



# COASTAL

Collaborative Land-Sea  
Integration Platform

## Deliverable 11

# Strategic Business Road Maps and Policy Guidelines for Coastal-Rural Synergy

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**DATE OF APPROVAL:**

06 October, 2022

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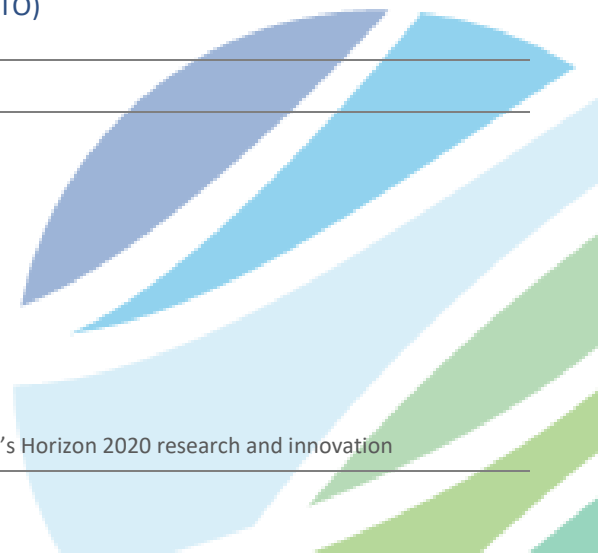
**DATE OF APPROVAL:**

17 October 2022

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773782.



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<b>CALL H2020-RUR-2017-2</b> <b>Multi-actor</b> <b>Research and Innovation action</b>	RURAL RENAISSANCE - FOSTERING INNOVATION AND BUSINESS OPPORTUNITIES - New approaches towards policies and governance
<b>WORK PROGRAMME</b> <b>Topic RUR-02-2017</b>	Coastal-rural interactions: Enhancing synergies between land and sea-based activities
<b>PROJECT WEB SITE:</b>	<a href="http://www.h2020-coastal.eu">www.h2020-coastal.eu</a>
<b>COASTAL Knowledge Exchange Platform:</b>	<a href="http://www.coastal-xchange.eu">www.coastal-xchange.eu</a>

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COASTAL: Collaborative Land and Sea Integration Platform - Co-creating evidence-based business roadmaps and policy solutions for enhancing coastal-rural collaboration and synergies in Europe focusing on economic growth, spatial planning and environmental protection. Project timeframe: 01/05/2018 - 30/04/2022

### Partnership:



This document was produced under the terms and conditions of Grant Agreement No. 773782 for the European Commission. It does not necessary reflect the view of the European Union and in no way anticipates the Commission's future policy in this area.

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## **ABBREVIATIONS**

AI: Artificial Intelligence

BE: Blue Economy

BP: Best Practice

BRM: Business Roadmap

BS2030: EU Biodiversity Strategy 2030#

C: Coastal

CS: Cross-Sectoral

CAP: Common Agriculture Policy

CEAP: EU Circular Economy Action Plan

CFP: Common Fishery Policy

DMO: Destination Management Organization

EGD: European Green Deal

ESs: Ecosystem Services

EUSBSR: European Union Strategy for the Baltic Sea Region

EUSDR: EU Strategy for the Danube Region

ICZM: Integrated Coastal Zone Management

IoT: Internet of Things

N.E.C.C.A.: Greek Natural Environment & Climate Change Agency

M: Marine

MAL: Multi-Actor Lab

MSP: Marine Spatial Planning

MSFD: Marine Strategy Framework Directive

OWE: Off-shore Wind Energy

PA: Protected Area

PPP: Public-Private partnerships

SCBE: Sustainability Criteria for the Blue Economy

UK: United Kingdom

WFD: Water Framework Directive

MAL – Multi-Actor Lab

MS – Milestone

MSFD – Marine Strategy Framework Directive

R: Rural

RD – rural development

SAB – Scientific Advisory Board

SV: Stakeholder's Vision

SD – System Dynamics

SDG – Sustainable Development Goal

SIP: Spatial Implementation Plan

SPZ: Special Protected Zone (Natura 2000)

WFD – Water Framework Directive

## SUMMARY

### Objective

The main objective of this deliverable is to present the business roadmaps (BRM) and policy recommendations for coastal-rural synergies (key outputs of the project), co-developed with local stakeholders (WP1) in each COASTAL Multi-Actor Lab (MAL). The business and policy solutions proposed have been tested and validated (WP5 - COASTAL D20), using the system dynamic models developed by each local team (WP4 - COASTAL D16). The deliverable also reviews the policy context for land-sea synergies from supra-regional to local level in each Sea Basin region covered by the project. Finally the report includes a dedicated chapter on blue economy indicators, looking at the sustainability of maritime sectors through the lens of the EU Sustainability Criteria for the Blue Economy.

### Rationale

The general objective of work package 3 (WP3) is to design and evaluate **evidence-based** business and policy solutions aimed at improving coastal-rural synergy in EU coastal regions, and translate the outcomes into strategic business road maps and policy guidelines. They will support policy-makers, business entrepreneurs and other local actors with evidence-based decision making. WP3 is central to the project impact and in particular the exploitation of project expertise and outcomes after the project conclusion. An iterative, multi-actor approach was used to exploit the local knowledge and experience of the MAL partners (WP1), model simulation (WP4), scenarios and transition pathways (WP5) to co-develop feasible, robust and accepted business road maps and policy guidelines with local stakeholders.

