COASTAL
Collaborative Land-Sea Integration Platform

Deliverable D5 (D1.3)

WP1 Multi Actor Analysis:
T1.2 – Multi-Actor Analysis; T1.3 - Conceptual Analysis of Land-Sea Dynamics

Lead beneficiary: SINTEF Ocean

Author: Rachel Tiller (SINTEF Ocean), Erika Palmer (SINTEF Ocean)

Contributors: **BELGIUM**: Jean-Luc de Kok (VITO), Bastiaan Notebaert (VITO), Nele d'Haese, Peter Viaene (VITO), Noémie Wouters, Maxime Depoorter (GRBR), Frank Stubbe (VLM), Sarina Motmans (POM), Wim Stubbe (AGHO), Steven Dauwe (VLIZ), Hans Pirlet (VLIZ); **FRANCE**: Françoise Vernier (IRSTEA), Jean-Marie Lescot (IRSTEA), Jean Prou, Jean -Luc Fort, Sandrine Sabatié; **ROMANIA**: Luminita Lazar, Florin Timofte, Magda-Ioana Nenciu, Mariana Golumbeanu (NIMRD); Ruxandra Pop, Steliana Rodino (ICEADR) **SWEDEN**: Georgia Destouni (SU), Samaneh Seifollahi-Aghmiuni (SU), Zahra Kalantari (SU), Carmen Prieto (SU), Yuanying Chen (SU); **GREECE**: Giorgos Maneas (SU), Erasmia Kastanidi (HCMR), Ioannis Panagopoulos (HCMR), Aris Karageorgis, (HCMR), Alice Guittard (Icre8); Håkan Berg (SU); **SPAIN**: Javier Martínez-López (CSIC), Joris de Vente (CSIC), Carolina Boix-Fayos (CSIC), Juan Albaladejo (CSIC); NORWAY:.

Approved by WP Manager:	Rachel Tiller (SINTEF Ocean)
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Dissemination level		
PU	**Public**	**X**
CO	Confidential, restricted under conditions set out in Model Grant Agreement	
CI	Classified information as referred to in Commission Decision 2001/844/EC)	
Deliverable type		
R	Document, report	**X**
DEM	Demonstrator, pilot, prototype	
DEC	Web sites, patent fillings, videos, etc.	
OTHER	Software, technical diagram, etc.	
ETHICS	**ETHICS**	

Partnership:

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List of Acronyms

BAU	Business-As-Usual (scenario)
CLD	Causal Loop Diagram
FCM	Fuzzy Cognitive Map
MAL	Multi-Actor Lab (case area)
MSP	Marine Spatial Plan
RDI	Research, Development and Innovation
SF	Stock-Flow (model)
WP	Work Package

1 COASTAL motivation and background

COASTAL represents a unique collaboration of coastal and rural business entrepreneurs, administrations, stakeholders, and natural and social science experts. Local and scientific knowledge are combined to identify problems and develop practical and robust business road maps and strategic policy guidelines, aimed at improving land-sea synergy. A multi-actor approach is followed to analyze the social, environmental and economic land-sea interactions in a collaborative System Dynamics (SD) framework, taking into consideration the short-, mid- and long-term impacts of decision making and feedback mechanisms on coastal and rural development.

The project is organized around interacting Multi-Actor Labs (MALs), combining tools and expertise for six case studies representing the major coastal regions in the EU territory. In each MAL local actors and experts participate in collaborative exercises to analyze problems, analyze the causes, propose and discuss solutions, and validate and interpret the impacts of simulated business and policy decisions. The MALs are connected into a durable platform for collaborative knowledge exchange which is underpinned by a generic set of tools and performance indicators.

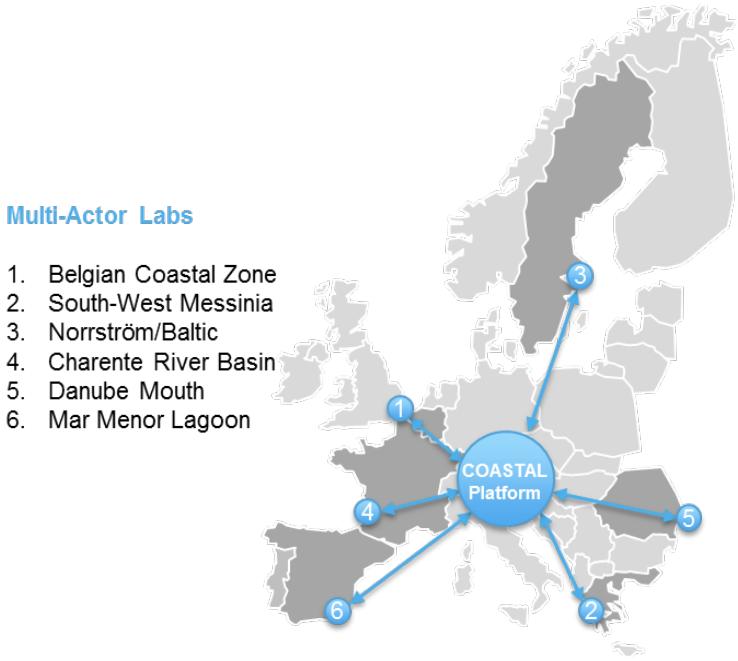

Figure 1 Multi-Actor Labs in COASTAL

The COASTAL platform and synergistic tool set will be further exploited and developed beyond the project lifetime. The ultimate ambitions of COASTAL are to inspire strategic land-sea planning and contribute to the formulation of integrated coastal-rural regulations at the regional, national and EU level.

2 Role of Deliverable

Deliverable D1.3 is a report on the workshops and the stakeholder integration in the co-production of knowledge in Task 1.2. The title and description of the deliverable is: "*D1.3: Conceptual Analysis of Land-Sea Feedback (Methodology) (R, PU, M40) Methodological report describing the second round of multi-actor workshops, and generic qualitative tools (mental maps and FCMs) developed by WP1.*"
Specifically, the goal, as described in Task 1.2: Multi Actor Analysis in Annex 1 – DOA (Part A) is the following:

" In a second round of multi-actor workshops (M31-M34; one per case study) the outcomes of the draft system dynamics models for the case study (WP4) were used to validate and calibrate the model with stakeholder input and to increase its legitimacy and the potential uptake of results by stakeholder."

It was the responsibility of the MAL leaders (VITO, HCMR, SU, IRSTEA, INCDM, ICEADR and CSIC) to coordinate this second round of MAL and ensure active participation of all relevant stakeholders. In this MAL, the outcomes of the draft SD models for the case study in question were used to validate and calibrate the model with stakeholder input, with an aim to increase its legitimacy and the potential uptake of results by stakeholder after the project end. Model validation with multi-actor workshops should be considered in the context of confidence building of SD models (see WP2 deliverable D8) – focusing on the co-creation of models and their usefulness for policy analysis rather than the technical details. The process uses a three-part structural approach: 1) individual mental models (can individuals in the group identify the problem, focus and purpose of the model?); 2) group mental models (can the group agree on the map/model structure, relationships, boundaries and simulated behavior?); and 3) data and logic (can the group members agree on the map/model structure, relationships, boundaries and simulated behavior?).

This deliverable also responds to the following concerns of the external reviewers around stakeholder mapping from the second reporting period of the project, specifically referring to the following statements in their overall assessment report, section 2:

"However, there are still some concerns regarding the level of clarity in systematically reporting the participation of stakeholders in the different workshops, which may limit the legitimation of the workshops' outcomes, that are based on presence and representation of stakeholders from the relevant sectors. Moreover, the current lack of a systematic stakeholders' map may hinder the plan for exploitation, with reference to identifying target businesses, policy makers and other actors, and could reduce the project's impact potential."

Reviewers also expressed this in their recommendation in section 4:

WP1 has only partially addressed the recommendation given for the previous reporting period, and a complete, clear and systemic overview of the stakeholders' participation in workshops is still required. In order to facilitate the efficiency of reporting, these issues should be addressed in the final deliverable of this WP.

And in Section 5, as relates to WP1:

Provide a full and detailed overview of the stakeholders engaged in the different workshops in Deliverable D1.3. This should include information that allows assessing the level of representativeness of different sectors and supports and demonstrates the legitimacy of the participatory process. Key information elements should include name of the actor/institution; type (i.e., NGO, business, local administration, etc.); sector their represent (to ensure a good level of representation, in relation to the legitimation of results); rationale for selection; a distinction between general stakeholders and actor partners; and number and gender of participants. Information should also be provided on returning stakeholders, from one workshop to the next. This should be provided for all workshops..."

The deliverable therefore first describes the *process* of the systematic stakeholder mapping for the sectoral workshops (D1.1) and the first round of multi-actor workshops (D1.2) held in all case study areas during the

first eight months of the project period, within the context of the recommendations above, but highlighting GDPR and the legal obligations COASTAL has to anonymize personal data to the full extent, which in some cases includes the recommended information requested from the reviewer: "… *name of the actor/institution"*.

The deliverable then goes on to deliver on the original description of the deliverable, namely the *methodology* used for the second round of multi-actor workshops, as specified in the DoA, where the aim was to validate the models developed by WP4 based on the conceptual mapping described in D1.1 and D1.2.

3 Multi-actor analysis - Background

COASTAL relied on three types of workshops aimed at utilizing the expertise of stakeholders and ensuring their priorities were addressed:

Sector workshops of coastal and rural sectors: identifying the problems, solutions, obstacles and opportunities and conceptualizing the system interactions for each sector (agriculture, environment, fisheries, industry, etc.) in causal loop diagrams.

- Multi-actor workshop – round 1: combined workshop bringing together all sectors of the MALs, aimed at identifying the land-sea interactions and developing an integrated causal loop diagram
- Multi-actor workshop – round 2: workshop aimed at validation of the quantified SD models (confidence building) – focusing on model structure, model behavior and policy implications

The second reporting period (M19-36) for WP1 consisted of building on the knowledge and understanding gained in the first reporting period and use this towards the work in all the other work packages that had use for this knowledge – most prominently WPs 3, 4 and 5. Towards the end of this reporting period, the second multi-actor workshop took place in all six MALs.

This second multi-actor workshop was a natural continuation of the co-creation process that had started with the mental mapping seminars in the six case areas, resulting in D1.1. The methodology for these workshops is published in Frontiers in Sustainability (attached). This open access detailed account of the methodology allows for the applicability of it in other case- and issue areas as well, and the study is as such replicable, in line with objective 2 of WP1: *" Develop transferable and generic mental maps allowing application to other study regions or adaptation to new problem contexts"*.

4 The General Data Protection Regulation

Prior to holding any of the workshops, COASTAL was required to notify the National Data Protection Official for Research when processing personal data in the same way as for data collection in Norway. The reason for choosing Norway in this case was because the WP1 leader was based in Norway. COASTAL emphasizes that the regulations in Norway are in line with *The European Code of Conduct for Research Integrity* as well as the cross-cutting issue of Horizon2020 on *Responsible Research and Innovation*. The regulations are also in line with Directive 95/46/EC, which specifies that personal data must be processed according to certain principles and conditions that aim to limit the impact on the persons concerned and ensure data quality and confidentiality. This is also in line with the **ethical standards and guidelines of Horizon2020.** Data transfers within the EU/EEA are not subject to specific requirements (i.e., specific authorizations or other restrictions), and COASTAL therefore only need to comply with the general requirements of Directive 95/46/EC.

The new EU Regulation 2016/679[2] builds on the earlier General Data Protection Regulation (95/46/EC) or GDPR and is aimed at ensuring the protection of natural persons regarding the processing of personal data. The main goal is to increase the accountability and transparency of the data processing, and data protection rights of individual persons. It is not referring to the use and/or protection of research data (see COASTAL

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0679&from=EN

deliverable D26 – Data Management Plan). **Personal data** refers to information corresponding to a natural person (a so-called 'data subject') who has been or can be identified directly, or indirectly. This will be the case if identifiers such as names, addresses, id numbers etc. are used. It also refers to person-specific factors such as gender, physical, mental, social-economic and cultural characteristics. The **data processing** refers to the collection, recording, storage, adaptation, disclosure, forwarding, destruction, and all uses of the data.

Important to keep in mind are a few **key principles**:

- The personal data should be adequate, relevant and limited for the intended use, rather than what data are desirable to collect and process
- Accountability of the data processing and data replaces a compliance-based approach (record keeping)
- It is mandatory to appoint an independent data protection officer, who will provide advice and can evaluate the data processing against compliance with the GDPR
- The rights of the data subjects are strengthened, for example natural persons should give explicit consent before personal data can be collected, and the data can be removed upon request

In addition, two general approaches are allowed in the GDPR and useful for projects such as COASTAL:

- **Anonymization**: this means that personal data are processed in a way that makes the risk of identification negligible. For example, interview data can be collected without storing the names, gender, age of the data subjects responding to the survey
- **Pseudo-anonymization**: here direct identifiers such as names and addresses are replaced by indirect identifiers (for example numbers) in the data set. A separate data set, known as the 'key', is used to link the indirect identifiers to the direct identifiers

Limited use was made of personal data in COASTAL for the purposes of the sector workshops, focused primarily on audio recordings which were temporarily kept during the processing of intermediate results of these co-creation activities until these had been analyzed for the purposes of this deliverable.

To ensure compliance with the EU Regulation 2016/679 on the protection of natural persons with regard to the processing of personal data during the sector workshops, COASTAL took the following actions:

- all project partners have been **informed** and **reminded regularly** of the obligations with respect to the collection and processing of personal data related to EU Regulation 2016/679
- effort have been made by means of technical and organizational measures to ensure the collection and processing of personal data are transparent, lawful, and limited to the purposes specified to the data subjects (natural persons) following (EU Reg. 2016-679 – Art. 28)
- a central, independent Data Protection Officer (DPO) has been appointed for the duration of the project to monitor compliance with the Regulation and provide advice to the project consortium members (EU Reg. 2016-679 – Art. 35)
- pseudonymization will be used to reduce the risks to the data subjects and assists the data controllers and processers with their obligations with regard to the Regulation (EU Reg. 2016-679 – Art. 32)

5 Stakeholder Mapping

A proper mapping of the appropriate target groups with decision-power or an interest relevant to the outcomes of the project is of vital importance for societal impact and the post-project exploitation and uptake of results. Stakeholder mapping refers to methods or stakeholder analysis, whereby the stakeholders of a project or enterprise are visually diagrammed in a systematic way that represents the relationships of the stakeholders to the project. For example, one can map the decision power of stakeholders against their interest in the project outcomes on a scale ranging from low to high. Stakeholder maps are used to identify stakeholders and understand their relevance for the project and uptake of results and the methodology. An effective stakeholder identification process increases the saliency of a research project while the transparency of this process increases credibility and legitimacy of the project and co-creation process. Stakeholder mapping is often

undertaken at the beginning of a project during the planning phase though repeating and updating the mapping throughout the project can have benefits.

