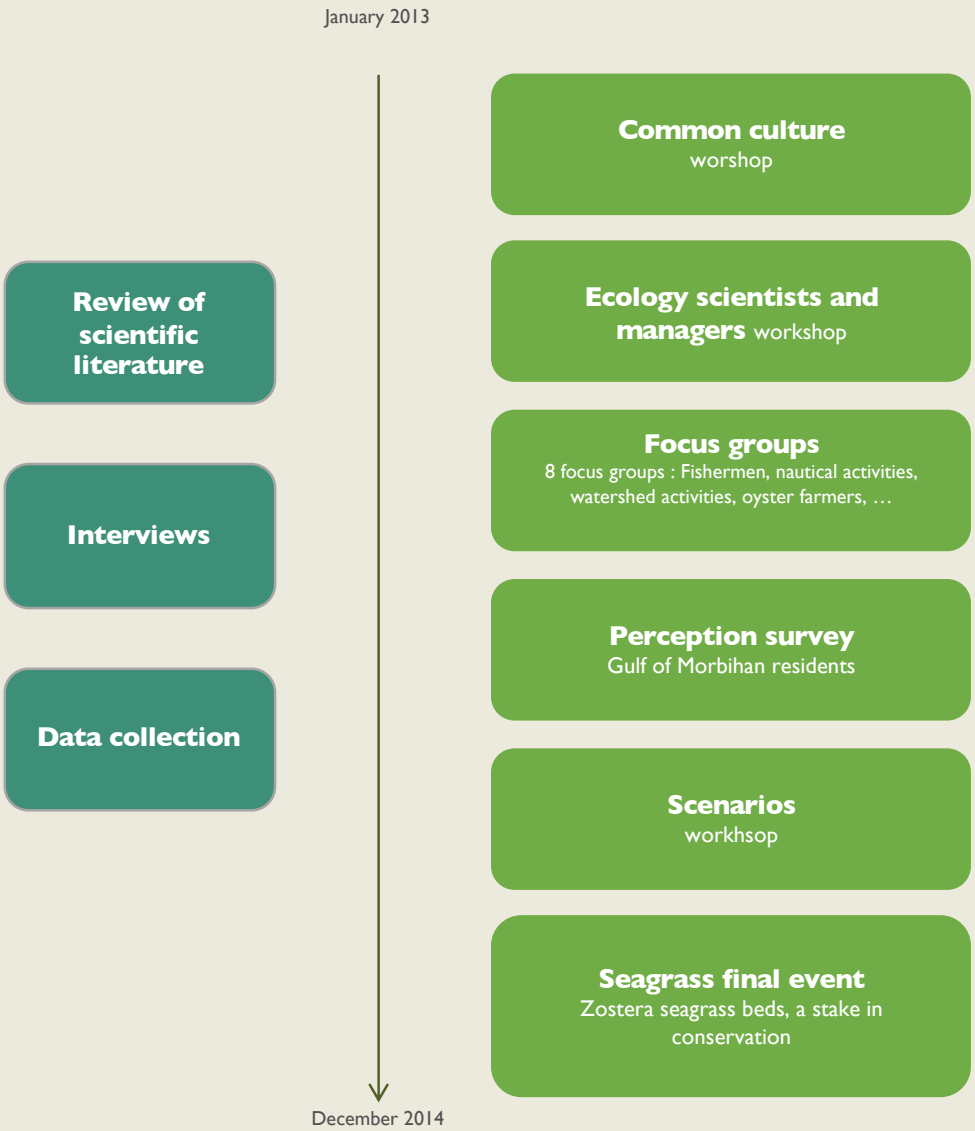
STEP 11 Gather focus groups

A focus group or discussion group is a form of qualitative research used by social sciences, but also marketing studies, which takes place among a specific group – cultural, societal or ideological – to determine the response of this group and the attitudes it adopts regarding a product, an issue or any concept.

It is a way of studying social perceptions, different from one-on-one interviews and which reveals the interaction in the group.

In the case of participatory assessment and participatory modelling, it can be a useful technique to gather stakeholders from the same sector to allow discussions that might not take place when all sectors are represented and if the considered issue raises conflicts. Furthermore, it may be more effective to work with smaller groups to involve the actors in the co-construction of the models and to go into more technical or specific details.

Data collection, knowledge sharing and participatory approach in the VALMER project, Gulf of Morbihan case study, France



Case Studies

Willingness to pay survey

Couesnon catchment, France

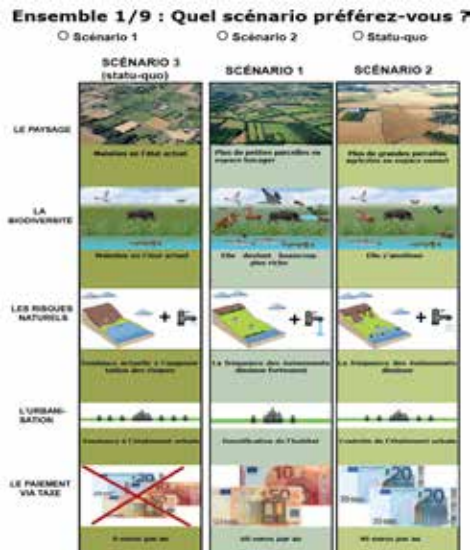
An online survey was carried out among the inhabitants of the Couesnon catchment area as part of the ALICE project.

The survey deals with 4 main issues:

- Landscape quality
- Urbanisation and artificialisation
- Natural risks and the challenge of water supply
- Protection of aquatic and terrestrial biodiversity

Local residents were invited to rank :

- Their importance to them and for the territory
- Efficiency of present public action
- Willingness to contribute to the implementation of nature based solutions through tax contributions



Biodiversity and landscapes are the characteristics of the territory that most influenced the respondents in their votes. Next came natural risks and urbanisation.

Finally, the monetary attribute is the characteristic for which people gave the least importance. 50% of the sample said they did not attach any importance to it, 20% were neutral on the subject and only 30% considered this attribute important.