Section 2 reviews the policy frameworks for land-sea synergies, coastal-rural collaboration and cross-sectoral approaches

Section 3 presents the business roadmaps and policy recommendations developed by each MAL to tackle the local key challenge(s) and achieve the local stakeholders' vision.

Section 4 focuses on blue economy indicators for sustainability in the context of land-sea interactions.

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# 1. INTRODUCTION

Coastal-rural areas are complex socio-ecological systems which face a wide range of challenges that involve a diversity of stakeholders from multiple sectors. Within the source-to-sea continuum, the sea, the coastal area and its (rural) hinterland form a single unique ecosystem (Granit et al, 2017). The sea and coastal zones are the natural continuity of inland areas, with land-based ecosystems and sea-based ecosystems intrinsically linked through the flows of water, sediments and nutrients; one not only benefiting from the other, but also impacting it and vice versa (Akinsete et al., 2021). The water resource is a key element in the relationship between inland rural areas and coastal zones, supporting multiple productive uses along waterways from the source to the sea. It accumulates sediments and nutrients vital to coastal and marine ecosystems as well as human activities, creating a relationship of dependency between downstream and upstream activities of coastal and rural communities (Dzwairé et al, 2010). As such, conflicts often arise when the resource becomes scarce or its environment polluted due to the inevitable impact of unsustainable practices inland (e.g. over-use of water resource, fertilizer and pesticides; soil degradation; release of chemical compound) on coastal areas and marine water (Zandaryaa et al, 2021). The sustainable development of coastal areas is therefore intrinsically dependent on the sustainable development of inland areas. In Europe, these hinterland areas are primarily classified as rural areas representing more than 90% of the territory as a whole (Council of EU, 2006). From an economic perspective, coastal-rural areas face a certain dichotomy between dynamic well-developed and attractive coastal zones with a high concentration of activities (on land and at sea), a generally lower unemployment rate<sup>1</sup>, and the corresponding less attractive rural inland areas characterize by depopulation and economic decline (Akinsete et al, 2021; Li et al, 2019). The concentration of activities and population centers in European coastal zones can however also create pressures not only on that specific region, but also on natural and agricultural land in adjacent rural area (Carels et al., 2006). In addition, it affects these areas through rural gentrification and its resultant negative externalities on rural communities (Stockdale et al. 2010). However, the high activity concentrations of coastal zones can also be considered an opportunity for rural development by fostering business opportunities that support the rural hinterland due to the afflux of newcomers (Council of EU, 2006).

The COASTAL Business Roadmaps for land-sea synergies developed in the 6 coastal-rural regions of the project propose a combination of actions involving the coastal and rural activities (agriculture, tourism, fishery, aquaculture, environmental and water management) aiming at an harmonious development of the whole coastal-rural territory, following the methodology presented in COASTAL Deliverable 10. They are based on the hypothesis that increasing synergies and collaboration across rural and coastal activities, breaking silos between sectors and public administration is a prerequisite for the sustainable development of coastal regions and their rural hinterland.

## 1.1. Aims and Objectives

The main objective of this deliverable is to present the business roadmaps and policy recommendation of coastal-rural synergies developed by the Multi-Actor Labs (MALs) in the 6 coastal-rural regions of the project (Belgium, Greece, Sweden, France, Romania, Spain). The deliverable is the output of work conducted under Task 3.3 – Business and Policy Diffusion Strategy. To this end, the lead partner for WP3 has worked in close collaboration with the MALs in order to

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<sup>1</sup> in half of EU coastal regions, unemployment is lower than the national average<sup>1</sup>

co-develop the business roadmap and policy recommendations. This third and last deliverable of WP3 presents a policy mapping of coastal-rural territories, the 6 COASTAL Business roadmaps and policy recommendations co-designed by MAL's leaders and their local stakeholders, based on the methodology developed by WP3 leader (COASTAL D10). This deliverable also includes an analysis of the sustainability of blue economy sectors (Ports and offshore energy, Oyster farming, Fishery and Aquaculture, Coastal tourism) in the context of land-sea synergies.

Partners who have contributed to the development of this deliverable include: ICRE8, BlueBridge, VITO, INRAE, HCMR, SU, CSIC, NIMRD, ICEADR.

### **1.1.1. Relationship with other deliverables**

The deliverable presented in this document is related to the following deliverables:

- D10 - Methodological Report on Business Roadmaps and Policy Recommendations development –
- D16 – Application of generic feedback structures to support business & policy analysis
- D19 – Application of Scenarios and Transition Pathways for Coastal-Rural Analysis
- D20 - Business & Policy Robustness Analysis

This deliverable present the results of the methodology developed in D10. The Business roadmaps have been tested and validated (D20) under different scenarios (D19) using the system dynamic models (D16) developed in WP4.



## **2. POLICY MAPPING FOR COASTAL-RURAL SYNERGIES**

Key policy frameworks relevant to each coastal-rural region, in regards to the challenges to be tackled by the project, have been identified by the Multi-Actor Lab leaders. They have been classified depending on the geographic scope (rural / coastal / maritime) and the scale of the policy (EU / regional / National / local). The analysis focuses on the policy capacity to support a holistic territorial management from source-to-sea by fostering land-sea synergies, cross-sectorial collaboration and cooperation, but also its ability to support the implementation of local stakeholders' future vision, developed within the second Multi-Actor Lab.

### **2.1. Key policy frameworks at Multi-Actor Lab level**

#### **2.1.1. EU and Sea basin policy frameworks**

##### ***2.1.1.1. Applied to rural-coastal areas***

- Common Agricultural Policy (CAP)

The CAP is a common policy for all EU countries. It is managed and funded at European level from the resources of the EU's budget.