Stakeholder mapping should help identify:

- Persons and organizations involved in the decision-making benefitting from the project outcomes
- Persons and organizations to be informed about the project
- Potential sources of conflict that may require attention and mitigation
- Potential opportunities for collaboration and synergy between and with stakeholders
- Actions to be taken or avoided to enhance stakeholder participation or satisfaction

Additionally, mapping techniques should compress and visualize stakeholder information, which conceptualize and communicate a significant portion of the complexity of stakeholder relationships quite rapidly. Some stakeholder mapping methodologies make use of spatial dimensions to encode stakeholder relationship information. Several methods have been developed which place the stakeholders along different axis, dimensions, or pathways according to their relationship to the project. Stakeholder maps can be helpfully classified into categories whether their purpose is identification, evaluation, or management for example. The following approach was used for COASTAL to address the needs of the project in a manner which was both systematic and pragmatic:

Identifying stakeholders – Mapping strategies for identification involve visualizing the connection-space of the project and visualizing the connections that stakeholders have to the project via various personal and working relationships. A typical diagram might describe the principal categories of relationships that individuals and institutions may have to a project, and branch off subcategories and smaller groups as a means of brainstorming individual stakeholders. After this, the branches of the tree can be extended to the level of individual contact persons where feasible. It is important to record as many stakeholder groups and individual stakeholders as possible. A stakeholder log can therefore be made to record the total set of stakeholders as well as relevant attribute information of each.

We recruited the stakeholders for the workshops in the COASTAL project using both the snowball method (Biernacki and Waldorf 1981) through project contacts, and by tapping into the partners in the project that had agreed to participate before the start of the project and stakeholders who expressed their interest through a Letter of Support. The snowball approach was selected because the quality of the results sampled from this group outweighs potential low numbers of informants the method often results in. This is often the case in qualitative research studies, where in some cases, large samples of respondents in a workshop setting can be ineffective and therefore not provide the detailed and contextual information wanted by the researcher. For the purposes of this workshop, the primary researcher considered from experience that fifteen participants would be the maximum of what could provide a holistic narrative where all participants were provided ample opportunities to share their perceptions on solutions to healthier coastal ecosystems from different sources. The sample size can also be as small as one or two people, if this (these) participant(s) have information that is of critical value for the given sector and advances the research towards a specific goal (Sandelowski 1995).

The aim of the sector and multi-actor workshops, and the consecutive steps, was to analyze and understand perspectives from different sources of stakeholders in terms of concrete policy action potentials and future scenarios. From these results, we wanted to explore and explain what this entails in terms of policy action limitations and adaptation options and how these affects management and adaptive capacities at different governance levels of analysis. To develop the stakeholder maps, we utilized the Miro Board software to conceptualize the various sectors that project stakeholders were part of. This method also provided the ability to better organize the various regional stakeholders and present our findings. The Miro Boards are also organized into Excel table. The Miro Boards and Excel tables for each case area are presented in the next section.

MAL specific stakeholder mapping

For each MAL we developed a stakeholder map for: (1) Sectoral Analysis of Coastal and Rural Development (D1.1) and (2) Multi-Actor Analysis of Land-Sea Dynamics (D1.2). The stakeholders in this deliverable are derived from the same maps. Shown below is a complete set of all stakeholder maps for the different MALs as well as their respective excel datasheets. All information has been anonymized in terms of personal data and references to specific organizations, even in terms of gender identification in some cases. The reason is that for some organizations there are too few stakeholders represented from the sector in question to avoid pinpointing individual persons. This approach is to ensure full accordance with GDPR. The individual workshop facilitators are the only ones that have access to specific names and specific institutions (in the case of these being too small to be anonymized). They will use these databases of names for individual exploitation plans in the case areas, and for recruitment to the international meeting at the end of the project.

MAL1 Belgium

Figure 2: Belgian MAL sectoral mapping. A total of 60 stakeholders were identified and recruited to workshops from this mapping process.

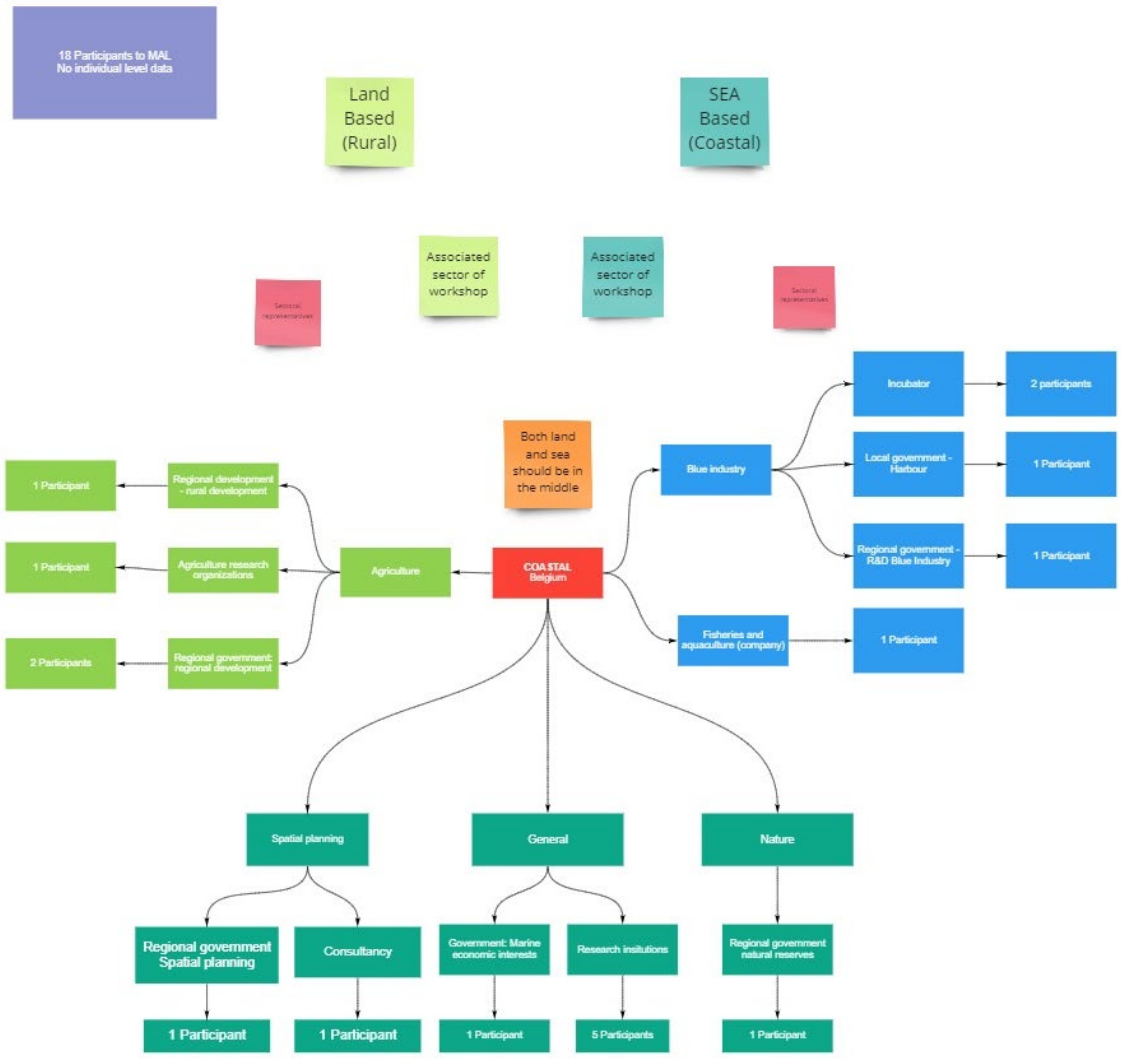

Figure 3: MAL workshop with 18 participants recruited from the selection of 60 participants in the sectoral workshops.

Table 1: Belgian MAL stakeholder overview based on the mapping in MIRO board.

Land/Sea based	Associated sector of workshop	Sectoral representatives	Type key
Sectoral workshops			
Belgium workshop report includes no numbers of participants, or other individual-level information			
Land based	Agriculture	Farming sector	Agriculture
		Environmental agencies	Tourism
		Regional administrations	Environment

		Spatial planning agencies	Spatial planning
Cross-cutting	Tourism	Coastal cities	Fisheries and Aquaculture
		Tourism planning agencies	Blue Industry
		One recreational agency	
		One regional airport	
	Environment	Federal/national level administrations	
		Regional/Flemish level administrations	
		Marine knowledge institutes	
		Environmental protection agencies	
		Nature-oriented NGOs	
	Spatial planning	Provincial (sub-regional) government	
		Maritime services	
		Environmental protection agencies	
		Spatial planning agencies	
Sea based (coastal)	Fisheries and Aquaculture	Fisheries sector	
		Aquaculture sector	
		(Relevant) government bodies	
		Food processing industry	
		Harbors	
	Blue Industry	Offshore energy sector	
		Fisheries	
		Regional development	
		Spatial planning	
Multi actor workshops			
18 participants to MAL; no individual-level data			
Land based	Agriculture	Regional development - rural development (1)	
		Agriculture research organizations (1)	
		Regional government: Regional development (2)	Agriculture
Cross-cutting	Spatial planning	Regional government: Spatial planning (1)	Spatial planning
		Consultancy (1)	General
	General	Government: Marine economic interests (1)	Nature
		Research institutions (1)	Fisheries and Aquaculture
	Nature	Regional government natural reserves (1)	Blue Industry

Sea based (coastal)	Blue Industry	Incubator (2)	
		Local government - harbor (1)	
		Regional government - R&D Blue Industry (1)	
	Fisheries and aquaculture (company)	1 participant	

MAL2 Greece

Figure 4: Stakeholder mapping for sectoral workshops in Greece resulting in D1.1. In total, 57 sectoral stakeholders (27 rural and 30 coastal) attended the workshops.

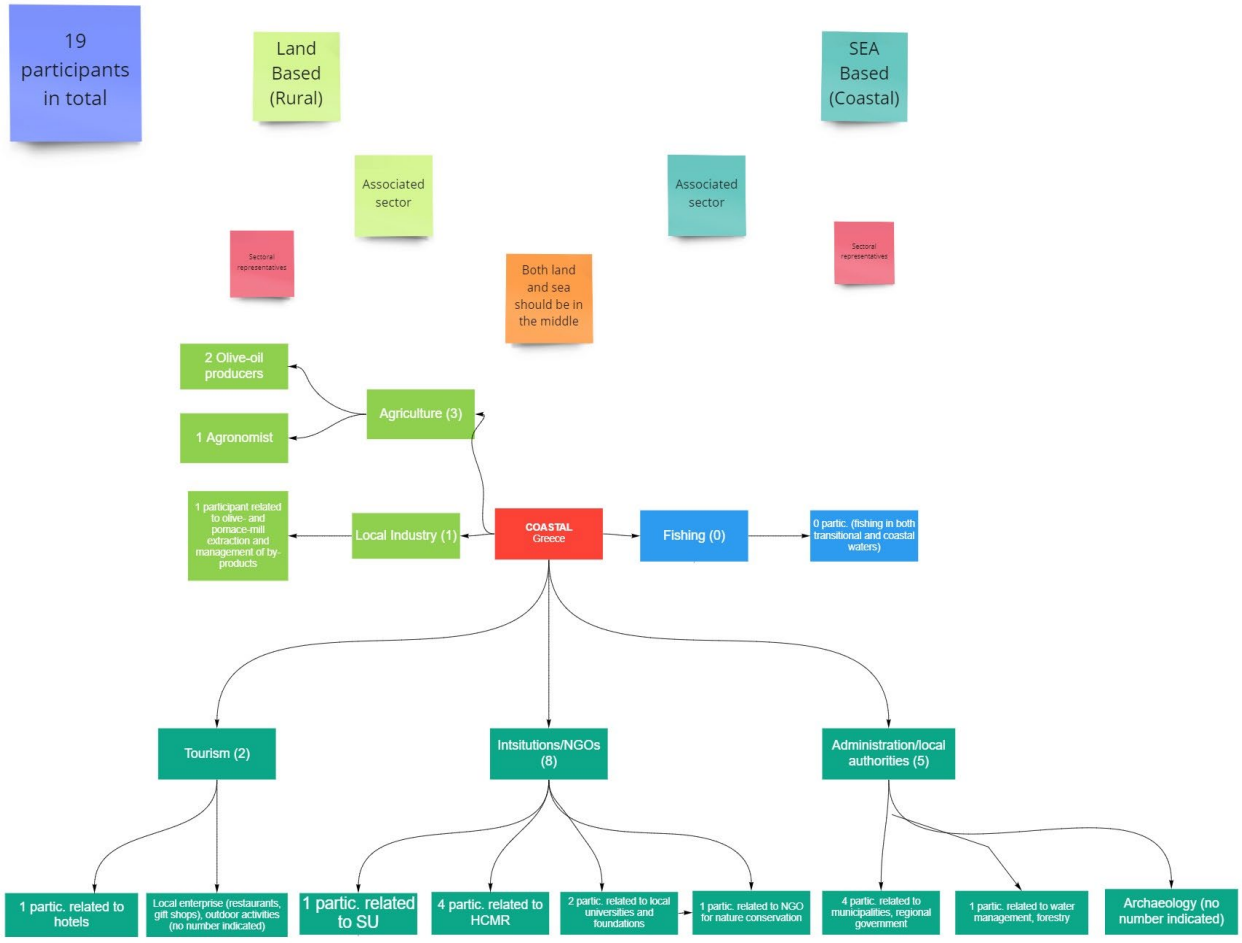

Figure 5: Stakeholder mapping identifying the participants in the first round of MAL in Greece. In total, 11 MAL representatives attended the workshops. These were the stakeholders who had demonstrated the greatest interest in the process and were willing to be contacted again and again without any complaints from the sector workshops.

Table 2: overview of stakeholders and number of representatives based on the mapping process from the MIRO boards.