The majority believe that the responsibility for environmental actions lies mainly with the public authorities (70%), including mainly public finances at the level of local authorities (41%). For a quarter of the respondents, this burden is mainly the responsibility of individuals.

Bailly D., Dao T., Graner E., (2021), Enquête à destination des habitants du bassin versant du Couesnon. Univ Brest, Ifremer, CNRS, UMR 6308, AMURE, IUEM, F-29280, Plouzane, France.

STEP 12 Gather socio-economic and environmental data

Many methods can be used to assess environmental issues. Essentially, these methods belong to either the natural or social sciences, and some of them attempt to combine concepts and principles from both fields.

Socio-economic data

It is just as important to understand the sensitivities underlying the social and economic impacts and benefits in a socio-ecosystem as it is to understand its biophysical and ecological properties.

Social-psychological approaches aim to characterize and measure the values people hold, express, and advocate with respect to changes in ecological states or their personal and social consequences.

These methods elicit value-relevant perceptions and judgments, typically expressed as choices, rankings, or ratings among presented sets of alternative ecosystems protection policies and may include comparisons with potentially competing social and economic goals.

Individuals making these judgments may respond on their own behalf or on behalf of others. The basis for judgments can be changes in individual well-being or in civic, ethical, or moral obligations.

Surveys, interviews and focus groups are typical social science methods that aim to elicit people's preferences for a given state of the environment and provide useful information about stakeholders' practices regarding ecosystems or their perceptions of possible changes and the main issues to be addressed by policy-makers.

Multi-criteria analysis techniques are often used to support decision making as they provide a formal framework in which different characteristics or options can be compared and relative preferences for them expressed, typically using weighting, ranking or scoring methods.

Behavioural observation methods elicit values information through observations of behavioural responses by individuals interacting with either actual or computer-simulated environments. Observing how the activities of people change as environmental conditions change can reveal information about the importance of these changes to these people.

Economic valuation methods seek to measure the trade-offs individuals are willing to make for ecological improvements or to avoid ecological degradation, given the constraints they face.

Trade-offs that people are willing to make are captured through the economic notion of "willingness to pay", i.e., the amount of money people would agree to pay to benefit from a given ecological improvement or to avoid some specific ecological degradation, in order to maintain a given level of satisfaction.

Willingness. To Pay can be computed using prices for some ecological services. However, most ecological services are not marketed, thus specific economic valuation methods are therefore required.

Economic valuation methods involving ad hoc studies are classified into revealed preference methods and stated preference methods.

Civic valuation seeks to measure the values that people place on changes in ecosystems or ecosystem services when explicitly considering or acting in their role as citizens.

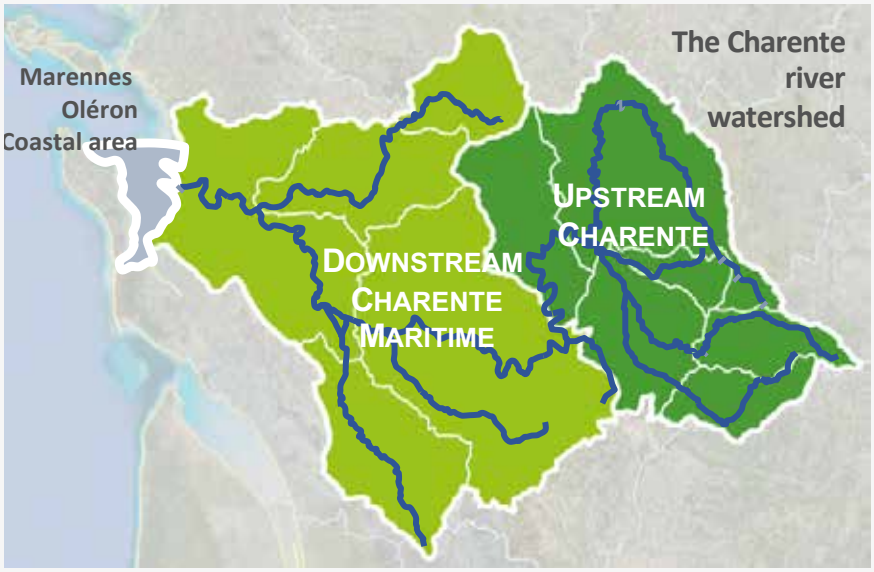
Referenda or initiatives can provide information about how members of the voting population value a particular governmental action involving the environment, given a particular means of financing the associated expenditure. Individuals may also consider what the community as a whole stands to gain or lose if the proposal is adopted.

Case Studies

Modelling water management

Charente River watershed, France

During the SPICOSA project (see https://participatory-assessment.eu/cross-thematics/spicosa/), on the Pertuis Charentais study site, we developed tools to explore management options to meet freshwater management objectives [3] [35]. A partnership was set up between a stakeholder expert group of local institutions involved in managing the Charente River catchment area and an interdisciplinary scientific group of economists, marine ecologists, modellers and agriculture specialists.



We developed a system model simulating the river hydrology, the irrigation regulation, the maize production and the coastal oyster production. The model took into account the differing management between upstream and downstream sub-watersheds.

During the development of the model, we experienced a problem of oscillation in the modelled river flow. After exploring numerical or coding errors, we went back to the stakeholder group to try to understand what was going wrong in the model.

We discovered a "hidden" management mechanism. In the dry season, farmers and managers meet every week and restriction decisions are made so that the irrigation ban threshold is not reached. We added that rule in the model, and the oscillation problem was fixed, and results were in accordance with data. When asked why they had not explained in complete detail their operating mode from the start, the managers answered they had not seen the relevance of this fact to the model.

This experience tells how small collective social action can influence the dynamics of such a system and how the discussion with stakeholders can be crucial to model the social and environmental components.

Environmental data

With the increasing development of environmental management agencies and governmental institutes, a large amount of knowledge and data resides in these institutions and not only in science institutes. Exchanging data between organisations – in particular for data connected to human activities – can be a challenge in terms of authorisations, property rights and willingness to share.

At the stage of formulation and appraisal of the model, overcoming those barriers can be crucial for the success of the modelling.