It consists of a partnership between agriculture and society, and between Europe and its farmers. It aims to:

- (i) support farmers and improve agricultural productivity, ensuring a stable supply of affordable food;
- (ii) safeguard European Union farmers to make a reasonable living;
- (iii) help tackle climate change and the sustainable management of natural resources;
- (iv) maintain rural areas and landscapes across the EU;
- (v) keep the rural economy alive by promoting jobs in farming, agro-foods industries and associated sectors.

MAL 1 highlighted a very low interaction between CAP policy and other policies. In MAL 2, the agro-environmental measures had mix-results, usually favouring large farms while Greece is characterized by a small average farm size. In MAL 4 the CAP is seen as having negative impacts because it didn't favour sustainable systems, but rather intensive irrigated systems which increased the pressure on the water resource. However the next cycle is expected to support the transition to a farming system more sustainable, in line with the European green Deal (EGD) and the Farm to Fork strategy.

#### *Common Agricultural Policy*

- Sector focus: Agriculture
- Land-based rural policy
- Related policies: European Green Deal – Farm to fork strategy
- The 2023-2027 phase is seen as having the potential to support local stakeholders' future vision

- Water Framework Directive 2000/60/EC

The European Water Framework Directive (WFD, 2000/60/EC) stipulates that all European ‘natural’ surface waters must have at least a good ecological status (GES) and a good chemical status (GCS) by 2015 (currently in its third cycle). When it is fully implemented, no water body that is not specifically exempted under the Directive will be allowed to deteriorate in terms of quality, quantity or ecological status. In order to achieve the objectives of the WFD, Member States are required to develop river basin management plans every six years, with a program of measures to be adopted to protect waters that are in danger of becoming or already are polluted.

The implementation of the Directive at national level which introduced a new approach, promoting the integrate management of the water resource, have been a challenge for Member States. After 2 cycles of program of measures, the environmental status of water bodies has improved but it is far away from achieving a good status, as defined by the law.

#### *Water Framework Directive*

- Sector focus: Water management - Environment, Agriculture, Tourism,
- Currently not reaching its goal
- Is generally seen by the MALs as a policy favouring land-sea synergies, coastal-rural collaborations and cross-sectoral interactions except in MAL6 where it fails to prevent the environmental collapse of the coastal lagoon due to unsustainable water uses upstream, and able to support stakeholders’ vision except in MAL2 where the Directive has not the capacity to properly tackle one of the key regional challenge (nutrient legacy).

- Nitrate Directive 91/676/EEC

The Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (the Nitrates Directive) was adopted on 12 December 1991. It aims to protect water quality across Europe by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices.

#### *Nitrate Directive*

- Sector focus: Water management - Agriculture
- Identified as relevant for MAL 2 MAL 5 MAL 6

- A European Strategy for more Growth and Jobs in Coastal and Maritime Tourism - COM (2014)86

The European Commission has issued a European strategy aiming to bring all stakeholders together to develop innovative and smart solutions to the multiple challenges facing the sector. This strategy sets out 14 targeted actions involving national, regional and industry level partners.

*EU strategy for coastal and maritime tourism*

- Sector focus: Tourism
- Only mentioned in MAL 4, is seen as having the potential to foster land-sea synergies and coastal-rural collaborations

- EU Strategy for the Danube Region (EUSDR)

Develop coordinated policies and actions in the area of the Danube river basin, reinforcing the commitments of Europe 2020 strategy towards the smart, sustainable and inclusive growth based on four pillars (strengthening the region, connecting the region, building prosperity, protecting the environment). These shall tackle key issues as mobility, energy, biodiversity, socio-economic development or safety.

*EUSDR*

- Sector focus: Environment, Energy, Agriculture and rural development, Tourism, Fishery and aquaculture – Multi-sectoral strategy
- Apply to MAL 5
- In line with the vision developed by local stakeholders

- Draft Danube Delta Integrated Sustainable Development Strategy (2030)

Set up a vision (“An attractive area – with precious biodiversity and vibrant, small/medium scale (artisanal and modern) agriculture and business - where people live in harmony with nature; ) and strategic goals for 2030.

*Danube Delta Strategy 2030*

- Sector focus: Transport, Energy, Tourism, Environment,
- Coastal regions are(not the focus of the policy
- Apply to MAL 5
- Favour cooperation and synergies across countries

**2.1.1.2. Applied to coastal-maritime areas**

- Common Fisheries Policy (Directive 1380/2013 EC)

The Common Fisheries Policy for the protection and sustainable exploitation of fish stocks defines the measures that the relevant organisations have to adopt in order to protect aquatic organisms. These arrangements also include the periods during which fishing for certain species is prohibited, as has emerged from scientific documentation. The policy establishes and implements a series of management plans: a) Management plan for the fishing of small pelagic species carried out with the purse seine gear, with the adoption of the Fisheries Management Plan for Small Pelagic Species. b) Management plan for fishing with the bottom trawl fishing gear (trawlers) c) Management Plan under the obligation to reduce discards for fishing for small pelagics (anchovies and sardines) d) Management plan in the framework of the obligation to reduce dumping of benthic species, for

which a minimum size applies e) Management Plan for specific fishing gear, for fishing for fish and anchovies in specific areas.