Land/Sea based	Associated sector of workshop	Sectoral representatives			Type key
Sectoral workshops					
Total number of participants: 57 stakeholders; 11 actor partners					
Land based	Agriculture - producers	11 local farmers and agronomists (stakeholders)			Agriculture - producers
		5 actor partner representatives			Agricultural refineries/ industry
	Agricultural refineries/ industry	4 pomace- and olive mill industry stakeholders			Institutions and NGOS

		7 actor partner representatives (pomace- and olive mill industry)			Tourism
	Institutions and NGOS	14 stakeholders, including those of the actor partners	Local university and technical institute		Governance
			NGOs - conservation of birds and sea turtles		Fisheries
			Actor partner representatives	SU	
				HCMR	
				CVKKF	
Cross-cutting	Governance	4 actor partner representatives and 11 stakeholders (administration/local authorities)	Local municipality		
			Regional dept. for agriculture and fishing		
			Forestry department		
			Local water agency		
			Archeological agency		
			Decentralized regional government		
	Tourism	10 stakeholders (large hotel operators, small scale hotel owners, outdoor activities operators, gift shop owners, restaurateurs)			
		3 actor partner representatives			
Sea based	Fisheries	8 fishermen			
		4 actor partner representatives			
D4					
Total number of participants: 19					
Land based	Agriculture - producers (3)	2 olive-oil producers			**Type key**
		1 agronomist			
	Agricultural refineries/ local industry (1)	Olive- and pomace- mill extraction and management of byproducts (1)			Agriculture - producers

Cross-cutting	Tourism (2)	Hotels (1)			Agricultural refineries/ industry
		Local enterprise (restaurants, gift shops), outdoor activities (no number indicated)			Institutions and NGOS
	Institutions and NGOS (8)	SU (1)			Tourism
		HCMR (4)			Administration/local authorities
		Local universities and foundations (2)			Fisheries
		NGO for nature conservation (1)			
	Administration/local authorities (5)	Municipalities, regional government (4)			
		Water management, forestry (1)			
Sea based	Fisheries (0)	0 participants (fishing in both transitional and coastal waters)			

MAL3 Sweden

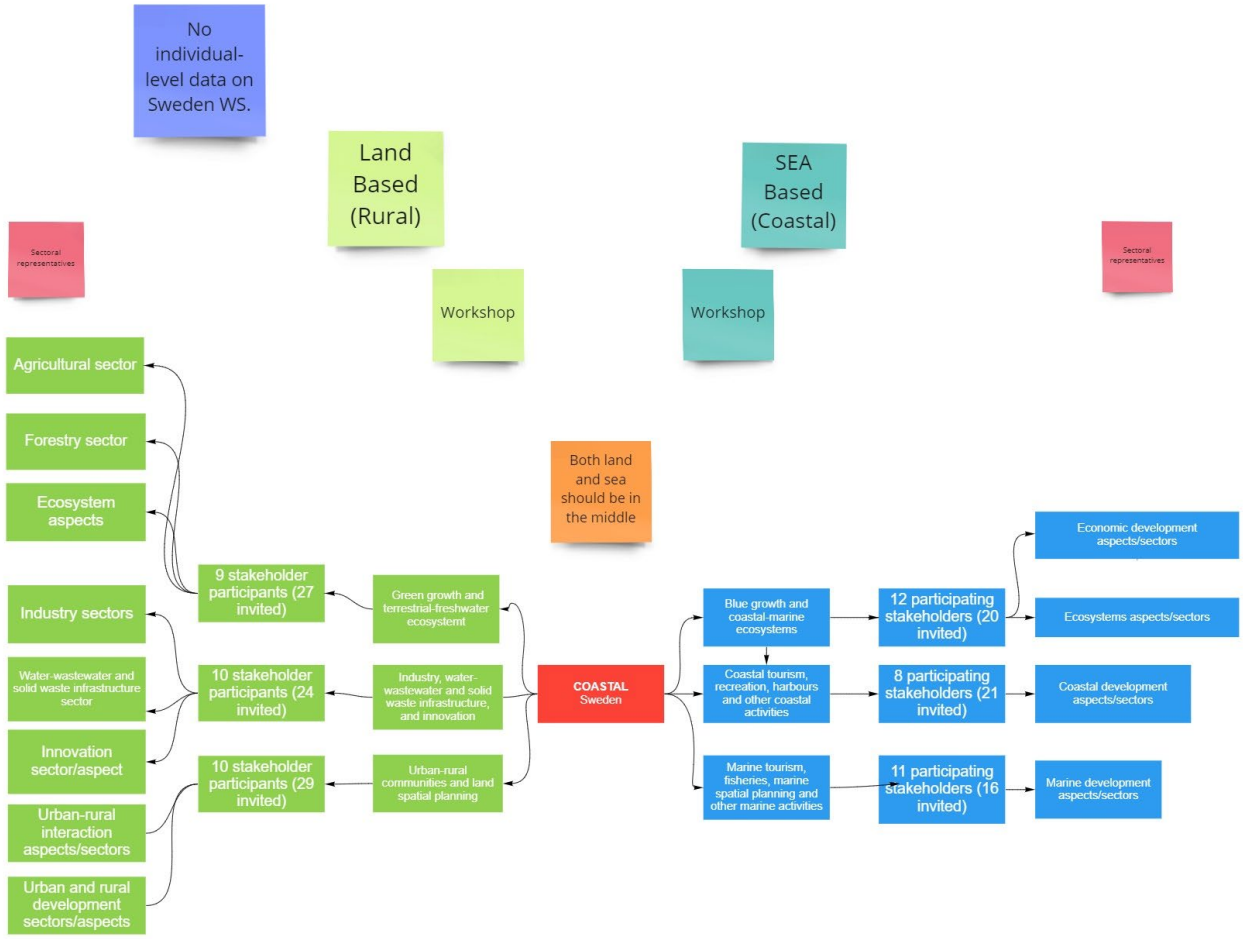

Figure 6: Swedish stakeholder mapping process for the sectoral workshops

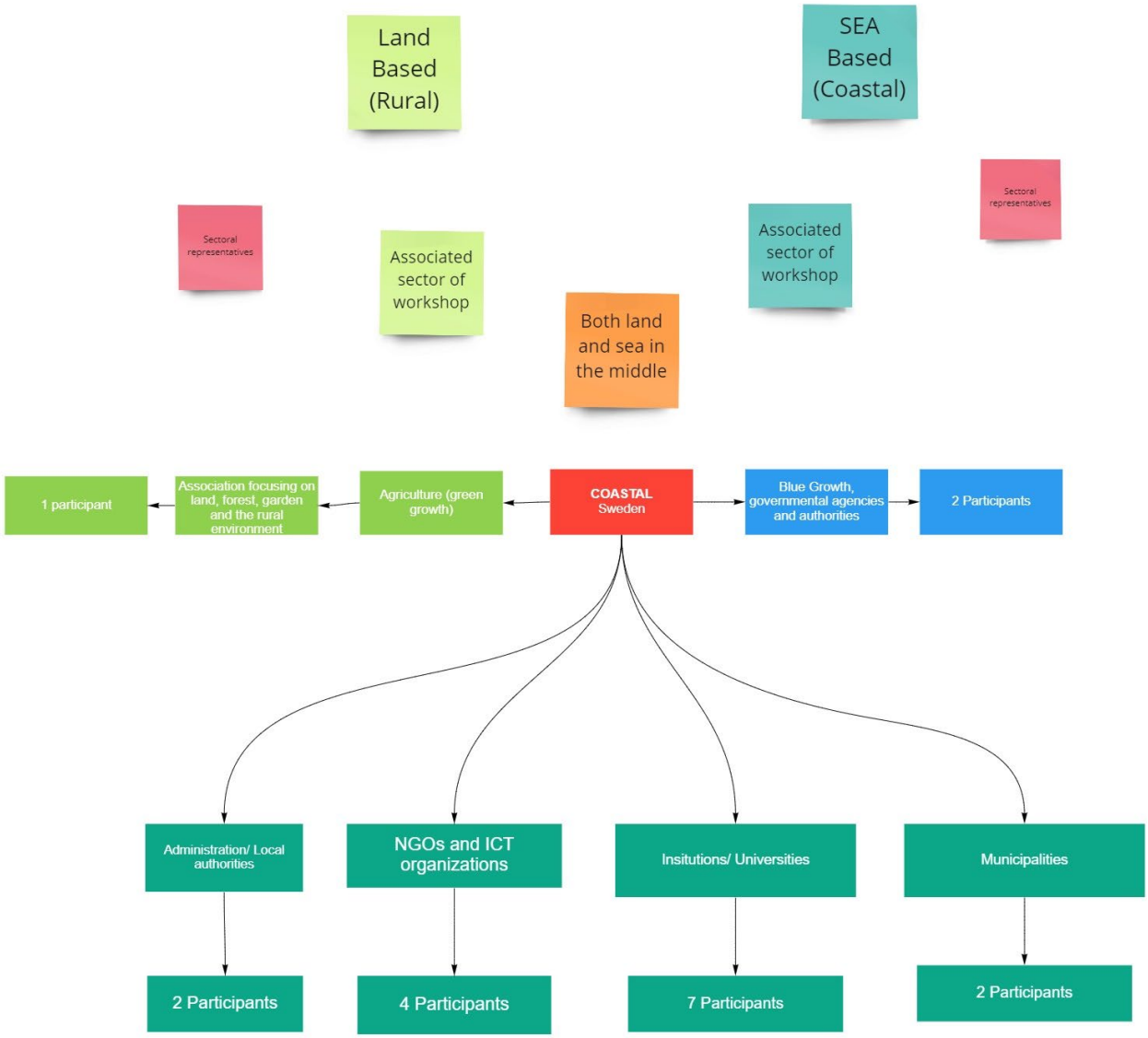

Figure 7: Swedish MAL stakeholder mapping from MIRO

Table 3: Overview of stakeholders in Swedish workshops

Land/Sea based	Workshop (title)	Number of stakeholders	Sectoral representatives	Type key
D3				
No individual-level data on Sweden workshops				
Land based	Green growth and terrestrial-freshwater ecosystems	9 (27 invited)	Agricultural sector Forestry sector Ecosystem aspects	

	Industry, water-wastewater and solid waste infrastructure, and innovation	10 (24 invited)	Industry sectors Water-wastewater and solid waste infrastructure sector Innovation sector/aspect
	Urban-rural communities and land spatial planning	10 (29 invited)	Urban-rural interaction aspects/sectors Urban and rural development sectors/aspects
Sea based (coastal)	Blue growth and coastal-marine ecosystems	12 (20 invited)	Economic development aspects/sectors Ecosystem aspects/sectors
	Coastal tourism, recreation, harbors and other coastal activities	8 (21 invited)	Coastal development aspects/sectors
	Marine tourism, fisheries, marine spatial planning and other marine activities	11 (16 invited)	Marine development aspects/sectors

Land/Sea based	Associated sector of workshop	Number of stakeholders	Sectoral representatives
D4			
No individual-level data on Sweden workshops			
Land based	Agriculture (green growth)	1	Association focusing on land, forest, garden and the rural environment
Cross-cutting	Administration/local authorities	2	
	NGOs and ICT organizations	4	
	Institutions/Universities	7	
	Municipalities	2	
Sea based (coastal)	Blue Growth, governmental agencies and authorities	2	

MAL4 France

Figure 8: France sectoral workshops, stakeholder mapping session in MIRO board

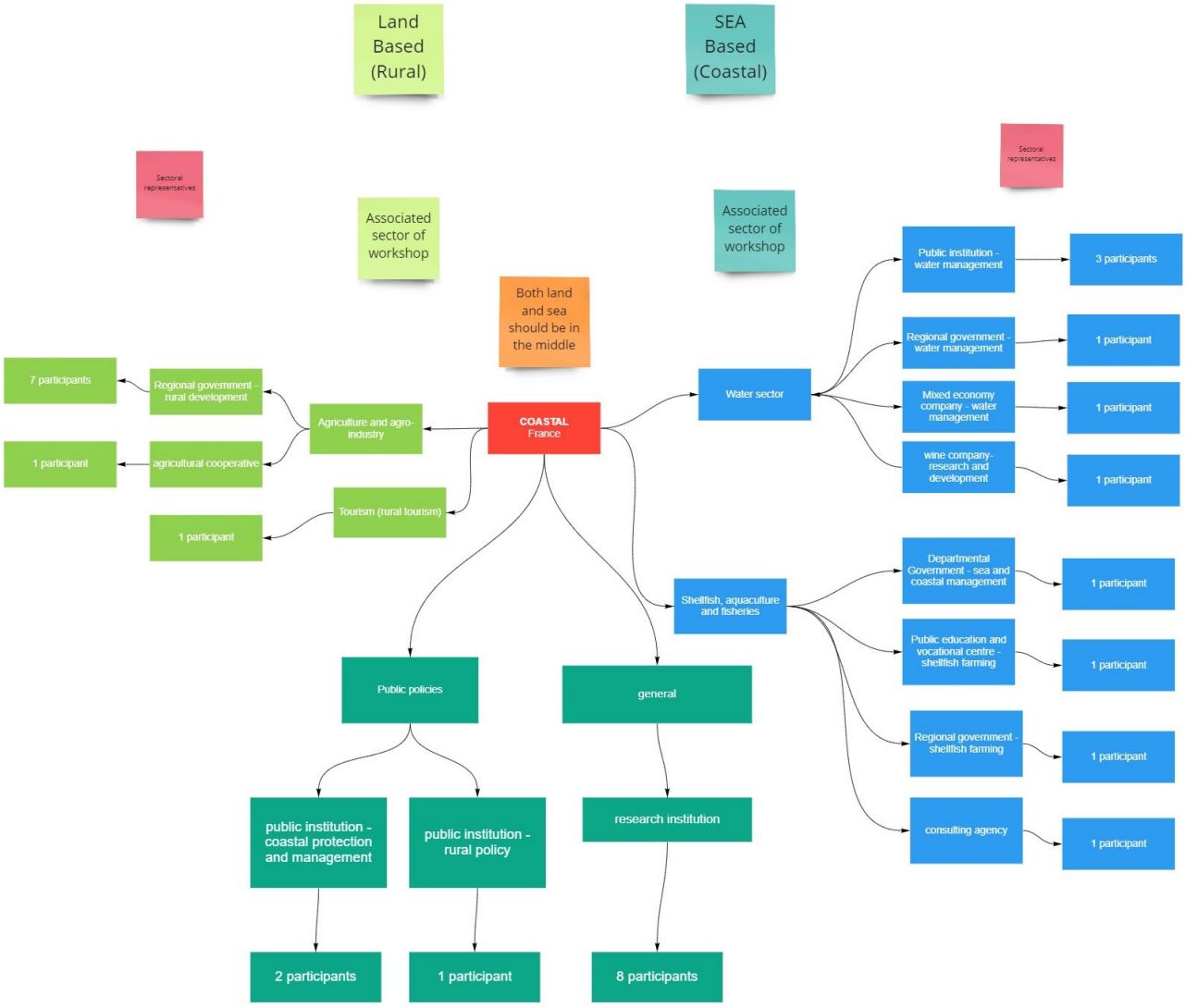

Figure 9: MAL stakeholder mapping for France.

Table 4: Excel datasheet about the stakeholders in French case area. Workshops included stakeholders from coastal (24) and rural (30) areas: Participants from inland rural areas (2 WS), coastal (2 WS); and from rural-coastal areas (2 WS for common concerns)

Land/Sea based (coastal)	Associated sector of workshop	Sectoral representatives
Sectoral workshops		
Land based	Agriculture and the agro industry	Economic organizations professionals Rural development agencies and farmers organizations/unions professionals Territorial or public authorities professionals
	Infrastructure/ports/energy	Development bodies Port managers Public authorities

		Territorial bodies Environmental protection agencies Public authorities Energy generating structures
Cross-cutting	Environmental policy/territorial development	Environmental organizations Water agencies Local administration
	Rural and coastal tourism	Environmental associations and management
Sea based (coastal)	Water sector	Regional economic agencies and organizations Development agencies Public authorities
	Shellfish farming/aquaculture/fishing	Shellfish farmers Management representatives Policy representatives

Land/Sea based	Associated sector of workshop	Sectoral representatives	Number of stakeholders
D4			
Land based	Agriculture and agro-industry	Regional government - rural development	7
		Agricultural cooperative	1
	Tourism (rural)		1
Cross-cutting	Public policies	Public institution - coastal protection and management	2
		Public institution - rural policy	1
	General	Research institution	8
Sea based (coastal)	Shellfish, aquaculture and fisheries	Departmental	
		Government - sea and coastal management	1
		Public education and vocational center - shellfish farming	1
		Regional government - shellfish farming	1
		Consulting agency	1
	Water sector	Public institution - water management	3
		Regional government - water management	1
		Mixed economy company - water management	1
		Wine company research and development	1

MAL 5 Romania

Figure 10: Romanian sectoral stakeholder mapping figure.