Moreover, the people in charge of the technical models and data in the different organisations might not have been involved in the PHASE I of the engagement process, thus they should be engaged at this stage.

STEP 13 Build models and assessment tools

In an article published in 2023 addressing the competencies needed in Participatory Modelling, Elsawah et al. [16] note that "Participatory Modelling remains a craft that is often learned by training 'on the job' and mastered through years of experience." They also observe that "the situation is complicated by Participatory Modelling being an essentially transdisciplinary craft, with no single discipline or skill set to borrow ideas and recommendations from".

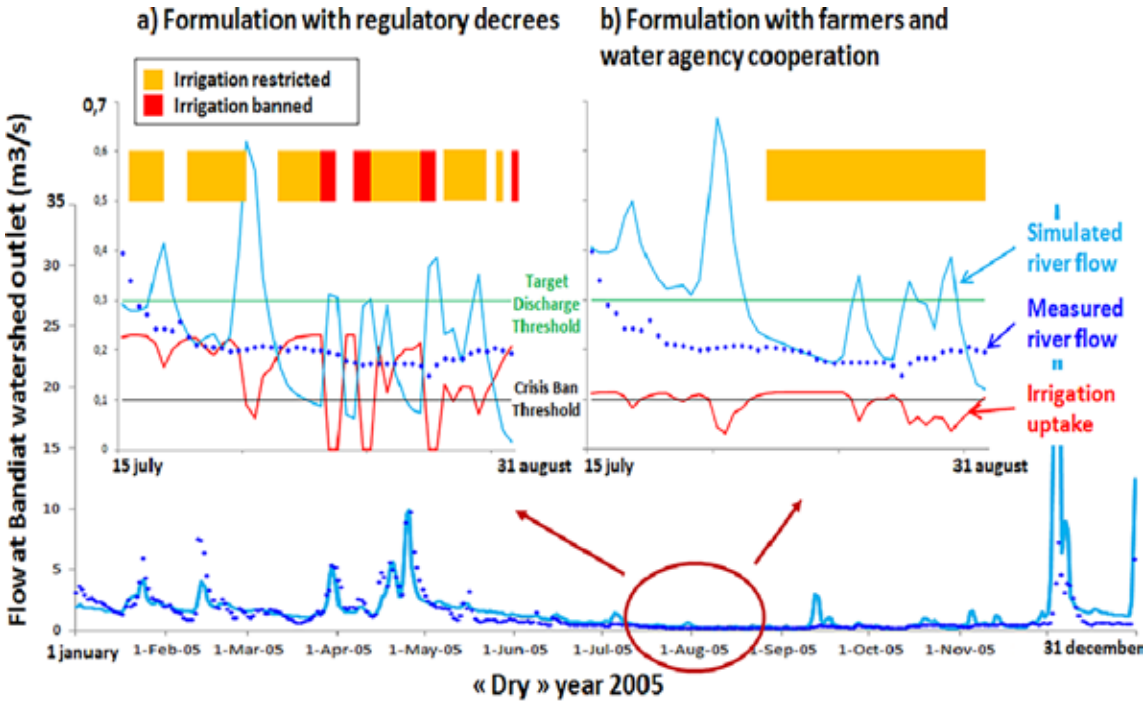


Figure 3. Simulated (blue solid line) and observed (blue diamond) river flow for the Bandiat sub-watershed (m3/s) and irrigation uptake (red solid line) during the dry season in 2005 for: a) irrigation regulation on first reading of regulatory decrees; b) irrigation regulation with collaboration between farmers and the EPTB agency. From Ballé-Béganton et al., 2012 [4].

Case Studies

Participatory modelling in the SPICOSA project: a sustainability-driven approach

18 case studies in Europe

Industrial vs. sustainability-driven approaches for model building. The controllability of the process corresponds to the slope of each curve and appears at the end of a sustainability driven approach.

According to Lample et al.[29], a classical "industrial" modelling approach (Waterfall), traditionally in science, leads to a fast growing quality of the process at its beginning (requirement analysis, coding libraries). However, the functionalities are only expressed at the end of the process by linking all the elements together. Thus, meeting the precise target depends on the quality at the beginning of the process. In this sense, this is like a "ballistic" approach because the controllability of the process only exists at its beginning (high slope of the curve). If the target is missed, the process must be restarted almost from its beginning.

Following an Exploratory / Communicative / Operational / Forecast pattern of development, we encourage a slow growing quality at the beginning of the process, implementing much functionality even if with poor quality. Socio-ecological issues may differ from "industrial" problems in that their target is often a "fuzzy target". As long as the issue is not completely explored, the process can't express a "sharp target". The increased growth of the "Functionalities/Quality" curve appears in the end. This allows for good controllability of the process as the target progressively gets more precise.

In some study sites, the SPICOSA project has tested this approach[3]. The use of the system-oriented platform ExtendSim has provided a quality growing process from conceptual models with empty-boxes of the systems to communication-able and operative models.

Interactive building of a system under ExtendSim platform, Pertuis Charentais study Site, Spicosa Integradted project

(see https://participatory-assessment.eu/cross-thematics/spicosa/)

In this step, we offer a general description of participatory modelling, some lessons learned and advice on implementation drawn from our experience in numerous case studies over the last fifteen years.

What is participatory modelling?

Providing deliberation support tools for environmental management requires complex socio-ecosystem modelling involving a joint effort by researchers, modellers, software engineers and stakeholders.

Participatory modelling is one aspect of stakeholder engagement in which actors participate in the design and development of conceptual or simulation models.

According to Voinov and Bousquet[47], participatory modelling, with its various types and clones, has emerged as a powerful tool that can:

- enhance stakeholders' knowledge and understanding of a system and its dynamics under various conditions, as in collaborative learning, and
- identify and clarify the impacts of solutions to a given problem, usually related to supporting decision making, policy, regulation or management.

The complexity of socio-ecological systems requires numerous assumptions and approximations, as well as formulations and data from different fields of knowledge. Involving stakeholders in the modelling process can improve the quality of modelling by integrating stakeholder expertise and provide a better understanding of assumptions and limitations encourages more appropriate use of model results in decision-making processes.