#### *CFP*

- Sector focus: Fishery
- Apply to MAL 2 and MAL 5
- Can favour cooperation and synergies across blue economy sectors, and support the stakeholders

- Marine Strategy Framework Directive (MSFD) 2008/56/EC

The MSFD is considered to be the environmental pillar of Europe's Integrated Maritime Policy (COM(2007) 575). It provides a common framework for the determination of environmental targets aimed at the protection and the conservation of the European marine environment. It strives towards a "Good Environmental Status" for the seas within its jurisdiction by 2020. In order to achieve this, a legally binding ecosystem approach build around 11 descriptors is followed. The MSFD is complementary to the Water Framework Directive, and the Habitats-(92/42/EEC) and Birds Directive (2009/147/EC).

#### *MSFD*

- Sector focus: Environment with implication for all marine sectors
- Related policies: EU Marine Spatial Planning Directive, EU Integrated maritime policy
- Cross-sectoral policy; Is seen as fostering land-sea synergies and coastal-rural collaborations in MAL 3 and MAL 4, and having the capacity to support stakeholder vision.

- Marine Spatial Planning Directive 2014/89/EE

The main objectives are: 1) To support and promote sustainable development and spatial cohesion between marine and coastal space, through the synthesis of ecological, environmental, economic, social and cultural parameters, taking into account land-sea interactions, ecosystem approach and the principles of sustainable management in general. 2) The rational and integrated spatial development of activities in the maritime and coastal areas, such as transport, shipping, energy sector, extraction of raw materials, minerals and inert materials, fisheries, aquaculture and tourism, as well as conservation, protection and improvement of the natural and cultural environment, taking into account the maritime cultural heritage in general. In this context, the harmonious coexistence of all relevant activities and uses is sought and resilience to the effects of climate change is ensured. By optimizing the use of marine space, it seeks to mitigate harmful (effects of) economic activities, thereby assisting in the accomplishment of the MSFD, Natura 2000 targets.

#### *MSP*

- Sector focus: All marine sectors
- Related policies: EU Marine Spatial Planning Directive, EU Integrated maritime policy, Habitats and Birds Directive,
- Cross-sectoral policy; Is seen as fostering land-sea synergies and coastal-rural collaborations only in MAL 2 and MAL4. and having the capacity to support stakeholder vision (MAL2. MAL3. MAL4)

- EU Integrated maritime policy (IMP)

The Integrated Maritime Policy seeks to provide a more coherent approach to maritime issues, with increased coordination between different marine policy areas. The main objectives are 1) to provide a more coherent approach to maritime issues, with increased coordination between different policy areas, 2) to develop and implement integrated, coordinated, coherent, transparent and sustainable decision-making in relation to the oceans, seas, coastal, insular and outermost regions and in the maritime sectors.

#### *IMP*

- Sector focus: All marine sectors – Multi-sectoral policy
- Related policies: EU MSP Directive, EU MSFD, Europe 2020 strategy for smart, sustainable and inclusive growth, COM/2014/0254 Innovation in the Blue Economy: realising the potential of our seas and oceans for jobs and growth.
- Cross-sectoral policy; Is seen as relevant for MAL 2 and MAL 4

- Integrated Coastal Zone Management (ICZM) (2002/413/EC) -

The Strategy aimed to strengthen appropriate co-ordinating mechanisms for integrated management and sustainable development of coastal and marine areas & their resources, at both the local and national level. It acknowledges that the coastal area is a whole system formed by both its land and sea components, with interdependent human uses and coastal resources.

#### *ICZM*

- Sector focus: All sectors at the land-sea interface
- Related policies: EU MSP Directive,
- ICZM is a cross-sectoral policy fostering land-sea synergies, only mentioned by MAL1 however it is currently not actively pursued

- Strategic guidelines for a more sustainable and competitive EU aquaculture for 2021 to 2030 - COM(2021) 236 final

It provides a vision for the further development of aquaculture, in a way that contributes to the European Green Deal and economic recovery following the Covid-19 pandemic.

#### *EU 2021 Aquaculture strategy*

- Sector focus: Aquaculture
- Related policy: EU Green Deal
- Only applicable to MAL 4 and MAL 5, is seen as having the potential to foster land-sea synergies and coastal-rural collaborations

- Blue Growth Strategy (COM (2012) 494 and COM on a new approach for a sustainable blue economy in the EU Transforming the EU's Blue Economy for a Sustainable Future COM/2021/240 final

The Blue Growth strategy outlined the trajectory towards a sustainable exploitation of ocean resources and creation of jobs within the blue economy. The EC moved away from the concept of Blue Growth toward the concept of sustainable blue economy with the COM/2021/240 to fully embed the blue economy into the Green Deal and the recovery strategy which drives the green transition. This new approach for a sustainable blue economy in the EU sets out a detailed agenda for the sector, to transition from “Blue Growth” to a sustainable blue economy, replacing unchecked expansion with clean, climate-proof and sustainable activities.

#### *Blue Growth and Blue Economy strategies*

- Sector focus: Blue economy
- Related policy: EU Green Deal
- Cross-sectoral policy, only mentioned in MAL 1 and MAL 4, is seen as having the potential to foster land-sea synergies and coastal-rural collaborations in its sustainability dimension

- EU North Sea Commission Strategy - North Sea Region 2020

The Strategy intends for the North Sea Region to remain and improve the performance as a competitive, attractive and sustainable area of Europe – supporting the implementation of Europe 2020 Strategy, setting a priority list for cooperation in the Region. It also wants to efficiently address common, transnational challenges and exploit opportunities related to sustainable economic growth, climate, energy, accessibility and management of the maritime space.