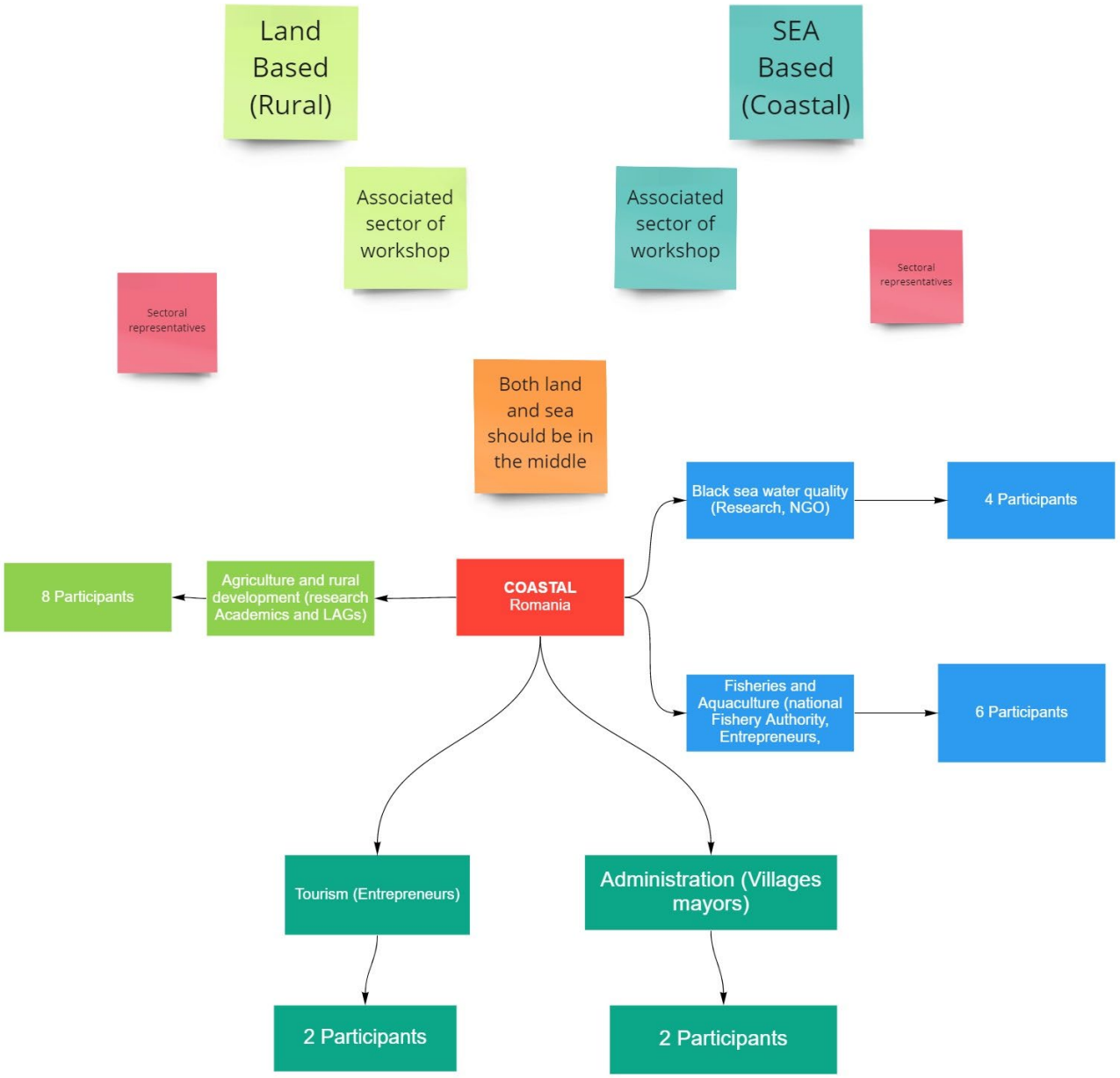

Figure 11: Romanian MAL stakeholder mapping

Table 5: Romanian overview of stakeholders.

Land/Sea based (coastal)	Workshop (title)	Number of stakeholders	Sectoral representatives
D3			
No individual-level data on Romania workshops			
Land based	Rural development of Danube's delta region	17	Administration University Research

			NGOs
	Agriculture, cross-compliance and ecosystem services	29	Local administration Action groups Farmers
	Rural tourism, recreation and other rural activities	19	Local administration Action groups Education sector Religious representatives Local entrepreneurs
Sea based (coastal)	Blue Growth - Industry, transport and administration	13	Public administration Oil and gas industry Transport sector
	Tourism	16	Administration Tourism associations Tourism operators
	Fisheries and aquaculture (marine)	7	Administrations NGOs Aquaculture Fisheries associations

Land/Sea based	Associated sector of workshop	Number of stakeholders	Sectoral representatives
D4			
No individual-level data on Romania workshops			
Land based	Agriculture and rural development	8	Research, Academics, LAGs
Cross-cutting	Tourism	2	Entrepreneurs (Danube Delta)
	Administration	2	Village's mayors
Sea based (coastal)	Black Sea water quality	4	Research, NGO
	Fisheries and Aquaculture	6	National Fishery Authority, Entrepreneurs, Research

MAL6 Spain

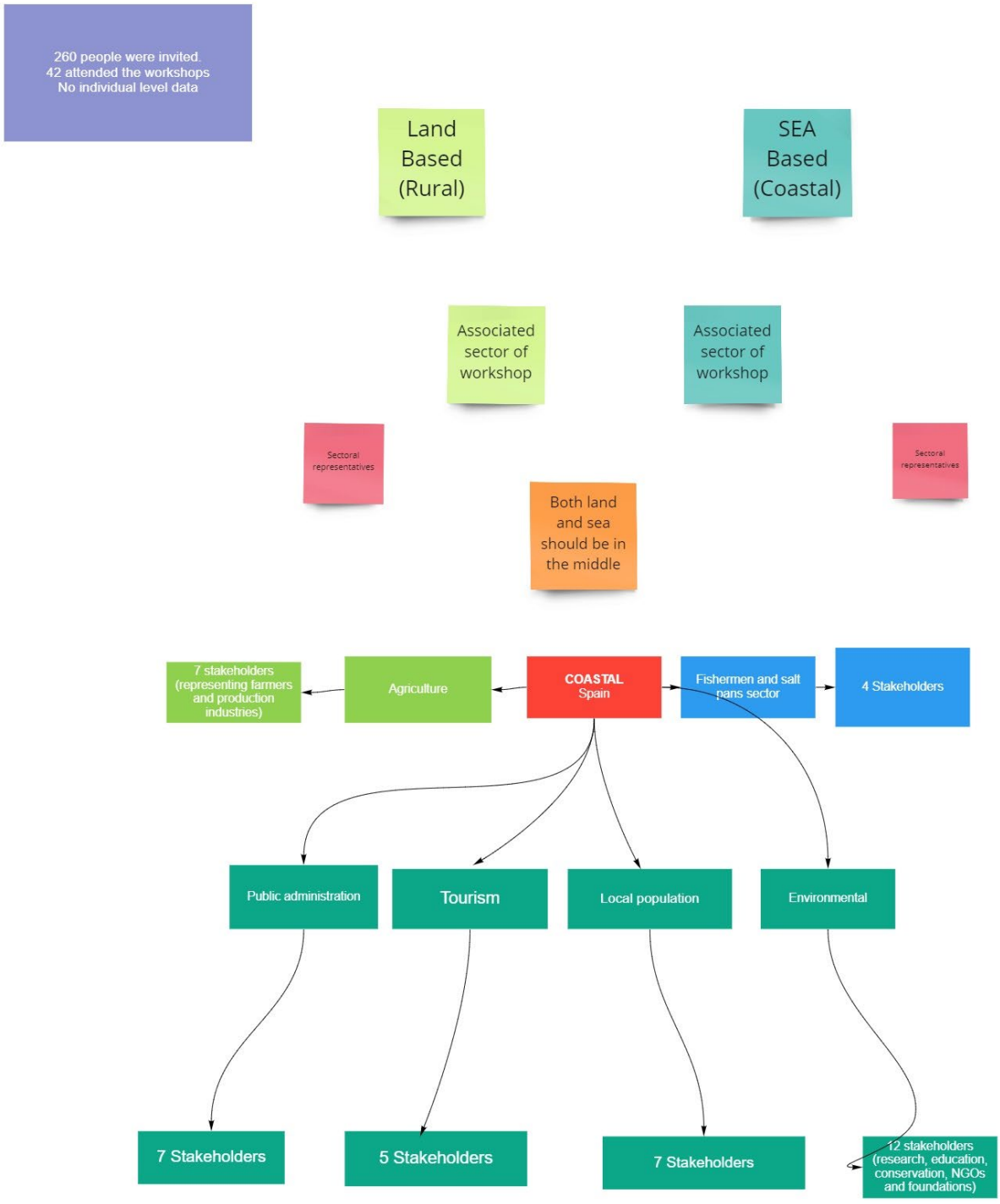

Figure 12: Spanish sectoral workshop - stakeholder mapping from MIRO

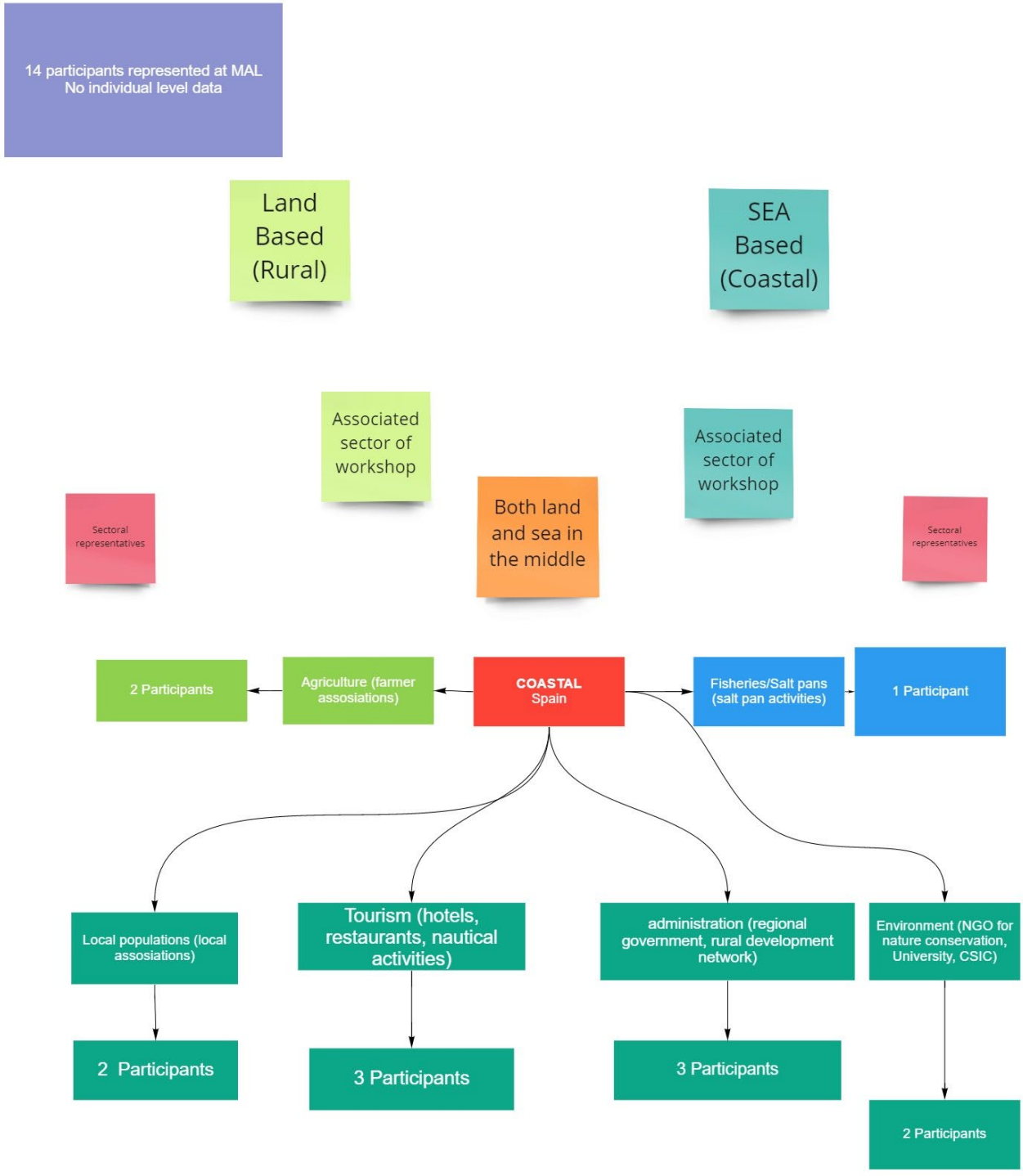

Figure 13: Stakeholder mapping from MIRO for the first MAL in Spain

Table 6: Spanish excel representation of stakeholder mapping and actual participation

Land/Sea based (coastal)	Associated sector of workshop	Sectoral representatives	Number of stakeholders	
Sectoral workshop				
260 people were invited; 42 attended the workshops; no individual-level data				
Land based	Agriculture	Farmers and production industries	7	Agriculture
Cross-cutting	Public administration		7	Environmental
	Tourism		5	Local population
	Local population		7	Tourism
	Environmental	Research, education, conservation, NGOs and foundations	12	Public administration
Sea based (coastal)	Fishermen and salt pans sector		4	Fishermen and salt pans sector

Land/Sea based	Associated sector of workshop	Sectoral representatives	Number of stakeholders	Type key
MAL workshop				
14 participants at MAL; no individual-level data				
Land based	Agriculture	Farmer associations	2	Agriculture
Cross-cutting	Local populations	Local associations	2	Environment
	Tourism	Hotels, restaurants, nautical activities	3	Local population
	Administration	Reginal govt., rural development network	3	Tourism
	Environment	NGO for nature conservation, university, CSIC	2	Administration
Sea based (coastal)	Fisheries/salt pans	Salt pan activities	1	Fishermen and salt pans sector

6 Methodology for the 2. round of multi-actor workshops (MAL II)

The system dynamics (SD) models developed in COASTAL were used to meet three requirements to serve their purpose: (1) addressing land-sea interactions in a synergistic manner, (2) alignment with existing or planned planning and administrative regulations, and (3) a focus on innovation and contribution to the formulation of practical business road maps and policy guidelines. The original description of the deliverable centers on reporting on the methodology used for the second round of multi-actor workshops, as specified in the DoA, where the aim was to validate the models developed by WP4 based on the conceptual mapping described in D1.1 and D1.2. This validation, referred to as "confidence building" in the SD modelling terminology (Forrester and Senge, 1980; Sterman, 2001) and can be aimed at analyzing the correctness and usefulness of the models by examining three aspects of the models: model structure (including boundaries and detail), model behavior (response to policies and scenarios) and policy implications. Given the objectives of COASTAL, and the progress of the modelling, not all tests were considered relevant. Therefore, the MALs focused the validation on the model structure and policy simulations. In addition, stakeholders can be expected to be less interested in the model design than model use, unless they have a modelling background and strong interest in SD modelling. Generally, this was not the case for the stakeholders invited as these were selected based on their relevance or involvement in the decision-making process.

We started the process for the second round of multi-actor workshops by ensuring that we would have a common approach towards workshops, by holding a meeting with all the MAL leaders and discussing whether there would be a script to follow and whether to hold the workshops digitally or in person. Keeping in mind that this discussion was taking place in the middle of the prolonged covid-19 pandemic (autumn 2020 – spring 2021), we were primarily leaning towards holding all workshops digitally, though some of the MALs were worried about elderly and less digitally-inclined participants effectively being kept from the workshops in this case.

However, given the social distancing rules that were in place throughout Europe at the time, we agreed to prepare for the workshop within the framework of a pandemic and opt for a virtual-only scenario.

The following is the script that all the MAL leaders were asked to follow, allowing room for adaptations to their specific situation at the time of the actual workshop, with sufficient flexibility to be adaptable to these situations while remaining comparable methodologically.

To ensure that we did not push the integration of the stakeholders too much, we also did allow for a separate section of the MAL that would give the facilitators the opportunity to also gather related information for WP3 and WP5 as well during the same workshop, reflected in section III of the script below.