In addition, the co-design and use of models puts the different components of the system into perspective, highlights any gaps in knowledge or data. It also helps to raise awareness among all participants of the different aspects of the natural environment, as well as the activities involved and the governance bodies and channels that interact in the areas under consideration.

Participatory modelling can use all forms of models, from conceptual models to predictive numerical models, including systems dynamics, Bayesian networks, fuzzy cognitive mapping, agent-based modelling..... Whichever type of model is used, it is the level of stakeholder involvement that will determine the effectiveness of the participatory process.

According to Voinov and Bousquet[47], the level of participation can be categorised in :

- Passive participation, in which the objective is just to inform people
- Extracting information from people for a scientist who needs data
- Participation to support the decisions, in which stakeholders are used to promote and articulate the chosen decisions
- Interactive participation, where stakeholders share the diagnostic and analytical methods and tools or results
- Self-organisation, where the lessons from the participatory process are transformed into decisions by the stakeholders themselves

Who initiates the process?

Participatory modelling is most often initiated by scientists, managers or government agencies. However, according to Lample et al.[29]], participatory approaches are often biased by the agendas of certain stakeholders:

- A "modelling-driven" or "modeller-led" protocol assumes that numerical models are the way to solve environmental problems. It is not a sufficient condition. And we can even question when a numerical model is or is not a "necessary" condition to deal with complex socio- ecological issues.
- A "policy-driven" or "manager-led" oriented approach is supposed to lead to decisions. This imperative therefore often counterbalances other necessary conditions, such as

an understanding of the complexity of the problem. For example, when it comes to the problem of eutrophication and green algae (excess nitrogen), many managers and technology providers advocate the production of biogas. This is typically a "decision-making imperative" that leads to a discourse of the "something must be done" type. However, as biogas is mainly composed of carbon and oxygen, the problem of excess nitrogen will only be displaced.

- A "Research-driven" process is expected to publish scientific advances. But is publication a necessary condition for scientific knowledge to inform political debate? It is only necessary for scientists.

Running the process

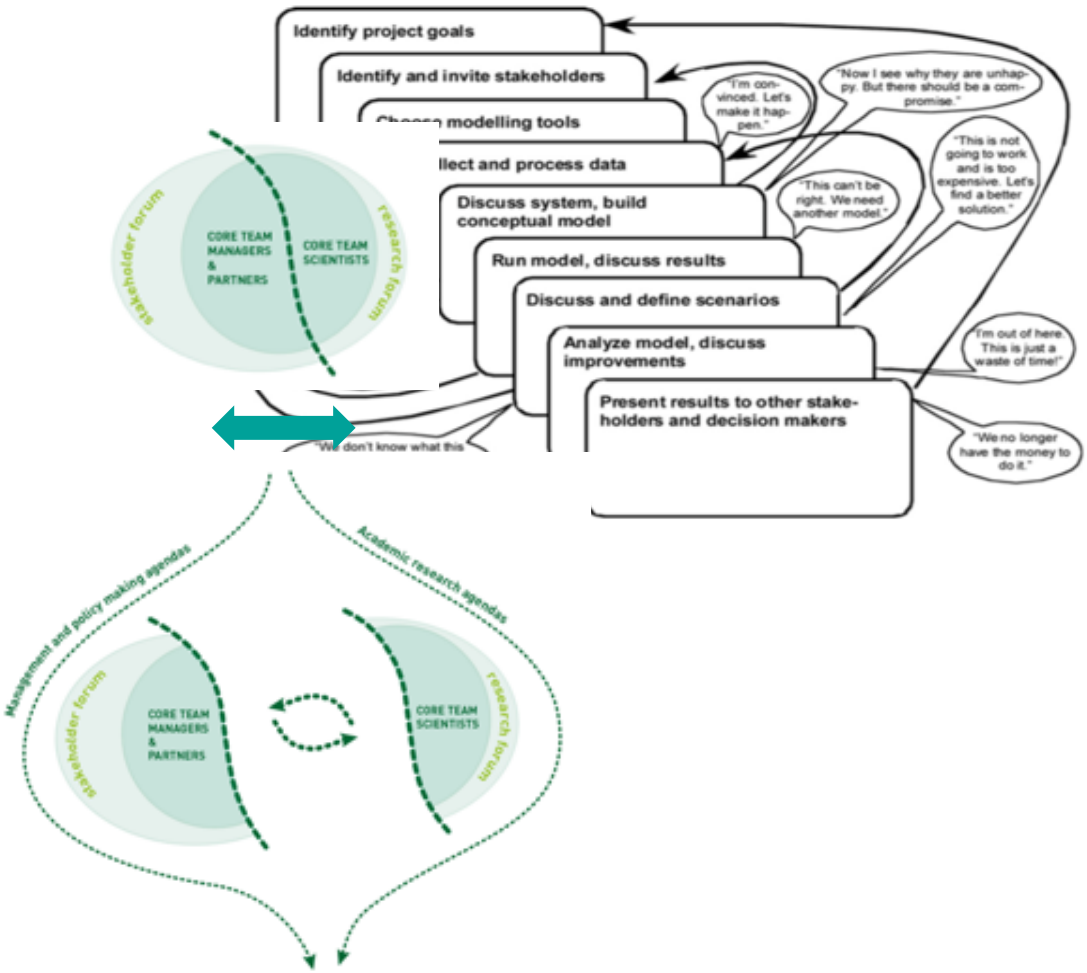
Keeping in mind the different agendas of the leading modellers, the path used to develop the models is also a key factor in the success of the co-construction.

Most participatory modelling experiments agree on the critical importance of the preliminary conceptual model phase – as we described in PHASE I –, in terms of collaborative learning, issue grounding, etc. However, the ensuing phases of model development are often more delicate in terms of participation, notably in the formulation of the model.

Elsawah et al. (2023)[16] raise the issue of the skills and training required, especially as those involved in participatory modelling are generally trained as modellers and would need to be trained in facilitation skills.