#### *North Sea Commission strategy*

- Sector focus: Blue economy, Energy, Environment
- Apply to MAL 1
- Cross-sectoral policy, foster land-sea synergies and coastal-rural collaborations

- EU Strategy for the Adriatic and Ionian Region along with its Action Plan

Since 2014, the EU Strategy for the Adriatic and Ionian Region along with its Action Plan (EUSAIR) is a macro-regional strategy adopted by the European Commission and endorsed by the European Council in 2014. The EUSAIR is of particular interest for Greece for promoting: combined transport (involving both land and sea transport), energy connectivity, environment protection and tourism. It is noteworthy to mention that all these sectors play a crucial role in creating jobs and stimulating economic growth. The Strategy was jointly developed by the Commission and the Adriatic-Ionian Region countries and stakeholders, who agreed to work together on the areas of common interest for the benefit of each country and the whole region.

#### *EUSAIR*

- Sector focus: Environment; maritime; fisheries; aquaculture; marine renewable energy; maritime and coastal tourism
- Apply to MAL 2
- Cross-sectoral policy, has the capacity to support stakeholder vision

### **2.1.1.3. Applied to rural-coastal-maritime areas**

- Habitat and Bird Directives (92/43/EEC of 21 May 1992; 2009/147/EC of 30 November)

Both directives oblige the Member States to take measures to protect the native European flora and fauna. One of these measures is the delineation of Special Protection Zones (SPZs), also known as the Birds and Habitat Directive areas, which together form the European Natura 2000 network. These SPZs comprise the most suitable areas for protecting wild European plants and animals, including their specific habitats. For each of the SPZs, specific conservation goals were formulated so as to achieve a 'favourable state of conservation' for the plant and animal populations there. This network, made up of the places that contain types of natural habitats listed in Annex I and habitats of species listed in Annex II, must guarantee the maintenance or, where appropriate, the restoration, in a favourable state of conservation, of the types of natural habitats and the habitats of the species in their natural range.

Article 3 of bird Directive indicates that the Member States will take all necessary measures to preserve, maintain or restore diversity and a sufficient extent of habitats for all species of birds referred to in Article 1 with particular importance to the protection of wetlands. Article 14 dictates that "Member States may take more stringent protection measures than those provided for by this Directive".

#### *Bird and Habitat Directives*

- Sector focus: Environmental protection
- Is seen by the MALs as a policy favouring cross-sectoral interactions
- In MAL 3 and MAL 4: Favour land-sea synergies and coastal-rural collaborations

- EU Plastic Directive 904/2019

It aims to prevent and reduce the impact of certain plastic products on the environment, and to promote a transition to a circular economy throughout the European Union (EU) by introducing a combination of measures tailored to the products covered by the directive, in particular, by ensuring that single-use plastic (SUP) products, for which more sustainable alternatives are available and affordable, cannot be placed on the market.

Develop a general framework for waste management at national level, with minimal negative effects on the environment. The main objectives of the planning process are to characterize the current situation in the field (quantities of waste generated and managed, existing facilities), to identify problems that cause inefficient waste management and applicable solutions, and to identify investment needs in this sector.

#### *SUP Directive*

- Sector focus: Fishery, Food and beverage industry, Tourism,
- Related policies: Directive 94/62/EC on packaging and packaging waste EU plastic strategy; Circular Economy Directive
- Identified as relevant only for MAL 5 (Plastic pollution is currently a concerning topic in Romania)

- Renewable Energy directive 2009/28/EC, revised in 2018<sup>2</sup>

The Renewable Energy Directive is the legal framework for the development of renewable energy across all sectors of the EU economy. It sets a common target – currently set at 32% – for the amount of renewable energy in the EU’s energy consumption by 2030. To support the achievement of this target, the directive establishes common principles and rules to remove barriers, stimulate investments and drive cost reductions in renewable energy technologies, and empowers citizens, consumers and businesses to participate in the clean energy transformation.

#### *Renewable Energy Directive*

- Sector focus: Energy
- Related policies: European Green Deal; Circular Economy Directive
- Identified as relevant only for MAL4 in relation to port activity development (Development of Marine Renewable Energy sector)

- EU Green Deal (COM(2019) 640) & Farm to Fork Strategy (COM(2020) 381 final)

The EU Green Deal outlines Europe's strategy towards a climate neutral Europe by 2050. In order to achieve this, emphasis is put on transforming the economy towards a resource-efficient, clean circular economy and the restoration of the biodiversity.

#### *European Green Deal*

- Sector focus: Universal strategy affecting all levels of society (Farm to Fork Strategy focuses on agriculture, fishery and aquaculture)
- Related policy: all EU policies fall into the framework of the EGD
- If effectively implemented, it has the potential to foster land-sea synergies, coastal-rural collaborations and cross-sectoral cooperation, as well as stakeholders’ visions

- OSPAR Convention (1992) (international convention, though with regional relevance (NE-Atlantic)<sup>3</sup>

The OSPAR Convention (1992) constitutes an overarching legal framework for the protection of the marine environment of the North-East Atlantic Ocean (including the North Sea) with a cooperation of 15 national governments and the EU. The convention contains general regulations on the protection of the marine environment from specific sources of pollution, such as pollution from land by disposal or combustion and by offshore activities. Furthermore, agreements on the evaluation of the quality of the marine environment (OSPAR QSR 2010, OSPAR IA 2017) and the protection and preservation of the ecosystems and biological diversity are part of the OSPAR Convention. OSPAR

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<sup>2</sup> [https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive\\_en](https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en)

<sup>3</sup> <https://www.ospar.org/convention/text>



centres around an ecosystem approach towards an integrated management of human activities. Monitoring activities are in line with the MSFD Strategy and thus findings of OSPAR assessments can be integrated within this framework.