COASTAL
Collaborative Land-Sea
Integration Platform

Script & agenda for virtual (preference) multi-actor workshop (round 2)
Total time: 225 min
Resources: Teams/Zoom, PowerPoint, VenSim, MIRO board,

PART I: PROJECT UPDATE (15 min total)

1. **Introduction to/Recap of project aims and objectives – 15 min**

Objective: provide insight in the project objectives and the objectives of this meeting; provide insight in SD modelling
What: The facilitator recapitulates what the project is about and why we organize this workshop:

- General project progress update
- Next steps Explaining workshop objectives and role of stakeholders
- Introducing stock-flow modelling, how to read and interpret the models: use of variables that are quantifiable, meaning of arrows, explain how relations are put in the model using a good example

PART II: Model Validation (90 min total)

2. **Model validation – 30 min**

Objective: provide an overview of the MAL's SD model(s)
What: The facilitator or local modeler explains the model and model simulations

- Plenary presentation of Stock Flow Model structures for Multi-Actor Lab (stock variables, feedback structures, drivers and business/policy indicators, intended use of the model)
- Visualization of distinct model simulations (if available)
- Confidence Building – tests available for stock flow models (use standard presentation provided by WP4)
- Instructions for validation breakouts (next part)

3. **Systemic Confidence building – 60 min**

Objective: validate the MAL's model for:

- Model purpose and boundaries.
- Structural validity.
- Behavioral validity: how should or does the model respond to different circumstances? Does it do that as expected?
- Model Policy relevance

What: the facilitator goes through the MAL's model and asks feedback to the participants following the guidelines provided in the pptx. We want them to focus on the connections between different sectors, and feedback structure rather than on their own specific sector. Recommendation to use VenSim and screensharing

- Breakouts: this session can be organized with the entire group, or in breakouts per theme, depending on the specific needs of the MAL, size of the workshop. See suggestions under Part III for the breakouts

Break – 15 min

PART III: Business Road Maps and Policy Recommendations (95 min)

Objectives: to identify and confirm solutions for the road maps and formulate the steps for the road maps. Please follow the WP3 guidelines.
Part IIIa: *Business and Policy solutions 15-30 min*
Identification of solutions to be translated into Business roadmap (1 to 3 solutions)
Identify with your stakeholders' solutions to be translated into business roadmaps
Focus on roadmaps that connect the different sectors together and create synergies. Do not focus on only one specific sector, but on the system as a whole.
Solutions can be business oriented, policy oriented, governance oriented.
Prioritize the solutions: focus on 1-3 solutions for the business roadmap.
A least one solution should be business oriented.
See WP3 guideline for further details

Part IIIb: *Business roadmap and policy recommendations*
A) Presentation of COASTAL business roadmap (purpose, content) 15 min

If using canvas on the MIRO board, get familiar with the canvas (and MIRO) prior to the workshop (the different steps, the information to be collected, the guided questions…).
Not all the canvas has to be filled in details during the workshop, the purpose of this exercise is to engage local stakeholders in a co-develop approach for the business roadmap, agree on the solutions to be focus on, identify the main steps (milestone to be reached) for the implementation of the proposed solution in a time series, highlighting key partnership(s) needed, collect as much information / ideas as possible from your local stakeholders.
If you have limited time, focus on STEP 1 to 4, STEP 4 being the core of the canvas: identifying the key steps for implementing the solution.

B) Co-developing the business roadmaps and policy recommendations 45 min
Breakouts rooms, number depending on system complexity, number of road maps, number of participants. Suggestion to have three breakouts. Each Breakout room will focus on one solution as explained below.

Each break out room will focus on one solution to be developed as a business roadmap using the canvas on a MIRO board if you decide to.
Make the breakout rooms based on the expertise of stakeholders related to the focused solution. (at least 2 different sectors represented - indicative number of persons per breakout rooms: 4 to 5 to facilitate interactions and participation of everyone)
If you are planning on using the canvas on a MIRO board: have one facilitator per breakout room who will oversee filling in the canvas on the MIRO board: https://miro.com/app/board/o9J_kkfy2VY=/

1. Prior to the workshop be sure that the facilitator has access to the Workshop MIRO board.
2. When creating the breakout room, be sure to allow "share screen" for the participant (thus the facilitator) in the breakout rooms.
3. Follow the canvas STEP by STEP, the questions in the boxes are indicative of the type of information needed but not limitative to.
4. Fill in the canvas with sticky note, use one color per steps, don't limit the number of notes to the space available within the canvas, be flexible and creative!
5. Mention any relevant inputs from stakeholders even if it doesn't fit in any boxes.

Tips for facilitator:

- Go step by step along the business canvas
- Lead the conversation by asking question to the participant

- You don't have to fill in the whole canvas with your local stakeholders, if participant don't have any information, answer to give, go to the next step
- Dedicate at least 15 minutes to step 4 – here choose the timeline appropriate to your case, you can have more, or less tasks/milestone then indicated in the canvas

Plenary evaluation

PART IV: conclusion and take-home message (10 min)

Objective: explain what the next steps are and how the participants can keep being involved in the project

- What*: The facilitator shortly discusses*
- *General conclusions and next steps*
- *Take home message Next steps in COASTAL and interaction with stakeholders (to be clarified)*
- *Closure*

Second round of multi-actor workshops -

To account for their experiences with the workshops, the MAL leaders were asked to consider the results of the validation of the models, considering all the workshop facilitators in MAL 01- MAL06 reported on similar challenges of this multi-actor workshop as opposed to those they had organized before. The first challenge was that it was in the middle of a pandemic. This made it impossible for them to hold the workshops live, and they had to have them digitally instead. In addition, not all MALs managed to complete their SD models to a stage allowing full validation and drawing lessons on a broad range of policy implications. Nevertheless, it was considered extremely useful to engage the stakeholders again for a renewed discussion of their priorities and the progress of the modelling.

Stakeholders

In terms of who the stakeholders were that attended this second multi-actor workshop, these were in general representatives that had participated in the previous workshops. MAL 1 – Greece – for example, had invited all the same people from the first round in a very targeted manner. They still had five new attendees, but these had been informed of the process from colleagues beforehand. More than 40% of those attending had in fact participated in both the sector workshops as well as the first round of MAL. The Belgian MAL, similarly, had a very targeted approach, but for different reasons. They had chosen subsections of their model that needed validation, since these were based on a targeted co-production effort with the actor partners and stakeholders earlier. As such, the stakeholders that were invited to this validation workshop were those that had the ability to see the big picture, which was critical for the model validation part. The Romanian MAL similarly took a more targeted approach to the stakeholders because of their validation needs. They also relied heavily on the actor partners to help bring in the stakeholders, and like with the Greek MAL, they too had different people as well, primarily because they were from local authorities, where specific persons were not always a given and people often changed roles – though the departments were the same. In all, the Romanians changed the stakeholders as the project progressed, because the focus of shifted in the models, and like the Belgian MAL, they therefore also chose a more targeted approach. The French, on the other hand, were in a similar position as the Greek ones, and had had a stable group of stakeholders throughout, and the ones attending the second MAL were the same as those in the first one. The Spanish, similarly, had seen some stability from the first to the second MAL. For the first one, they had invited more than 250 people to come – which they did not do in this second one since they had at that point identified who wanted to be connected to the project.

Format

In terms of the format (physical, virtual or hybrid) of the meeting, all MALs opted for the online format, and reported on limitations of this because of the lack of personal contact with and between stakeholders, affecting participation of stakeholders who consider this personal contact an added value of the workshop. The Greek MAL, however, who had originally been most skeptical to the concept, expressed surprise that it had gone better than they had anticipated. They commented on how people by this time had gotten more familiar with the online forum, and they had had the format in mind when designing the workshop in the first place. They mentioned though that in their experience, it had been more difficult to control the conversation in the online forum, but they did have discussions and they achieved the results they wanted despite their original hesitance of the format suitability for the workshop setting. The lack of informal chat was recurring in many of the MALs, including the Spanish one, where they talked about the lack of informal chats during coffee breaks, when the stakeholders could get to know one another, and this removed some of the benefits of the workshops. The Belgian MAL, however, reported more challenges. In this region specifically, the stakeholders were tired of meetings and being asked to comment on research projects frequently. Significantly fewer people attended workshop than usual because of the online format – and those that do were primarily government experts because they were the ones that were used to the online life. The workshop facilitators argued that farmers, however, after having spent a day working in the fields, did not want to come to an online meeting at night. You don't feel connected to other people online, and farmers, in their opinion, still preferred the personal contacts of in-person workshops as opposed to the online format with social contact, conversations, food and drinks, they argued.

The Romanian MAL, however, had other challenges related to online formats, focusing rather on the difficulties in keeping the stakeholders focused throughout the process, even with breaks. They argued though that the benefits of this format were that it was easier to calm then down online than when they had them all in the same room. This was echoed by the French MAL, which emphasized that even though people were used to the format now – like the Greek MAL had also stated – it was much less dynamic, and the meetings had to be much shorter as well, so the discussion was much shrunk. The Spanish MAL agreed with this point and commented on how people got exhausted in online meetings that lasted more than 2 hours, so you had to keep it tight. This was also commented on by the Swedish MAL, who also referred to how used all the stakeholders were to this format by now, but where the shorter time format meant that it was also difficult to keep track of time when people started discussing. The French MAL however felt that this format worked when you already knew the group of people you were talking to, but it reduces trust for those not that used to the format. They did comment on how the technology had changed though, and how there at least were not challenges with connections anymore as it had been in the beginning of the pandemic, when much time was lost to this. This was, however, what had happened to the Romanian MAL, when a sudden electrical problem cut the internet and made it impossible for them to continue the second MAL at that time. Given how difficult it was for them to get the stakeholders to attend the workshop in the first place, this proved to be a big challenge and a lot of frustration. Generally, all the MALs achieved their objectives despite the change in format and the challenges therein.

Validation method

The MAL leaders had all been provided with the script and had all attended the meeting where the project group for WP1 in collaboration with the project coordinator discussed and decided on the methodology to be used for examining the models, given the objective of the deliverable. The model validation itself was scheduled for 90 minutes total originally, where the facilitator would explain the model design and use first for 30 minutes after which the facilitator would ask for feedback on it, focusing on connections between different sectors and structure in general – instead of the sector specific ones.

For some of the MALs, this implied starting from a more basic level of analysis, explaining first what a model even is, as with the Greek MAL. The facilitators explained how models could be applied and showed the stakeholders some of the data they were using for model and where they got these from – to demonstrate that the data really existed and that the model was not based on the scientific knowledge alone. In this MAL, they then showed the stakeholders selected sub-models, explaining what challenges the models were linked with, how they were structured, what variables were included – all factors that affected the model. Finally, they discussed whether the model was well designed and could be used in practice (confidence building). After having done this, they asked the participants to comment on whether it made sense to them. Adding new variables was not an option at this stage in the project though and would have made the work of the modelling and their use for other WPs more complex, since several WPs built on these models.

The other MALs used the same format of presenting the models. The Belgian and the French MAL, however, chose to split up their models and their stakeholders into different groups when it came to the validation itself, rather than keeping all the stakeholders together during the process as the other MALs had done. The argument for this was the big difference between the prioritized sub models in terms of context, functionality and design. It was considered necessary to engage domain experts to give useful feedback on these models when it came to validation. As with the Greek MAL, too, they also set limitation in terms of calibrating the model, since, they argued, you must draw the line somewhere in terms of adding too much detail to the models. The French MAL also emphasized how difficult it is to bring stakeholders "into" the model itself – even the actor partners find this challenging, they said.

Additional tools used in the workshops

Because of the online format, and the lack of impromptu discussions and informal talks bringing the stakeholders closer and enabling more connections, the facilitators in the different MALs also looked for new methods for both keeping interest but also for recording data from the participants. With limitations on discussions when only one person can talk at a time, you could sometimes lose valuable information from one stakeholder or another. As such, many introduced tools for this, such as the Greek MALs, who used

quick polls throughout the validation session (www.sli.do) which the stakeholders could use throughout the online workshop and gave good breaks and more interaction. The Spanish and Swedish MAL similarly used methods for getting things "on paper" directly from the stakeholders, using Google Doc link during the meeting itself, while the others took standard notes during the meetings. All are good methods for gathering information, and all were adapted to the level of internet literacy and interest of the stakeholders that were present.

7 General conclusions on stakeholder-driven model validation

"People don't care about models though. Modelers do." This was a comment from one of the facilitators in the second MAL workshop. This was general feedback throughout the discussions with the MAL leaders about their experiences with the validation workshop. One commented on how stakeholders often think in short term actions, especially those from sectors, and as such, for modeling and validation purposes, these representatives from the public may not always be the ones needed. For most of the stakeholders, modeling is more interesting when you zoom in on specific challenges that affect them specifically as sectors – not the whole model with all sectors represented. On the other hand, a key objective of the COASTAL project was to improve and further develop the capacity for systemic thinking and problem solving related to land-sea synergy. In case stakeholders relied on models for their activities, this usually concerned sector-specific models addressing particular processes (for example hydrological processes). SD models are useful beyond this point, but other tools were deployed and developed in the process (mental models, scenarios and FCMs to name a few). The majority of the MAL leaders commented on how moving away from models, and over to the business road maps and future scenarios for WPs 3 and 5 in the other half of the workshop, often brought more enthusiasm as well (much to some of the modelers' chagrin). Bringing the issues away from quantitative modelling and down to earth and real-life issues makes this more tangible and interesting for many stakeholders. This demonstrates the importance of a good communication strategy to clarify the added value of quantitative modelling, and in particular SD modelling, in structuring mental models and identifying any inconsistencies and unanticipated impacts of policy actions proposed and discussed in stakeholder engagements. This was even more challenging for COASTAL as the (quantified) modelling required more time than anticipated and was partially carried out in parallel with the workshops. Well designed, focused and not overly complex, models are the first requirement for promoting their use among stakeholders. Obviously, the online mode of interaction with stakeholders was generally also not so appealing to neither the facilitators or the participants, and all expressed an interest in holding more validation workshops in person, and with specific people or groups, once social gathering restrictions across Europe eased up. Because these workshops did not end with this deliverable. All the MALs expressed that they needed more workshops and interactions with the stakeholders – not less – in the future as well to deepen the discussions and further clarify the added value of synergistic tools for supporting rural and coastal development. Possibly such workshops should not focus on validation in the first place.

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9 METHODOLOGY ARTICLE PUBLISHED IN FRONTIERS IN SUSTAINABILITY

The following article was accepted for publication in the special issue on multi-criteria decision making in Frontiers in Sustainability on October 19th, 2021. It is available in the Funders & Tenders portal.

Abstract:
To reach the global aspiration of 17 ambitious SDGs, local realities must be integrated. Often, models are developed based on quantitative statistical data sources from databases on environmental indicators or economics to assess how a given SDG can be achieved. This process however removes the local realities from the equation. How can you best include stakeholders in this mathematical modelling processes distanced from their local realities, though, and ensure higher probability of future compliance with top-down global decisions that may have local consequences once implemented? When researching stakeholder involvement and their ability to form public policy, their opinions often get reported as a single assessment, like counting the fish in the ocean once and stating that as a permanent result. Too seldom do stakeholders get invited back and given the opportunity to validate results and allow researchers to adjust their models based on on-the-ground validation or change requests. We tested the full integration of stakeholders in the modelling process of environmental topics in six different case areas across Europe, with each area holding six sectoral and one inter-sectoral workshops. In these workshops, the scope of the issues relevant to the stakeholders was driven by first the sectoral priorities of the given sector, followed by a merging of issues. In this process, we were able to identify what the commonalities between different sectors were and where synergies lay in terms of governance paths. These results were then returned to the stakeholders in a mixed session where they were able to come with feedback and advice on the results researchers presented, so that the models reflected more closely the perceptions of the regional actors. We present these methods and reflect on the challenges and opportunities of using this deep-integration method to integrate qualitative data from stakeholder inclusion in a quantitative model.