Depending on the level of co-construction, stakeholders can be involved at different stages of the modelling process:

- Preliminary synthesis and diagnosis (through previously available data). This



includes making explicit the goal of the modelling process.

- Data collection (specific to the modelling purpose).
- Conceptual model design.
- Scenario design.
- Implementation.
- Calibration and verification.
- Simulation process (might be running a computer simulation model, playing a game session, …).
- Validation.
- Discussion of results.

Model objectives versus project objectives

As models are increasingly used to respond to the complexity of environmental issues, their development has not always kept pace with any new objectives and uses that may have been set. As a result, models designed primarily for prediction are used as exploratory models, taking them out of their calibration scope and leading to their use in applications where the uncertainty of these models is soaring (Brugnach et al, 2008).

Brugnach and Pahl-Wostl (2008) provided a scale of model complexity to determine the scope of a model's use (cf. Table). By following these development stages, we can ensure that socio-ecological models are well grounded and avoid the risk of missing the desired objective by following conventional development pathways.

Table 1. summarizes the implications of different modeling purposes on the system characteristics represented in a model, the role of uncertainties, important model properties and the type of model validation to be chosen.

Purpose	System characteristics	Role of uncertainties	Model properties	Model validation
Prediction	Stylized facts available, central elements of overall structure known, abstract representation possible	Uncertainties must be constrained within manageable bounds	Clear structural dimension with rules how to explore relationships systematically	Agreement of model results with observed system behavior
Exploratory analysis	Evolutionary, trajectories may explore large development space	Uncertainties as source for innovative processes	Evolutionary components	Plausibility of results based on expert and stakeholder judgment. Completeness of mapped space.
Communication	Complex dynamics leading to counterintuitive behavior. Robust knowledge on system complexity available	Uncertainties must be clearly captured	Simple and transparent	Adoption of new insights
Learning	Reflexive system Model internal to the system	Role of uncertainties in social interactions must be addressed	Focus on modeling process Highly interactive	Facilitation of social learning in group, plausibility assessment by stakeholders

- Exploratory: the problem is explored following exploratory pathways and scenarios. These models can be conceptual, or system dynamics models for cases with easily transformed formulations.
- Communicative: Models that show numerical results as a first representation of reality.
- Operational: These models show the most suitable representation (calibrated) of what seems to be the problem to address; it allows for scenario testing.
- Forecast: These models can be operated by managers in policy-making contexts for scenario testing. They are the most advanced stage and show a degree of ownership by users measuring the quality of the product.

To be effective, participatory modelling must clearly identify its purpose in this classification and identify the level needed to meet the project objectives identified during the TRIAGE. If, for instance, the aim of the project is to improve and integrate knowledge, a forecasting model, with its high cost in terms of time and resources, will not be necessary. Furthermore, forecasting models are extremely inflexible in their design and are therefore unsuitable for the preliminary exploratory phase of a collaborative project.

Elsawah et al. (2023)[16] stress the need to beware of the "hammer and nail syndrome" and that in practice, different modelling approaches should be mixed. In particular, modellers with previously available operational or forecast models should beware of using them in the preliminary stages of the co-construction and risk constraining and limiting the assessment.

STEP 14 Wrap up the assessment

Given the complexity of the systems and issues involved, different tools will need to be used to highlight different perspectives. Each person perceives information through different cognitive channels: visual, auditory, kinaesthetic, etc. To enhance understanding, sharing and appropriation, it is essential to use expression and representation tools that mobilise these different channels: storytelling, graphics, maps, role-playing, brainstorming on post-its....