#### *OSPAR*

- Sector focus: All sectors
- Policy applies to coastal and maritime territories (indirectly to rural area via actions to be taken in the agricultural sector)
- Related policy: EU MSFD
- Apply to MAL 1
- Cross-sectoral policy, foster land-sea synergies and coastal-rural collaborations

- Barcelona Convention

The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention; signed in 1976; amended in 1995) is the main policy achievement of the Mediterranean Action Plan (MAP) of the United Nation Environment Programme (UNEP). The contracting parties to the Barcelona Convention are 21 countries bordering the Mediterranean Sea. The Barcelona Convention is the only regional, legal and regulatory framework for the protection of the entire Mediterranean marine and coastal environment providing for objectives and obligations agreed by all the contracting parties, 1) “to prevent, abate, combat and to the fullest extent possible eliminate pollution of the Mediterranean Sea Area” and 2) “to protect and enhance the marine environment in that area so as to contribute towards its sustainable development” (Barcelona Convention, art. 4). It is complemented by seven protocols (Land-Based Source Protocol, Hazardous Wastes Protocol, Prevention and Emergency Protocol, Dumping Protocol, Offshore Protocol, Specially Protected Areas/Biological Diversity Protocol and ICZM Protocol) and a number of strategies and plans (Ramieri et al., 2019).

#### *Barcelona Convention*

- Sector focus: Environment; maritime; fisheries; aquaculture; marine renewable energy; maritime and coastal tourism
- Policy applies indirectly to rural areas for tackling land-based pollution
- Mentioned as relevant for MAL6
- Cross-sectoral policy

- EU Strategy for the Baltic Sea Region (EUSBSR)

Integrated EU framework identifying the needs and coordinate appropriate policies, enabling the Baltic Sea region to achieve a sustainable environment with optimal social-economic development. The Strategy is divided into three objectives, which represent the three key challenges of the Strategy: saving the sea, connecting the region and increasing prosperity. Each objective relates to a wide range of policies and has an impact on the other objectives.

#### *EUSBSR*

- Sector focus: Multi-sectoral
- Apply to MAL3
- Cross-sectoral policy, foster land-sea synergies through the goal for achieving a good environmental status and reduce eutrophication

- Helsinki Convention - The HELCOM Baltic Sea Action plan

Conventions for the protection and management of the regional seas with numerous specific measures, recommendations and regulatory elements - focus on eutrophication, hazardous substances, maritime activities and biodiversity

#### *HELCOM Convention*

- Sector focus: Environment, Agriculture, Maritime sectors
- Apply to MAL3
- Cross-sectoral policy, foster land-sea synergies and coastal-rural collaboration, favour cross-sectoral collaboration. To some extent it will support stakeholder vision

- Black Sea Convention and Strategic Action Plan for the Rehabilitation and Protection of the Black Sea 2009<sup>4</sup>

Agreement between the six Black Sea Coastal states (Bulgaria, Georgia, Romania, the Russian Federation, Turkey and Ukraine) to act in concert to assist in the continued recovery of the Black Sea environmental status.

#### *Black Sea Convention*

- Sector focus: All sectors impacting the Black Sea environment
- Related policy: ICZM
- Apply to MAL5
- Favour land-sea synergies

#### **2.1.1.4. Synthesis**

We looked at the most relevant EU and regional policy frameworks for coastal and rural territories, identifying, based on the project case studies local experiences, whether or not the current policy landscape support synergies and collaborations across sectors, from coastal to rural territories, in order to tackle key environmental and economic challenges.

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<sup>4</sup> [http://www.blacksea-commission.org/\\_bssap2009.asp](http://www.blacksea-commission.org/_bssap2009.asp)

Sea basin regional frameworks are often better placed to favour land-sea synergies and coastal-rural collaboration due to their strategic regional orientation over-looking multiple sectors however, as shown in figure 1 below, disparity exist across sea basins, from a sectoral driven focus in the Baltic Sea, in regards to the implementation of regional strategy, to the absence of land-sea synergies dimension in the Mediterranean Sea (based on the experience of COASTAL case studies). Only in the North Sea and the Black Sea regions regional policy frameworks have favoured cooperation across sectors and coastal-rural / land-sea collaborations. As those strategies are non-binding agreement, providing policy directions and objectives without obligations, their implementation and degree of success can vary greatly from state to state, region to region. As mentioned in the discussion with local stakeholders, the lack of sanctions is often a limiting factor for the success of those policies. Nevertheless the sea basin strategies facilitate the development of a holistic vision of a land-sea territory, the Helsinki and Black Sea Conventions go even further than the coastal zone by taking into consideration rural activities inland impacting the marine environment (e.g. nutrient inputs from agricultural areas.).

The Habitats and Birds Directives are the only key identified EU binding policies for coastal-rural territories to be implemented across rural, coastal and marine territories. To which extend they fostered collaboration and synergies across sectors is less evident, as it is case specific depending on the implementation modalities locally (i.e. if a NATURA 2000 area includes economic activities to be associated in the management process) since it is not explicitly mentioned in the law.