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METHODS
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Understanding Stakeholder Synergies Through System Dynamics: Integrating Multi-Sectoral Stakeholder Narratives Into Quantitative Environmental Models

Rachel Gjelsvik Tiller[1], Georgia Destouni[2], Mariana Golumbeanu[3], Zahra Kalantari[2], Erasmia Kastanidi[4], Luminita Lazar[3], Jean-Marie Lescot[5], Giorgos Maneas[2], Javier Martínez-López[6], Bastiaan Notebaert[7], Samaneh Seifollahi-Aghmiuni[2], Florin Timofte[3], Joris de Vente[6], Francoise Vernier[5] and Jean-Luc de Kok[7]*

[1] SINTEF Ocean, Trondheim, Norway, [2] Department of Physical Geography, Stockholm University, Stockholm, Sweden, [3] National Institute for Marine Research and Development Grigore Antipa (INCDM), Constanta, Romania, [4] Hellenic Centre for Marine Research (HCMR), Anavyssos, Greece, [5] Department of Territories, Institut National de recherche pour l'agriculture, l'alimentation et l'environnement (INRAE), Paris, France, [6] Consejo Superior de Investigaciones Científicas (CSIC), Madrid, Spain, [7] Flemish Institute for Technological Research (VITO), Antwerp, Belgium

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Edited by:
Manel SANSA,
France Energies Marines, France

Reviewed by:
Florentin Smarandache,
University of New Mexico, United States
SARA TONIOLO,
University of Padua, Italy

***Correspondence:**
Rachel Gjelsvik Tiller
rachel.tiller@sintef.no

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To reach the global aspiration of 17 ambitious SDGs, local realities must be integrated. Often, models are developed based on quantitative statistical data sources from databases on environmental indicators or economics to assess how a given SDG can be achieved. This process however removes the local realities from the equation. How can you best include stakeholders in this mathematical modelling processes distanced from their local realities, though, and ensure higher probability of future compliance with top-down global decisions that may have local consequences once implemented? When researching stakeholder involvement and their ability to form public policy, their opinions often get reported as a single assessment, like counting the fish in the ocean once and stating that as a permanent result. Too seldom do stakeholders get invited back and given the opportunity to validate results and allow researchers to adjust their models based on on-the-ground validation or change requests. We tested the full integration of stakeholders in the modelling process of environmental topics in six different case areas across Europe, with each area holding six sectoral and one inter-sectoral workshops. In these workshops, the scope of the issues relevant to the stakeholders was driven by first the sectoral priorities of the given sector, followed by a merging of issues. In this process, we were able to identify what the commonalities between different sectors were and where synergies lay in terms of governance paths. These results were then returned to the stakeholders in a mixed session where they were able to come with feedback and advice on the results researchers presented, so that the models reflected more closely the perceptions of the regional actors. We present these methods and reflect on the challenges and opportunities of using this deep-integration method to integrate qualitative data from stakeholder inclusion in a quantitative model.

Keywords: sustainable development goals–SDG, stakeholder, conceptual modeling approach, workshops, compliance, qualitative study

INTRODUCTION

In 2015, the United Nations General Assembly formulated the 17 sustainable development goals (SDGs) under the 2030 Agenda for Sustainable Development (Kamau et al., 2018). Global aspirations, however, must inevitably meet the realities of stakeholders and policy makers charged with implementing global aspirations. The inclusion of stakeholders and "information gatekeepers[1]" from the start of any implementation phase is as such arguably critical to achieve the SDGs. The benefits of including the priorities of local agents in a bottom-up approach to governance are multiple. First, by ensuring that local voices are heard, knowledge is exploited, and the process is perceived as more transparent, giving users ownership in decisions that are taken. Local interaction among stakeholders also has an important impact with respect to information sharing and comprehension in decision making (Reed, 2008; De Vente et al., 2016). It promotes, for example, co-creation of knowledge and social learning, including the spread of common understandings of concepts, such as targets and indicators and what this really means on the ground. It also discusses approaches to reaching goals, discussions around the specificities of the sustainability goal in question, as well as challenges and solutions (Smith, 1980; Clark, 1994; Estellie Smith, 1995; Bruckmeier and Höj Larsen, 2008; Leys and Vanclay, 2011). Combined, this can create increased legitimacy and encourage long-term compliance with resultant legislations (Sun, 2017; Coleman et al., 2019).

This development of a broad epistemic community or "community of shared knowledge" (Haas, 1989) that encompasses the key shareholders in a given issue-and geographical area, is key to achieving global aspirations such as the SDGs. Stakeholder integration methods, practices and ideals vary greatly though (Mielke et al., 2017). We argue that the use of an overarching methodology for monitoring a given global challenge at the local level can be beneficial. Generally speaking, developing methods for facilitating comparative analysis between different countries, local communities and socio-economic regions is important to observing the proceedings toward reaching a global goal–made possible when epistemic communities are activated (Herrera, 2019). Ensuring results are comparable demands an adaptive methodological solution within the context of deep integration of stakeholders and close collaboration of researchers across disciplinary boundaries though. In the context of this article, these interfaces are between coastal and rural areas, mathematical modeling and qualitative perception workshops, and data driven by climatic as well as non-climatic stressors (Cottrell et al., 2018).

In this article, we investigate the interface between qualitative narratives and mathematical modeling to develop a holistic decision-making support tool. We offer results from a process of performing this kind of cross-sectoral, transdisciplinary and socio-political comparative analysis. Our analysis was driven by a demand from decision makers for predictive tools and evidence-based analysis of the impacts and effectiveness of management alternatives that can address socio-ecological variables. We therefore developed an inter-*and* transdisciplinary[2] multi-methodological approach of taking qualitative narratives from participatory stakeholder workshops and transforming these into causal loop diagrams and systems for decision support. This is an approach that allows us to address a number of governance questions from global to local and back again, and requires the mix of inter-and intra-disciplinary methods, with a deep integration of representatives from epistemic communities and industry sectors in the given case areas (Brannen, 2005; Elliott, 2005; Kelle, 2006). It's a methodological innovation in that it not only combines qualitative and quantitative methods, but that it does so comparatively–testing it out in six different locations in Europe with diverse inter-and intra-socio-geographical and cultural contexts as well as issue areas, while demonstrating that the method can adapt to different situations while still keeping a comparative element.

We did this within the context of assessing land-sea interactions under different climatic and anthropogenic stressors in six case areas across Europe (Belgium, Greece, Sweden, Romania, Spain and France)[3]. We studied discourse and narratives from 36 sectorial participatory workshop discussions (six in each case area). We then developed conceptual maps from each sector and merged these into combined inter-sectoral causal loop diagrams, capturing the system feedback structures across the sectors. These were then brought back to the stakeholders for feedback and validation in a combined iterative multi-sector workshop. Data from these exercises allowed us to better understand how participants perceive their individual and group roles. It also offered insights into their attitudes, beliefs, and knowledge. This methodological approach may subsequently be one of the methods in the toolbox that can help researchers approach and involve actors in research where results are important for a given decision-making process. Such involvement can ensure more stakeholder legitimacy with the political process, and within the context of this article, results can be translated toward policy advice toward reaching the global aspirations of multiple of the global sustainable development goals.

BLUE-GREEN AND COASTAL-RURAL INTERACTIONS–FROM GLOBAL TO LOCAL

Current solutions for achieving stakeholder integration are in many cases based on working with them in parallel sectors–both

[1]Gatekeepers are "… individuals and groups who collect information regarding the organizations' surroundings, filter it, translate it into the organizations' language and distribute it for use within the organization." The term was first coined by Lewin (1943), and he described it as a metaphorical entrance to a tunnel, via a gate, where the traffic within is controlled by said Gatekeeper, who determines the distribution of information that travels through to reach its destination, Lewin (1943) and Bouhnik and Giat (2015).

[2]For more in-depth reading on the three most common definitions of integrated studies—multi-, inter-and trans-disciplinary definitions–specifically in the field of sustainability, we recommend reading for example Stock and Burton (2011).

[3]This study was conducted as part of the Horizon 2020 project COASTAL—https://h2020-coastal.eu/.

in terms of aquatic and terrestrial systems. Human beings are however affected by externalities caused by interactions across multiple sectors and ecosystems (Langhans et al., 2019). These interactions affect the lives of people across regions. Globally for example, the rural population has declined as a percentage of the total population from 66% in 1960 to 44.7% in 2018 (The World Bank, 2018). This is even lower in the EU, where the rural areas are home of only 29.1% of the population (Eurostat, 2018). Rural development in the EU faces highly dynamic challenges including global competition, decreasing population densities, lack of employment, aging farm managers and difficulty in taking over farms, desertification, land abandonment, and climate change. These significant challenges were also addressed by the EU Strategic Guidelines for Rural Development (European Commission, 2006). The aim of these guidelines was to improve the competitiveness of the green sector–such as agriculture and forestry–taking into consideration the natural environment, quality of life while simultaneously ensuring a diversity of the rural economy.

At the same time, the coastal areas have had opposite experiences compared to the rural areas, both globally and in the EU. In the former, 2.4 billion people live within 100 km (60 miles) from the coast (United Nations, 2017). In the EU, nearly *half* the population lives within only 50 km of the sea. In fact, in 2001, near 15% of the entire EU population lived within half a km from the coast—demonstrating the importance of the blue economy, which employed 4 million people and had a recorded profit of 74.3 billion Euro in 2017 (European Environment Agency, 2016; European Commission, 2019b). The blue economy could potentially contribute to rural development by providing ecosystem goods and services and business opportunities to these areas though. However, blue growth itself also affects coastal ecosystems negatively. This puts them under increasing pressure from a number of industries, including fisheries, aquaculture, energy production, tourism, and shipping. Coastal ecosystems are similarly under pressure from land-based human activities, such as forestry, agriculture and agro-industries. For instance, the current, mainstream agro-environmental policies have failed to effectively lower the nutrient loads below target values from economic activities in rural areas to coastal ecosystems. Consequently, the attainment of good water status defined by the 2015 target laid down in the European Water Framework Directive (WFD) has had to be postponed to 2021, or even 2027 for many watercourses (European Commission, 2019a). Integrated and long-term approaches, as laid out in the EU Common Agricultural Policy, EU Marine Framework Directive and EU Green Deal, and through SDG 14.1 are therefore needed to be implemented at the local scale (United Nations, 2015) to have upstream efficacy at a governance level (Martínez-López et al., 2019a).

Existing research and policy primarily address issues from either a coastal-or rural-based perspectives in isolation, though. This makes it ill-adapted to support effective land-sea integration at the local, regional and macro-regional scale and achieving the related SDGs at the global level. User-friendly instruments for identifying and analyzing challenges and opportunities from an integrated perspective are scarce. It is therefore also difficult to derive effective policy recommendations that are grounded locally from a multi-sectoral perspective. To be effective and accepted, tools for business and policy support need to be based on a participatory, multi-actor approaches. Within the current context, it also needs to include both rural and coastal sectors as well. This will allow us to enhance and exploit co-creation and take into account the different levels of governance and systemic transitions. It will also ensure that the method is sufficiently flexible for adaptations (Martínez-López et al., 2019b), which is important when comparing perceptions for policy advice across social and geographical aspects of human activities.

DESCRIPTION OF METHODS

Considering this, the following article presents an example of an adaptive multi-sector implementation of a mix of qualitative and quantitative methodologies. These have allowed us to combine local and scientific knowledge in a collaborative mental mapping framework. We present strengths and weaknesses of the mix of methods and compare results among case studies. The methodology takes into consideration the impacts of decision-making choices and feedback mechanisms on coastal and rural development. It does so by enabling us to interpret participatory conceptual maps and identify problems, to develop practical and robust business road maps and strategic policy recommendations. These are in turn aimed at improving sustainable development and ensure allow implementation grounded in realistic local goals.

Combining Tools

The process of using a mix of qualitative and quantitative methods to obtain some holistic result is not unproblematic, but it's also no longer unusual and is now an accepted methodological approach. Focusing on creating outcomes that are more generalizable from qualitative approaches can deepen our understanding. It is also very suitable when results need to be useful for interventions and policies (Strijker et al., 2020), as in the case of the current study. We understood that results from approaching social phenomenon around coastal-rural interactions when using both qualitative and quantitative approaches in combination could give us findings that for example: (1) *corroborated one* other; (2) *elaborated* on one another, with for example the narratives exemplifying results from the modeling process; (3) *complemented* each other, in terms of being different but in combination could give more insight into the research question; or (4) *contradict* one other, with for example stakeholders and expert workshop results conflicting with that of the models (Morgan, 1998; Brannen, 2005).

We prepared for these challenges and potential outcomes while planning for the workshops, among others with building in several steps into the method. These included validation of results from the workshops by smaller inter-sectoral groups. These groups were to consider the interpretations of the research group in the case areas after the initial conceptual modeling exercises. For the workshops, we first used the "*Systems Thinking*" method (Senge, 1990; Forrester, 1994; Sterman, 2000). System

thinking uses a stepwise problem-solving approach that allows researchers and practitioners to understand problems from the underlying system feedback structure. This is done by eliciting this information interactively from stakeholders who live and work in the given system, such as fisheries or olive oil industry for example. Systems thinking and systems dynamics exploit transparent, graphical tools that can be used in live sessions to explore real world problems and discuss solutions and obstacles. This process takes the form of group identification of components and processes the participants consider essential. In this case, we focused on the functioning of their given land-sea "system." The aim of the research and the stakeholder interactions was to develop an actor-driven representation of this system. These models are graphical visualizations of a basic construct of the system feedback structure, and rely on both qualitative and subjective interpretations of the results from the workshops (Bredehoeft, 2005).

In this study, the conceptual model consisted of components or variables with key relationships between them. These highlighted how the given stakeholders perceived their system, in different socio-geographical regions, including transition pathways toward a desired future state of the system. Understanding the role of system feedback is important for understanding the response of the system to different pressures or management actions, since these can lead to unexpected and counter-intuitive results (Sterman, 2000). The purpose of a conceptual model is two-fold. We can either use it as a research tool for further exploration and quantitative modeling, or as a management tool for consensus building amongst stakeholders. In either case, we can explore future scenarios and actions at local, regional or global levels of governance (Flood, 2010; BeLue et al., 2012). These conceptual models are also known as "concept networks" or "concepts maps" (Axelrod, 2015).

For the purposes of this study, we planned six sectoral workshops in six case areas. The aim of these workshops was to include policy makers, business entrepreneurs, sector representatives, and domain experts to participate in exploring the relevant land-sea interactions from a coastal or rural perspective in each case area. They were encouraged to consider the motivations and barriers for collaboration between regions as well as sectors *within* their region. They were also asked to consider both positive and negative externalities. We engaged them in an open discussion, using the conceptualization methods from systems thinking. In this process, we identified the main issues, opportunities, obstacles for sustainable development and inter-sectoral synergies in the context of land-sea interaction. To do this, however, and to ensure cross country and sectoral comparison, there was a need for methodological coherence. We therefore started the process by facilitating a workshop with experts from all the six case areas themselves to establish initial drivers of the mental modeling exercise in a flexible and unbiased manner. This method of developing the drivers has been used in a number of studies previously (Tiller et al., 2013, 2016; Salgado et al., 2015; Tiller and Richards, 2015, 2018).