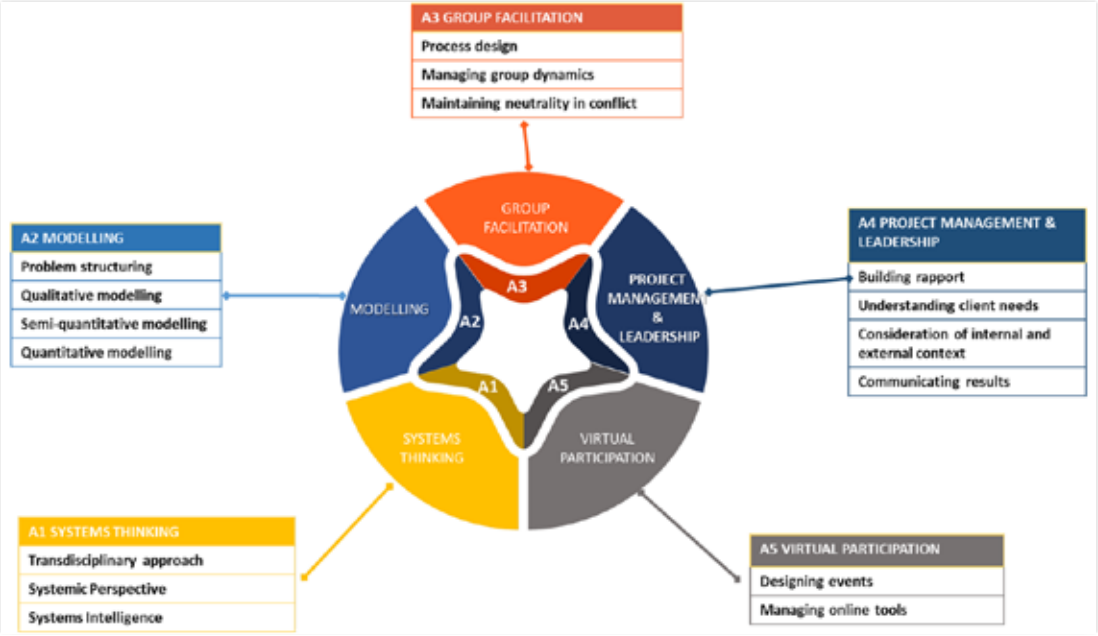


Fig. 1 Core competency areas for participatory modeling

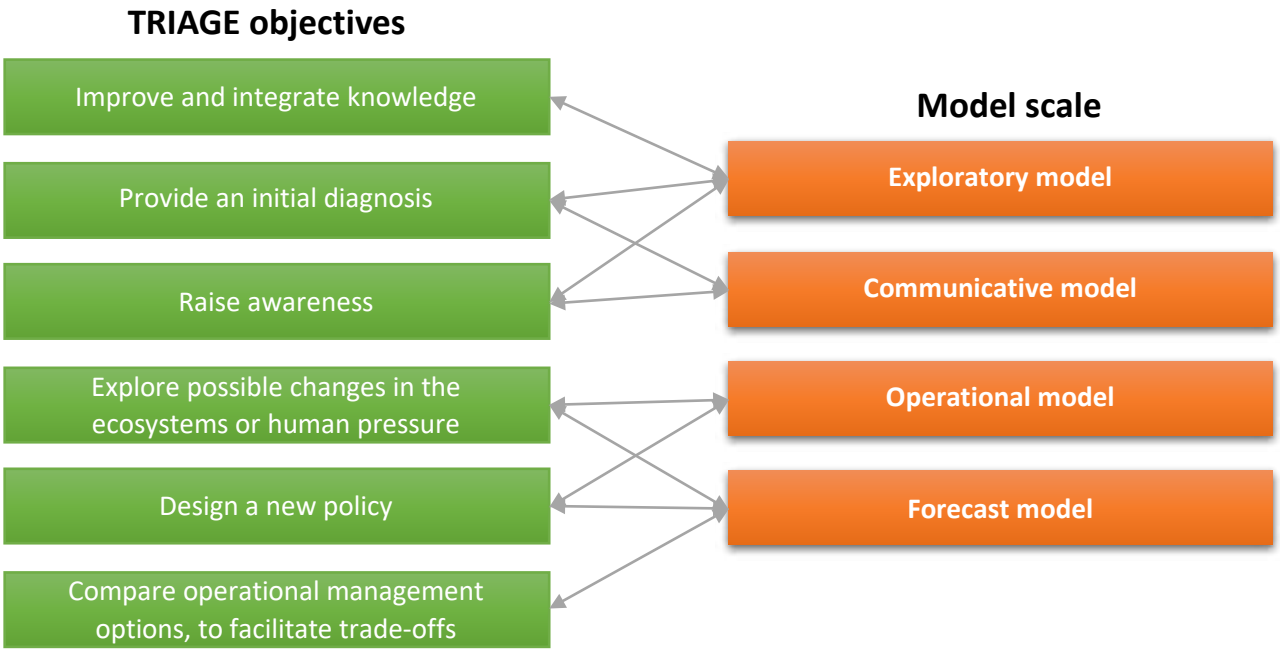
Conventional scientific models deal with high-level numerical production intended for an academic audience and are not necessarily suitable for deliberation or decision support. Moreover, integrated socio-ecosystem models or assessments must not be designed solely for predictive or operational purposes. Their results must highlight their exploratory, learning and communication aspects. The results must be carefully designed so that they are not misinterpreted and used out of context by end-users. These tools should favour visual and animated indicators rather than traditional diagrams. The hypothesis chosen for formulation must also be clearly stated and documented.

Outputs are an important part of the process. Firstly, they must reflect a shared construction for the participants. Secondly, they must be able to communicate the main findings to different audiences, depending on the case: decision-makers, experts or the general public. The design of the products should therefore be particularly careful and adapted to the target audiences: whether in terms of vocabulary, graphic representations, results indicators, etc. Narratives play an essential role in communicating results. The strength of the assessment lies in its ability to capture the subjective dimensions, reflecting the fact that everyone's voice has been heard and considered after analysis and reflection.

A distinction must be made between the need to keep a record of the exercise, which may take the form of reports or large digital resources intended for specialists, and the production of summaries reflecting the quintessence of the co-constructed vision. However, the source documents must be referenced in the summary documents to enable everyone to have access to the methodology or data.

This key issue of communicability and co-construction of formats needs to be discussed very early on in the process. For example, the choice of indicators to characterise the scenarios to be communicated may have consequences for the design of models, assessment tools or data collection tools (cf. PHASE II). The aim is not to produce a single representation format, but rather a set of different perspectives on the issue under consideration, to provide food for thought for everyone involved. The uncertainty inherent in different assessment approaches should also be part of the communication of results.

What's more, proposing different approaches and representations keeps the process dynamic and avoids stakeholder fatigue. In the




Models and Assessments
Scenarios
Context knowledge
SYNOPSIS
Environmental issue
Conceptual maps
ALICE
Improving the management of Atlantic Landscapes: accounting for biodiversity and ecosystem services
Désert céréalier
Le paysage en 2050
ALICE
MEDIA TOOLKIT

context of the SPICOSA and VALMER projects, we have developed a structure to organise, integrate and share participatory assessment outputs: SYNOPSIS platforms. Each SYNOPSIS platform is organised around four axes:

- hierarchically structured knowledge of context and issue
- conceptual graphical mappings and representations of the system
- numerical system models with user-friendly control panel boards and animated graphical outputs and environmental or socio-economic assessments
- scenario narratives

STEP 15 **Celebrate**

The importance of this Celebration step is inspired and adapted from the Dragon Dreaming approach (https://dragondreaming.org), which makes it different from many other project management processes. Here, celebration is not a task of the noisy extrovert, but rather part of reflection, recognition of effort and acknowledgment.

It is about acknowledging everything that went well in the project and everything that did not go so well. Celebration is also an important process that reconnects the performance of a project all the way back to the initial brainstorming phase.

Community and capacity building is encouraged through Celebration. It gives the chance to step back a little from the everyday stress a project may bring. We look at what we have learned, which new skills we have acquired and where we have actually left our comfort zone and encountered 'Aha-Moments' of change of perception and outlook on the considered issue.