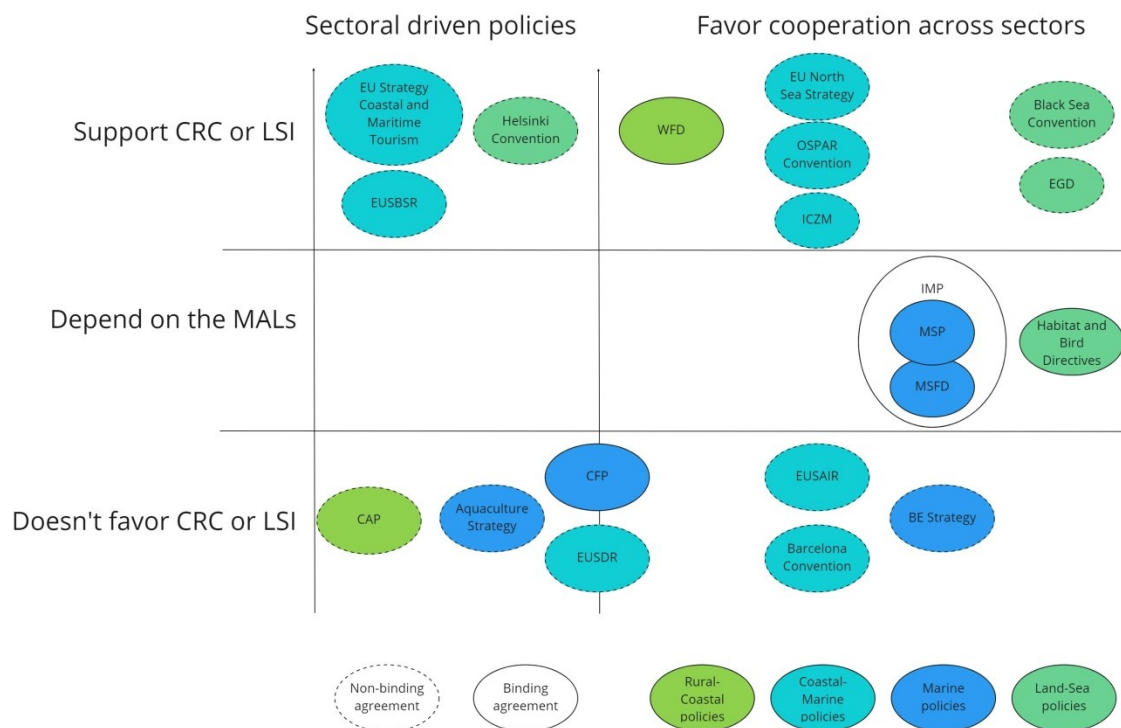
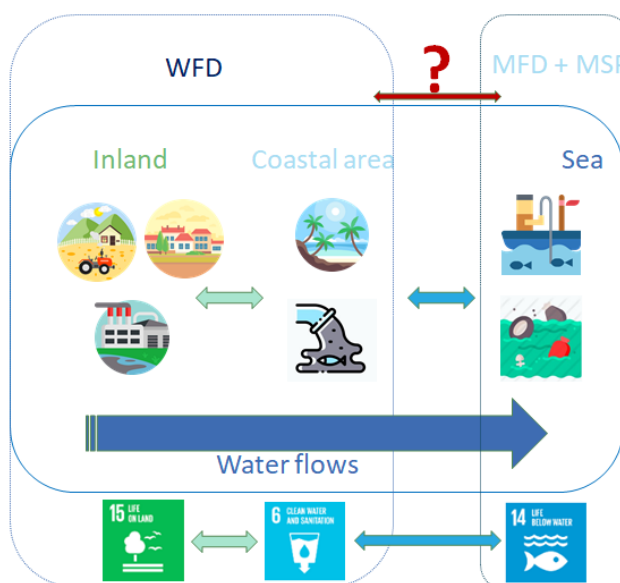


Figure 1: Synthesis EU and Sea basin policies based on COASTAL MAL's local experiences

Following the COASTAL case studies' experiences of EU and regional sea basin policies local implementation, the WFD seems to have the greatest capacity to foster coastal-rural synergies, collaboration and dialogue across sectors despite the mix-results so far. Being a legally binding document with the aim to manage the water resource in an integrated manner at the scale of a river

basin, from upstream to downstream, it has the capacity to foster synergies and collaboration across sectors if properly implemented and enforced, including measures to enhance synergies and collaboration across sectors for a sustainable use and fair share of the resource.



*Figure 2: Land-sea interactions*

However, to effectively address land-sea interactions and more specifically land-based water pollution (illustration in figure 2), beside enforcing the law locally, policy integration between land and sea frameworks must be improved as today those 2 realms are still too often managed through different administrations with low collaboration level and unconnected policy frameworks, hampering policy coherence from land, coast to sea. As an example, the effectiveness of the MSFD could be greatly improved if its local implementation could be coupled with the WFD program of measures. To be noted the exception of Sweden where the national agency for water resource management has authority over fresh waters and marine waters, facilitating the integration of marine and land policies at the implementation level.

The EGD presents a new approach to policies, holistic and cross-sectoral, with one of the priorities being the protection of the environment and the ocean with the EU Directorates General of Environmental, and Maritime affair and fisheries working together to protect natural areas on land and at sea under the umbrella of the Biodiversity strategy 2030. Within COASTAL case studies, the EGD and its related policies are seen as very promising, and a necessity for tackling the local environmental issues.

### 2.1.2. MAL level

Complementary to regional and European frameworks, local policies regulate natural resource usages and activities with the capacity to increase land-sea synergies and coastal-rural collaboration, depending on the MALs.

The scope of the policies identified as most relevant in the context of land-sea / coastal-rural synergies, varies from MAL to MAL, depending on the local challenges and the stakeholder future vision which defined the area of intervention within the project (Business Roadmap objective(s)).