The final list of drivers decided upon by the experts was the following:

1. Water;
2. Human Consumption Pattern;
3. Regulation/Policy;
4. Temperature;
5. Human Migration;
6. Pollution; and
7. Infrastructure.

Water was related to both quality and quantity, saline and fresh according to the experts at this initial workshop—and affected all stakeholders, from urban dwellers to farmers and fishers across case areas. **Human consumption pattern** was another driver that was considered important, though there were some discussions around the semantics around it. The emphasis was on how the middle class is growing globally, and as such, the demand for more products is increasing as well. Some of the experts felt that the word "Lifestyle" would encompass more, as it would bring in connotations of millennials, smartphones, urbanization, organic food etc. that all are results of changes in human consumption patterns, and simultaneously influence many stakeholder groups. **Regulations and policy** are natural drivers in any system and there was not much discussion around it. **Temperature** was another given, though some of the case area experts argued for "climate change" as a variable instead. **Human migration** was chosen since this is an era in which we see a large movement of people and a lot of challenges associated with this. With human migration, we did not consider only immigration from other nations, but also migration within a nation, often from urban or rural to coastal areas. **Pollution** was included as well, since many sectors struggle with this, both in terms of being affected by it and being made responsible for it—and as such it was considered an important topic to bring up. Finally, **infrastructure** was the last driver we considered important enough to reach the "top level" in our mind maps. This also includes a lot, including roads, public transport, airports, internet, canals etc.

Conceptual/Mental Mapping Using VenSim®

The aim of the drivers decided upon in the initial workshop was to use them as conversations starters in participatory workshops where the development of mental models of different stakeholder groups would take place (**Figure 1**). Several user-friendly software platforms are available for the design, testing and application of these models (Sterman, 2000). Examples are Stella®, VenSim®, PowerSim®, ExtendSim®. We decided to use VenSim® for the mental mapping and modeling[4]. This was because of its user-friendliness, and the free license provided. The standard version used is VenSim PLE (Personal Learning Edition), which has the features needed for the mental mapping activities and the SD modeling (Kok and Viaene, 2018). In addition, its functionalities allowed for plug-and-play construction of mental maps by adding variables, issues and the linkages between them.

[4]A freeware version of VenSim® is available online (https://vensim.com/free-download/).

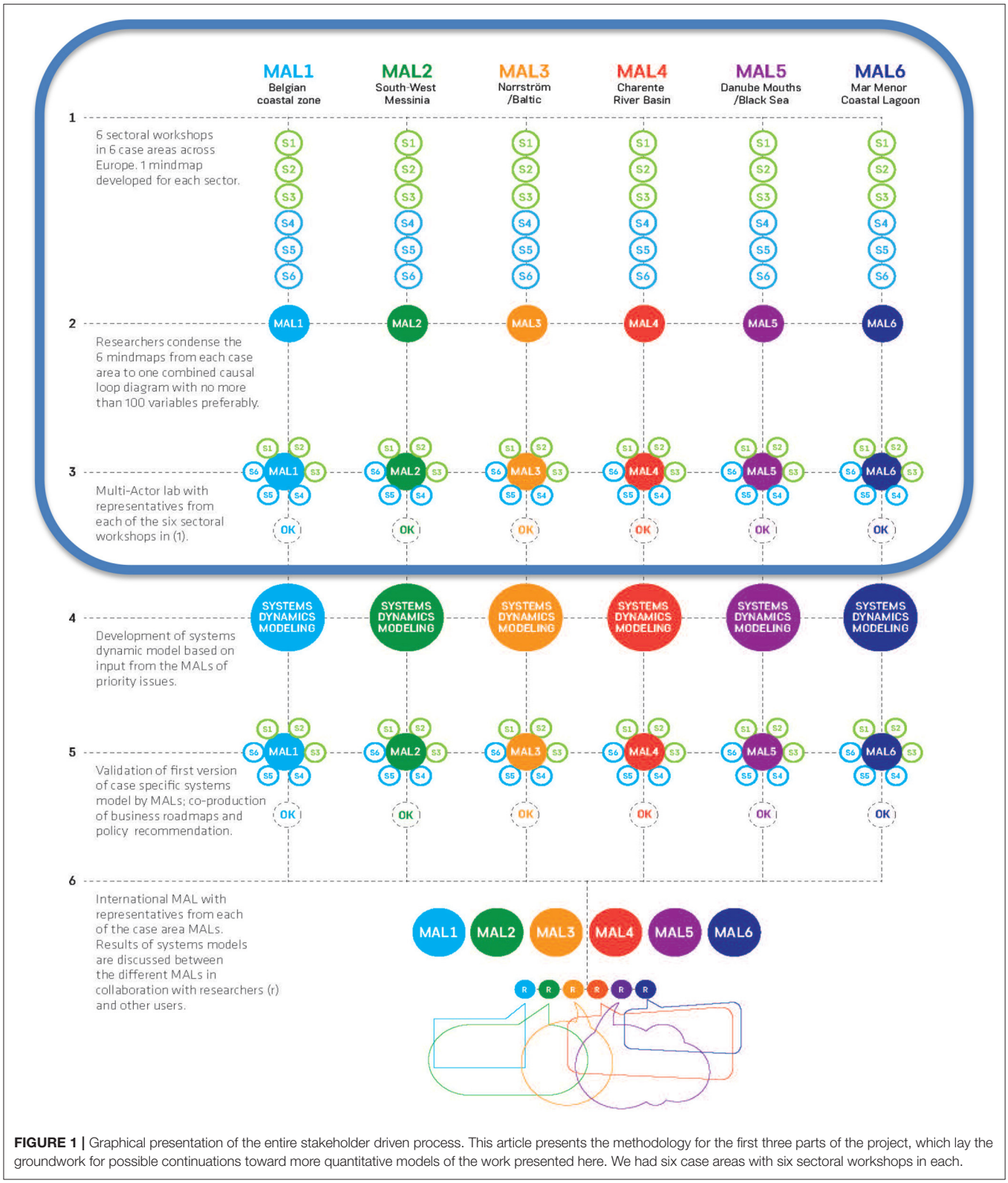

FIGURE 1 | Graphical presentation of the entire stakeholder driven process. This article presents the methodology for the first three parts of the project, which lay the groundwork for possible continuations toward more quantitative models of the work presented here. We had six case areas with six sectoral workshops in each.

Stakeholder Selection

We selected the groups of stakeholders for the workshops in each of the six case areas using the snowball method (Biernacki and Waldorf, 1981). Participatory approaches support stakeholder involvement, through which stakeholders can exchange their share experiences, learn about other perspectives. These

approaches also lets stakeholders examine their perceptions to better understand the behavior of the system (Sterman, 2000). We used this approach because the quality of the results sampled from this group would outweigh the relatively small number of informants the method usually produces, which is often the case in qualitative research studies. In the case of stakeholder workshops, experience had shown us that larger groups can sometimes be ineffective and not provide the detailed and contextual information desired by the researcher. For the purposes of the current study, we therefore considered fifteen participants to be the maximum of what would provide a holistic narrative where all participants were provided ample opportunities to share their perceptions, while allowing for adaptations when necessary. The sample size can be as small as one or two as well, if this participant has information which is of critical value for the given sector and advances the research toward a specific goal (Sandelowski, 1995).

From a natural science and engineering perspective, $n \leq 15$ participants may seem like a small number of observations. However, samples in qualitative research tend to be smaller than one would expect in the more numerical sciences. This smaller sample aids in supporting the depth of problem driven analysis that is fundamental to the mode of inquiry we use in this study. The samples were also purposive in that they were selected by virtue of the respondent's capacity to provide richly textured information, relevant to the phenomenon under investigation. As such, this purposive sampling (as opposed to probability sampling that is customarily employed in quantitative research) selects "information-rich" cases or respondents. The more useful the data sampled from each of the participant during these sessions, the fewer respondents are needed. In fact, research has shown that after 20 responses, there is seldom any new information to be gained that is analytically relevant in workshops (Green and Thorogood, 2018). The table below (**Table 1**) specifies how many in total participated in the workshops (rural and coastal each had three workshops).

Sectoral Divided Workshops

For the first round of workshops, the stakeholders were deliberately divided into the traditional sectors and territories, with three rural and three coastal workshops in each specific case area. The intention was to avoid unnecessary conflicting discussion in this first phase of the project. The facilitator started the group model building experience by presenting pertinent background information about the project and the project aims (Impson, 2011), and informing them of General Data Protection Regulation (GDPR) related to the collection and handling of personal data. The participants were informed that the session would be recorded for purposes of narrative analysis after the workshop and it would be deleted after transcription. After the introduction, each facilitator in each case area asked the stakeholders to consider, from a sectoral perspective, their perceptions on challenges and opportunities around areas of interaction between different sectors in rural and coastal areas. The system conceptualization process was initiated by presenting the participants with the seven predetermined drivers. The facilitator explained that the drivers were variables that could influence other variables, though not always vice versa. They were also described as having multiple "states" or "settings"—for example if the variable is "the color of a boat" then potential states could be red, blue, green etc. The drivers list was purposefully not exhaustive, and the facilitator emphasized that the stakeholders could change them if they did not consider them relevant. They were only to be considered as conversation starters. This ability to change or modify the drivers speaks of the flexibility of this method, since it allows the inclusion of additional drivers through facilitating direct group input or redirection of the discussion when deemed necessary.

The drivers were either be posted on the board with colored "sticky" notes or written on the board directly. The stakeholders were then encouraged to identify the causal interrelationships and connections between these variables in the form of directional associations. This could for example be connections that highlighted that water quality in the olive oil industry (variable "A") was affected by the number of tourists in the area because of pollution (variable "B"). It could also for example be that the amount of fish that an aquaculture company was allowed to have in a pen (variable "C") directly affected the areas available for fisheries (variable "D"). The result of this stepwise identification of variables and interactions was a system conceptualization or group mental model—or sector mind maps. The process customarily lasted 1 to 2 h; sometimes longer if the stakeholders were very engaged. These maps were graphical representations of the problems, solutions and opportunities and interconnections as perceived by the stakeholders during the sector workshops. The models represented how this particular group of stakeholders collectively viewed the causal pathways between variables at that given time. The model also identified, on closer inspection, where possible solutions and conflict points could be located.

Narrative Analysis

After the workshops, the research team used the Vensim® software to visualize the results graphically in combination with analyzing the narratives from the workshop thematically, using the diagnostic tools. When needed, the visualization process was coupled with a narrative analysis from the recordings taken during the workshop. Narratives can be described as "*discourses with a clear sequential order that connect events in a meaningful way for a definite audience and thus offer insights about the world and/or people's experiences of it*" (Hinchman and Hinchman, 1997). To get the narratives from the transcription of the recordings from the workshop, one options is to concoct one's own narrative; that of the researcher's interpretation of what was discussed during the workshop, rewritten from its original form. Another option is to analyze the narratives as special kinds of texts, in and of themselves, using conversation analysis (Czarniawska, 2004). It is also possible to use a combination of the two, interpreting narratives within the context of the workshop setting, and other times treating the text literally as it related to the output of the systems thinking analysis from the workshop. The most important role of a narrative is the knowledge content that can be extracted that might be missed from the model conceptualization process alone

as relevant element where either ignored or only considered implicitly during the stakeholder exchange. This is in line with Elliott's account of narratives as being instrumental because "… *internal validity is … thought to be improved by the use of narrative because participants are empowered to provide more concrete and specific details about the topics discussed and to use their own vocabulary and conceptual framework to describe life experiences*" (2005).

Inter-workshop Interpretations and Development of Causal Loop Diagrams (CLDs)

We then developed sector specific *shared* mental maps of the land-sea system in the given case area. The work allowed for further polishing, structuring and correction of the mental map (see point 2 in **Figure 1**). As a first step, the research teams condensed and simplified the initial mental maps from the sectoral workshops and combined them into one regional mental map of both rural and coastal stakeholders, with <70 variables in total. Though this number of variables may still seem large, a result from the first round was that *each* of the sectoral workshops had in some cases up to 100 variables. As such, this work condensing six workshop mental maps into one causal loop diagram was a time-consuming and intense task that required a lot of patience, expertise, and reflection. To simplify the mental maps and assess the volume of data to be collected, we therefore first prepared poster size printouts of all the initial sector workshop mental maps and put these on the wall for the participants to discuss. This technique was employed to obtain a visualized summary from the initial workshops, and to easily allow an assessment of what variables were discussed by the stakeholders, and which could be combined or discarded (whether as extras or as "opinions" or other reasons). Each workshop was then "*restarted*" by a facilitator. The case area leaders were asked to discuss each variable on the original map, and were encouraged to combine variables, when possible, and come up with new ones that might better represented a set of variables. The discussion was done in the same order the workshops were originally conducted.

The facilitators also asked the participants who had run the original sectoral workshops to consider data sources, or proxies for data, for each variable they decided to be "keepers" for the later Causal Loop Diagrams (CLDs). The facilitators then had to identify variables that existed in already processed mental maps. This was to ensure that they were not duplicated, but in fact could serve as "links" between the new simplified sectoral models, preparing for joining them all together into a joint CLD. The aim was that each new condensed sectorial model would not have more than 12 variables on average when they are finished processed. While work was ongoing on boards and printouts, simultaneously, another facilitator developed the new Vensim representations graphically, while putting in + (plus) or – (minus) values on the arrows from one variable to the next to represent increasing or decreasing trends in the variables. These were decisions taken by the case area leaders in terms of their recollection of how it was being discussed by the stakeholders in the first workshops. This was to be later validated (or changed) by the stakeholders during the next round of workshops, which were inter-sectoral.

After all the new diagrams had been developed, both on the board and electronically, the latter were combined in the Vensim® software, using the shared variables as links. This was done by cutting and pasting first model two into model one (the new versions) with two different colors. Vensim offers tools to identify identical variables, but we experienced that a manual inspection was necessary. This was because of spelling errors, or similar interpretations of variables that had different words associated with them. At this stage, we then added the key interactions between the sector models as well, with those that link the variables from one to the other. Finally, the teams obtained a full regional model (CLD) of land-sea perceptions and interactions, where all variables ideally could be quantified with existing data or at least through proxies thereof. **Figure 2** shows an illustration of the complexities that come out of developing models that include several sectors. The example below is of the land-sea system obtained for the Belgian case area, where six sector workshops were combined (agriculture, environment, spatial planning, fisheries and aquaculture, blue industry and tourism).

Validation of the CLDs in the Multi-Actor Labs

The case area leaders then further engaged with a representative selection of stakeholders in a multi-actor workshop, where the aim was to validate the CLDs. During this meeting, stakeholder representatives from each of the initial six sectoral workshops were invited to assess the results from not only the sectoral workshops but also the condensation-and CLD development session that had taken place in the meantime. This validation process was done by first presenting the combined CLD (**Figure 2** example) and illustrating to the stakeholders how a change in one variable could affect multiple other variables in the system in unexpected ways due to feedback mechanisms. Some multi-actor labs used Fuzzy Cognitive Mapping (FCM) to visualize the significance of interactions and analyze the sensitivity of the system for policy interventions. FCMs are weighted, directed graphs which can be used to analyze and visualize system feedback in a semi-quantitative manner. As such this technique finds a place between casual loop diagramming and System Dynamics. The overall aim was to highlight the feedback structure of the system and asking stakeholders if any important links were missing and if the strength of relations was correctly represented. The objective was that the stakeholders would validate the results of the interpretations of the researchers during the inter-workshop session where the CLDs were developed. The number of participants and which sector they represented in each of these workshops is given in **Table 2**.