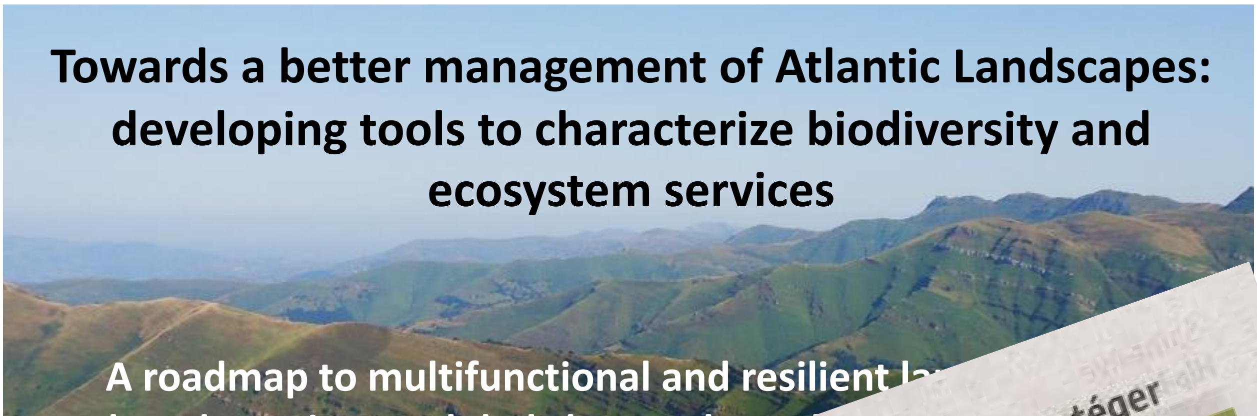
When a project ends, each person who has contributed to the project needs to be thanked. Once the doing stage of your project is finished, make sure you have a big celebration. It is only after you have done this that your project is really finished. And so, the circle is complete and can start all over again... Indeed, the last step to your celebration requires analysing the transformative results. This needs the following tasks:

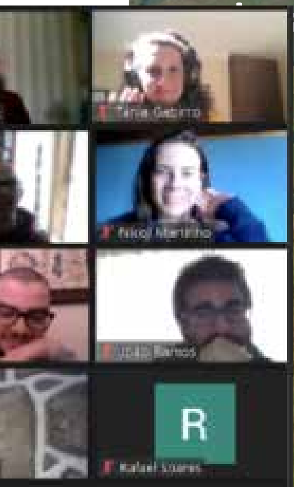
- Firstly, now that we have finished, what would we change if we had to do the project again?
- Secondly, what in this project have we enjoyed the most to ensure we build this into any future project we may do? In what ways has the project truly led to our personal growth, the strengthening of participatory management?

At the end of the participatory assessment, it is important to 'celebrate' with a final workshop that closes this cycle of the process with the stakeholder forum. This workshop should focus more on future perspectives than on an ex-post evaluation: 'Where do we go from here?', 'Should we pursue the same issues?', 'Are there other issues that could be addressed?', 'Are there other stakeholders who should be engaged?

To further celebrate the engagement process, a local public event can be organized to present the final results and invite discussion through round tables and open debates, allowing the experience and results to be shared more widely.


TABLE RONDE
« REGARDS CROISÉS SUR
LES ENJEUX DE GESTION ENTRE
SITES D'HERBIERS DE ZOSTÈRES »
Cécile Lefeuvre
Pauline Malterre
Stéphan Arnassant
Ronan Pasco
VALMER





Séné

Zostères du golfe. Des plantes à protéger

Quel avenir pour les zostères ? Scientifiques, professionnels, associations, gestionnaires du littoral étaient réunis, hier, à Grain de Sel, pour un échange international sur ces plantes marines qui jouent un rôle majeur dans la biodiversité des espaces littoraux. Le golfe du Morbihan abrite le deuxième plus grand herbier de zostères en France, après celui de la baie d'Arcachon, et il fait partie de l'un de sites pilotes du projet européen Valmer dont la gestion a été confiée au Parc naturel.

Juliette Herry, chargée de mission au Parc naturel régional du golfe, a coordonné un travail d'équipe sur les zostères du golfe.

Des refuges à nourriture

On sait depuis le début des années 2000 que ces zostères sont menacées. Mais dans quelles proportions ? C'est l'objet d'une évaluation de leur biomasse en cours de réalisation par l'Ifremer et qu'on pourra comparer à de précédentes mesures. Or, elles jouent un rôle précieux de filtre en captant les particules de sédiments et « favorisant ainsi la clarté de l'eau et le processus de photosynthèse », précise Juliette Herry, chargée de mission climat et gestion du littoral au Parc naturel régional du golfe. Ces zostères, dont on trouve deux espèces, les « naines » et les sur les zones découvrantes, et les

les poissons.

Ne pas confondre avec les algues

Ce projet Valmer a été lancé en 2012 grâce à l'appui de l'Union européenne et de ses fonds Interreg. Trois sites ont été sélectionnés en France et trois en Angleterre. Le site du golfe retenu pour la préservation des zostères associe le Parc naturel, l'Université de Bretagne Occidentale (UBO) à Brest et les acteurs du territoire. « Il s'agit de pouvoir bien identifier les bénéfices que l'on peut reti

utilisateurs du littoral car les zostères sont méconnues. Dans le cadre de ce projet Valmer, une enquête a été réalisée auprès de 600 habitants des bords du golfe. « Il se trouve qu'on les confond avec les algues vertes », indique Juliette Herry. Or il n'en est rien. Les zostères sont de véritables plantes marines qui ont des racines et font des fleurs. En 2007, on en dénombrait dans le golfe 1.100 hectares pour les « marines » et 720 hectares pour les « naines ». Une bande dessinée, réalisée par Sophie Lambda, sera diffusée dans les écoles pour éveiller

2.4 Monitoring

Monitoring is a key element of the participatory evaluation process. It can be difficult, particularly in terms of timing. The monitoring process should begin at the earliest stages of a project, but it can take time for project results to be achieved [15], and it can be difficult to identify when monitoring needs to be completed to meet project deadlines. In addition, on-going monitoring requires constant adaptation between the monitoring process and the project objectives.