DISCUSSION

The multi-actor labs described above served multiple purposes. The first was as mentioned to validate the outcomes of the coastal and rural sector workshops from a new, synergistic perspective. Secondly, it was to co-produce an integrated, conceptual model– a qualitative system model of the land-sea system at the regional

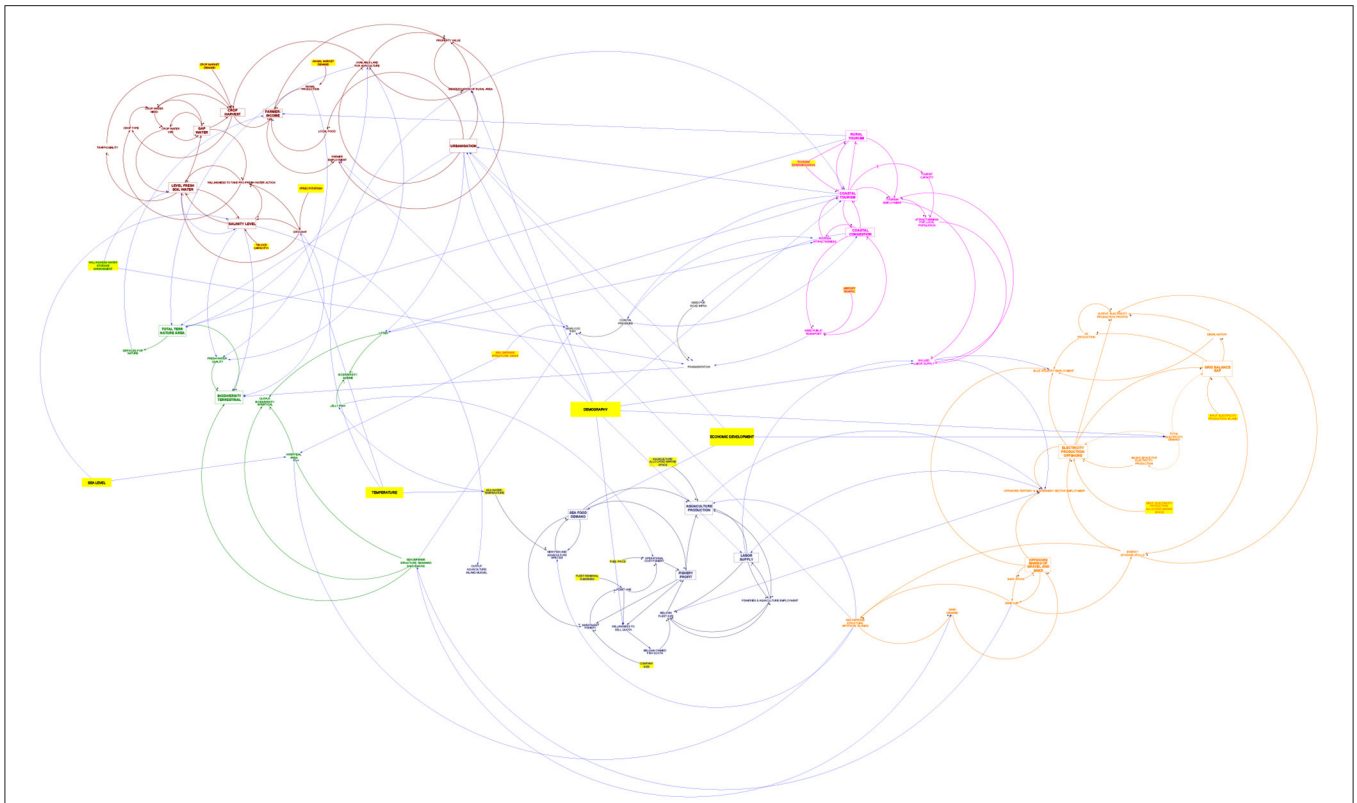

FIGURE 2 | Illustration of how complex a CLD can be after combining six sectoral workshops. The different colors represent the different sectors.

TABLE 1 | Overview of case areas and number of stakeholders in total in the study.

Country	European sea	Specific case	Coastal (3 WSs)	Rural (3 WSs)
Greece	Eastern Mediterranean Region	South West Messina	30	24
Belgium	Southern North Sea	Belgian North Sea (BNS); coastal zone and hinterland (Province West Flanders)	30	29
Sweden	Baltic Sea	Norrström	31	29
Romania	Black Sea	Danube's Mouths–Black Sea coast	36	61
France	Atlantic region	Charente River Basin and Pertuis sea	24	30
Spain	Western Mediterranean	Mar Menor Coastal Lagoon	35	33

Numbers are split between coastal and rural workshops (WSs) and represent the total over three workshops in each case.

scale of the case areas. This could then serve as the architecture for a subsequent evidence-based quantitative system modeling process, and formulation of business road maps and policy guidelines[5]. We also wanted to identify the reinforcing and balancing feedback mechanisms underlying the problems and affecting the opportunities for improved land-sea synergy, as reported by the stakeholders. This could then in turn allow us to collectively define and/or validate the significance of the land-sea interactions in the diagram. Finally, we also wanted to challenge the stakeholders to formulate scenarios aimed at regional sustainable development and improved land-sea synergy, taking into consideration potential opportunities and obstacles for implementation.

Contrary to the expectations, none of the inter-sectoral workshops reported problems associated with workshop dialogues when combining sectors. The project teams had anticipated challenges when stakeholders with different and sometimes conflicting objectives (such as agriculture and environmental protection, or aquaculture and fisheries) were brought together to discuss challenges and opportunities around collaborations. Instead, open discussions were reported by all case areas, and the participants appreciated the use of graphical tools and systemic analyses supporting their discussions. The actors attended these workshops to give their opinion on a given situation and their remarks were generally clear and simple because they understood that their contribution could improve the progress of the work. In some cases participants wanted to be sure the researchers had in fact understood the issues so that the project wouldn't produce results that were inadequate or too far from their concerns when it was used as recommendations

[5]This can then serve as architecture for a subsequent evidence-based system modelling process, and formulation of business road maps and policy guidelines.

TABLE 2 | Participants multi-actor labs and what sectors they represented in each area.

Mal 1-Greece	Mal 2-Belgium	Mal 3-Sweden	Mal 4-France	Mal 5-Romania	Mal 6-Spain
19	18	18	22	24	14
Agriculture	Agriculture	Green growth	Agriculture and agro-industry	Agriculture, cross-compliance and ecosystem services	Agriculture
Tourism	General	Institutions/universities	Tourism	Coastal tourism	Tourism
Fishing	Fisheries and aquaculture	Municipalities	Shellfish farming, fisheries	Fisheries and aquaculture	Fisheries and salt pens
Local industry	Blue Industry	Blue growth	Ports and infrastructure	Blue growth-industry, transport and administration	Local population
Administration and local authorities	Spatial planning	Administrations/local authorities	Public policies	Rural development of Danube's Delta region	Administration
Institutions/NGOs	Nature	NGOs and ICT organizations	Water sector	Rural tourism, recreation and others rural activities	Environment

for policy action or business decisions by managers or decision-makers.

As such, a general lesson from these workshops was to focus on the practical implications of the analyses with scenarios rather than methodological technicalities. This practical approach was stated with reference to the presentations of the interactive design and polishing and improvement of the merged CLDs for the land-sea system. However, one of the concerns in analyzing the outcomes of such a participatory and systems thinking approach was how detailed a CLD should be to properly reflect system behavior. Including more elements and connections might make the conceptual representation more realistic or instead more inert. Moreover, stakeholders expressed a clear demand to continue getting informed on the modeling process and to provide again their expert opinion on the various outcomes of the modeling exercise, i.e., policy measures, financial perspectives, and future benefits, among others.

We did identify differences between the MALs and interpretation of the guidelines for implementation that we decided upon at the start of the project when the drivers were developed. These pertain to differences in the complexity and thematic focus of the MALs, the presentation and the level of detail used in the diagrams, and the level of detail of the narrative scenarios. This, however, speaks to the flexibility and adaptability of this method and is one of its benefits. Results showed in the end that there is considerable overlap in the issues affecting coastal-rural interaction in the six different case-areas (**Table 3**).

The general impact of the results from the workshops, and the analysis of the policy relevant themes in the six case areas were for example that there was great variability in the importance of themes between regions, but some themes are important in all countries. CAP themes, however, are generally found important everywhere, while the importance of marine strategic directive themes varies between case areas.

CONCLUSION

The main challenges of the methodology we chose is in its inherent complicated nature. It involves numerous stakeholder groups from different and often competing sectors, which in addition is layered with different geographical areas around Europe also include the element of both the rural and the coastal areas. In addition, the stakeholder integration process itself is difficult at best. Reaching stakeholders and ensuring that there was adequate—but not too high—attendance at the workshops was also difficult. We used the snowball method and gatekeepers, which helped in this endeavor. This targeted approach ensured that rather than high numbers, we had the correct stakeholders with the correct background and interest in the topic attending. It did however require a lot of effort in ensuring participation.

Stakeholder fatigue was another challenge we were faced with. Most of the stakeholders had a great interest in the topic, and were generally approachable, and as such were invited to attend multiple different research projects and workshops and were susceptible to being "overused" in research projects. Furthermore, many participants expected there to be more immediate results that would show direct relevance to their field, which is not always the case in research projects, where results take time. Even after detailed briefings, there also seemed to be a general lack of understanding of the way a research project works and the time that is needed to move from qualitative data collection to a good synthesis of the results and subsequent quantitative modeling. As such, ensuring good communication and making sure that stakeholders are continuously kept in the loop on ongoing developments of the project and results was determined to be critical to ensure continuous participation. This has been solved differently in all the different case areas, and this is also a methodological choice. It was also our perception that keeping stakeholder engaged and interested and continuously coming to workshops was more difficult in urban environments than in rural ones. We speculate that this could be because of a lack of community feeling in these areas, and therefore also

TABLE 3 | The themes in column 1 of the table are first themes we extracted based on the deliverable itself and the workshops in the six case areas.

	Belgian coastal zone	Messina	Baltic	Charente	Danube Mouth	Mar Menor
Inland water quality	**2**	**2**	**2**	**2**	**2**	**2**
Fresh water availability	2	2	0	2	1	2
Rural economy reform	**1**	**2**	**1**	**2**	**2**	**2**
Funding for agriculture transition	0	2	0	1	2	1
Rural gentrification	2	0	0	2	0	2
(On land) spatial planning	**2**	**2**	**2**	**2**	**1**	**2**
Management of nature areas	0	2	0	1	2	2
Capacity building	1	2	2	0	2	1
Bureaucracy	0	2	0	1	2	2
Preserve local traditions	1	1	0	0	2	1
Tourism coordination	**2**	**2**	**2**	**0**	**2**	**2**
Tourism diversification	2	2	0	1	2	2
International cooperation	2	0	2	0	2	0
Cross-sector cooperation	**2**	**2**	**2**	**2**	**2**	**2**
Coastal water quality	**1**	**2**	**2**	**2**	**2**	**2**
Marine spatial planning	2	2	1	1	2	1
Climate change and sea defense	2	2	1	1	1	1
Aquaculture regulation	2	2	1	2	2	0
COMMON AGRICULTURE POLICY POINTS						
Ensuring viable farm income	**2**	**2**	**0**	**2**	**2**	**1**
Increasing competitiveness	2	2	1	1	1	1
Farmer position in value chains	2	2	0	2	2	0
Agriculture and climate mitigation	2	2	1	2	1	0
Efficient soil management	0	2	1	1	2	2
Biodiversity and farmed landscapes	**1**	**2**	**1**	**2**	**2**	**1**
Structural change and generational re	1	2	0	1	1	0
Jobs and growth in rural areas	1	2	1	2	2	2
Health, food and antimicrobial resistance	0	2	1	1	1	0
Simplifying the CAP	0	2	1	0	0	0
MARINE STRATEGIC FRAMEWORK DIRECTIVE DESCRIPTORS						
Biological diversity	**2**	**1**	**0**	**2**	**2**	**2**
Non-indigenous species	1	1	0	1	1	1
Commercially exploited fish and shellfish	**2**	**2**	**0**	**1**	**2**	**2**
Marine food webs	1	0	0	1	0	1
Eutrophication	**1**	**1**	**2**	**1**	**2**	**2**
Sea-floor integrity	2	2	0	1	1	0
Hydrographical conditions	0	0	0	1	1	2
Contaminants	**0**	**2**	**2**	**2**	**1**	**2**
Contaminants in fish and other seafood	0	1	0	2	2	2
Marine litter	**2**	**2**	**0**	**1**	**1**	**2**
Underwater noise and other forms of pollution	1	0	0	0	0	1

Then we related these to the Common Agricultural Policy (CAP) and the Marine Strategic Framework Directive (MSFD) and added weights of importance to these as well. Stakeholder assessment of important of an issue: 0, If it was not mentioned during the stakeholder workshops; 1, If it was mentioned during stakeholder workshops, but not an important issue; 2, If they found that it was an important issue during the stakeholder workshops.

a lack in interest in other sectors. We also hypothesize that it could be because of the larger number of planning and decision-making project that are inherent to such urban areas (compared to rural), which make participants more critical to new initiatives and therefore also more in demand. This is however something that should be considered in future work using this methodology.

This returns us to the discussions of how different methods in the same study come together in the end—in terms of whether they corroborate, elaborate, complement, or contradict each other. So far in the process, they have complemented each other in that the workshops have provided more depth and new insights into traditional modeling and allowed for the inclusion of new variables, interactions, data, and considerations that were not expected before the start of the study. Invariably, however, some issues may become contradictory in that workshop mind maps sometimes reflect wishes and perceptions rather than facts.

In addition, we need to acknowledge the challenge of granularity. Participants sometimes tend to lose track of the big picture and add more detail to parts of the model they know best and have a personal interest in—when more depth and new sights are no longer practical for the modeling purposes. This was especially the case for people representing particular interest, who always kept emphasizing their particular interest (which is often a very small issue that doesn't really influence the big picture/system). Finding an equilibrium between on the one hand trying to keep the interest of stakeholders and focusing on their specific problems—and on the other hand keeping a focus on the holistic system and intersectoral interactions is very difficult.

This study has allowed us, though, to start the participatory modeling of key scenarios for modeling purposed, developed by the stakeholders themselves and agreed upon across coastal-rural areas in Europe. This can be applied to assess the effect of different management practices on several socio-ecological indicators and ensure the deep integration of stakeholders for increased legitimacy and compliance with resultant policy action plans and regulations. The challenge for the workshops is now to convert the outcomes of the multi-actor analyses evidence based CLD into quantitative models using system dynamics, while keeping in consideration the priorities of the stakeholders and conclusions of the multi-actor workshops—and avoiding more details while still retaining stakeholder interest.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by NSD–Norwegian Center for Research Data. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

RT came up with the concept, organized the paper, did the theoretical framework, the introduction and the conclusion, and the sewing together of the work done in the case areas. GD, ZK, and SS-A were responsible for holding the stakeholder workshops in the Swedish case area and for collating the information from these for the article. MG, LL, FT, BN, and J-LK were responsible for holding the stakeholder workshops in the Romanian case area and for collating the information for the article. EK and GM were responsible for holding the stakeholder workshops in the Greek case area and for collating the information for the article. J-ML and FV were responsible for holding the stakeholder workshops in the French case area and for collating the information for the article. JM-L and JV were responsible for holding the stakeholder workshops in the Spanish case area and for collating the information for the article.

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