Objectives of monitoring the engagement process

Five main objectives have been identified in the monitoring process of a participatory assessment[15]:

1. Measure the effectiveness of the participatory process by elaborating indicators of engagement.
2. Learn and capitalise from experience - what has worked and what needs to be improved- and listing the outcomes of the project.
3. Give feedback to stakeholders, and, in particular, demonstrate their participation in the participatory process.
4. Provide feedback to researchers to make changes and improvements if needed.
5. Be transparent in the use of public money.

There is no single methodology to monitor stakeholder engagement, it depends on the objectives of the evaluation[15]. The monitoring process may be carried out by an external expert or a member of the project team and may or may not be built in a participative way. Participatory monitoring is an option that aims at involving all stakeholders. Nevertheless, it is costly and time consuming and should be considered according to the outcomes that it could provide[39].

Types of evaluation and tools of monitoring the engagement process

There are two types of evaluation[49]:

- A summative evaluation, undertaken at the end of the project, provides an overview of the whole project.
- A formative evaluation, undertaken from the beginning of the project, is part of project development and helps to adapt it thanks to feedback.

The evaluator can use quantitative tools such as questionnaires and/or qualitative tools such as semi-structured interviews, focus groups and observation.

These tools can be used to[15] [49]:

1. Monitor the success of the participatory process: Has the participatory process met its objectives?
2. Evaluate the organisation of the participatory process: Were the methods, the exchanges, the duration of the workshops adapted? It can also question the cost of the participatory process: Were the costs adapted to the objectives and outcomes of the project?
3. Analyse the results of the participatory process: What have stakeholders and researchers got out of the process?
4. Get ideas for futures participatory processes: What was efficient and what could be improved?

Phasing the monitoring process

Monitoring the evaluation process can be initiated at various stages of the project:

- A the start of the project: initiating the monitoring process at this stage ensures that it

Case Studies

Monitoring the engagement process in the ALICE project

In the ALICE project, as well as monitoring the stakeholder engagement process, it is also important to evaluate the expectations of the process and what the group has learned from the process. Additionally, the monitoring process supports the research teams in carrying on with the engagement. The end result of this monitoring process is to strengthen the capacity building of the participants in the case studies, particularly in the scientific teams. The monitoring was performed by researchers inside the ALICE project in collaboration with the different research teams and began at the very first stages of the project. We elaborated a two level monitoring protocol: at the stakeholder level and at the core team level including researchers and local partners.

We used various tools according to the objectives pursued:

A questionnaire was designed to understand stakeholders' opinions of the participatory workshops: on their organization, content and discussions.

An interview grid was developed to collect the points of view of local partners and researchers on the engagement process: on their expectations at the beginning of the project, on the process itself and on their needs for the future.

Focus groups were implemented to understand researchers' perceptions about the engagement process and to favour practice exchanges.

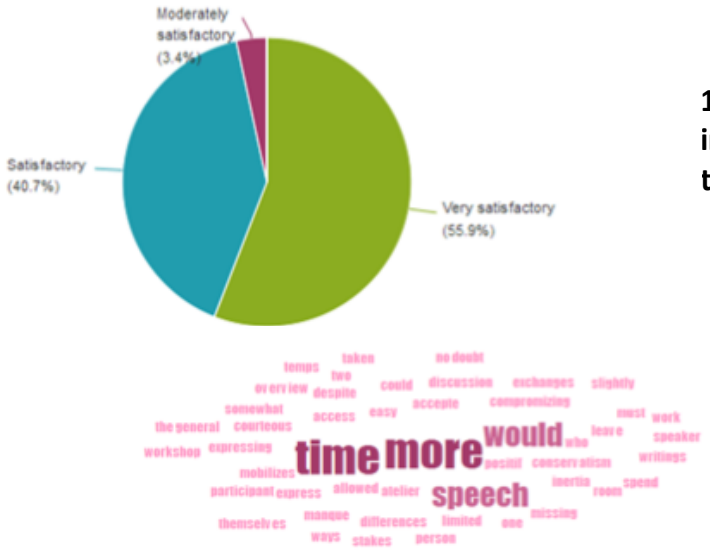
We elaborated a plan for the implementation of this monitoring protocol:

- 1st step: writing the monitoring protocol at the very beginning of the project (to fit the objectives of the project and evaluate the evolution of the engagement process throughout the project)
- 2nd step: presentation of the protocol to the research teams, discussions and adaptation of the protocol (for coherence and transparency)
- 3rd step: implementation of the protocol at various stages of the project
- 4th step: feedback to researchers (exchanges to allow for changes in the monitoring protocol and in the project itself) and to stakeholders (to continue the engagement process)
- Thus, it is an iterative process where the following steps are adjustments of the monitoring protocol with the aim of improving it and fulfilling the objectives of the project
- 5th step: evolution and adaptation of the monitoring protocol (this helped with planning engagement for the rest of the project, make changes and improvements)
- 6th step: carrying out the monitoring of the engagement process
- 7th step: feedback to stakeholders (how did they contribute?) and core team (how did they contribute? What can be used for future projects? what needs to be modified?).

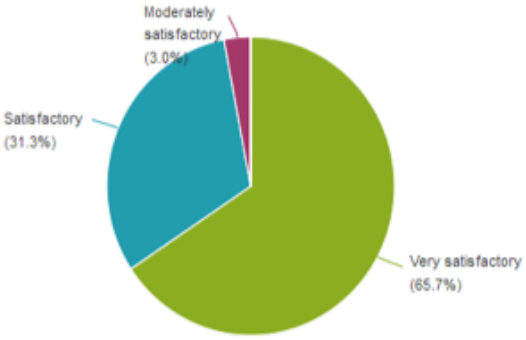
fits the objectives of the project and gathers data for comparison.

- Throughout the project: in this case, the monitoring process helps to ensure that the participatory process is meeting its objectives and, if necessary, allows changes and adaptation. It is also a way of carrying on the engagement process.
- At the end of the project: at this stage, the monitoring process evaluates whether the engagement process has fulfilled its objectives. It is also a way of giving feedback to stakeholders about the participatory process and its outcomes.

10- Did you find that the place given to exchange and discussion was:



12- Do you consider that the taking into account of the interventions of the participants was:



Absence of stakeholders considered by participants as key actors