**2.1.2.1. MAL 1 – Belgian Coast**

Table 1: Main local policy frameworks relevant for MAL 1 – R=Rural, C=Coastal; M=Marine; CS=Cross-Sectoral; SV=Stakeholder Visions

Local Policy framework	Geographic area	Legal obligation	scale	Focus	Support Project objectives
Marine Spatial Plan	Belgian North Sea	Hard	Federal (national)	Spatial planning	M;SV
Spatial Policy Plan Flanders (Beleidsplan Ruimte Vlaanderen)	Coastal zone and hinterland (terrestrial)	Medium	Sub-national district (Flanders)	Spatial planning	R;CS
Spatial Implementation Plan Oudlandpolder (Ruimtelijk Uitvoeringsplan Oudlandpolder)	Oudlandpolder	Hard	Regional	Spatial planning and water management	C;R;CS;SV

**2.1.2.2. MAL 2 – South-West Messinia –Greece**

Table 2: Main local policy frameworks relevant for MAL 2 – R=Rural, C=Coastal; M=Marine; CS=Cross-Sectoral; SV=Stakeholder Visions

Local Policy framework	Geographic area	Legal obligation	scale	Focus	Support Project objectives
Spatial Planning policy	R-C-	Hard	National	Planning	CS - SV
Thematic tourism Special forms of tourism (Law 4582-2018.)	R-C-M	Hard	National	Tourism	LSI-CRC-SV
2014-2029 Greek National Biodiversity Strategy and Action plan	R-C-M	Soft	National	Environment	(LSI-CRC)-CS-SV
MEECC S.G. Decision 48730/2236/15-10-2014. "Approval of the Special Environmental Study (SES)	R-C-M	Soft	National	Environment	
Greek National Strategy for Sustainable and Fair Growth 2030	R-C-M	Soft	National	Sustainable development	CS-SV
Social Cooperative Enterprises policies (Law 4430/2016); Public-Private partnership law;	R-C-M	Hard	National	Cooperation	CS - SV

National Strategic Research and Innovation Framework in Greece and Research and Innovation Strategy for Smart Specialization (RIS3) in Peloponnese	R-C-M	Soft	National & Local	Innovation and Competitiveness	CS-SV
Operational Programme of Competitiveness, Entrepreneurship and Innovation of Peloponnese and Operational Programme of Transport Infrastructure, Environment and Sustainable Development	R-C-M	Soft	National & Local	Innovation and Competitiveness	CS-SV

In South-West Messinia, the key local policy frameworks focus on environment, and territorial development by boosting economic activities through innovation, competitiveness and cooperation. They are applicable throughout rural, coastal and maritime territories except the Spatial Planning Policy which doesn't apply to maritime territories.

At the MAL level, the only framework (international or national) favouring land-sea synergies and coastal-rural collaboration is the Greek Law dedicated to tourism development (a sectoral policy). While the National Biodiversity strategy refers to land-sea / coastal-rural synergies, it doesn't foster cross-sectoral and territorial collaboration locally. More generally, the effective implementation of policy frameworks is a work in progress in the region (the lack of law enforcement is sometimes an issue), having not reached their goal yet (e.g. WFD Good environmental status of water bodies; MSP). Nevertheless they are seen as having the potential to favour cross-sectoral innovations and the capacity to support local stakeholders' future vision if properly enforced. Additionally, it is worth noting that following the recent establishment of the central offices of Natural Environment & Climate Change Agency (N.E.C.C.A.), there is the requirement for the creation of regional implementation offices (Article 37, N.4903/2022 - ΦΕΚ 46/A/5-3-2022) *which will have as part of their responsibility the **promotion of synergies** for the utilization of financial tools for the promotion of new local development standards and actions and the support of ecotourism programs as well as actions to highlight and promote local products of the primary sector.*

### 2.1.2.3. MAL 3 – Norrström Basin and Baltic Sea – Sweden

Table 3: Main local policy frameworks relevant for MAL 3– R=Rural, C=Coastal; M=Marine; CS=Cross-Sectoral; SV=Stakeholder Visions

Local Policy framework	Geographic area	Legal obligation	Scale	Focus	Support Project objectives
RUFS 2010 - Regional development plan for the Stockholm region	R-C-M	Soft	Local	Urban development	CS-SV
Food strategy	R-C	Soft	National	Agriculture	CS-SV

Swedish national environmental quality objectives	R-C	Soft	National	Environment	
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The European policies (CAP, WFD, Habitat directive, MSP, MSFD) and regional cooperation frameworks (Helsinki Convention, EUSBSR) provide the main policy instruments to tackle the water quality issue in the Baltic Sea, MAL 3 key challenge. The Swedish food strategy, and national environmental quality objectives are 2 other relevant policy instruments, at national level, in place to tackle coastal-marine eutrophication and pollution while the Stockholm regional development plan specifies the basic features and goals (horizon 2030) at local level for the use of land and water areas, providing a framework at local level to mitigate land-based negative impacts on the marine environment.

In MAL 3, synergies and collaboration across segments of the source-to-sea system are essentially favoured by the implementation of the European and regional policies, however, so far, those policies have failed to reach their objectives in rehabilitating the good environmental status of the Baltic Sea while decisions are still too often taken sector by sector. “Thinking and working in silos” was frequently mentioned throughout the MAL workshops as a main barrier to effective environmental and ecosystem management (i.e. sound Ecosystem-Based Management implementation) in the Baltic Sea region, with participants calling for better cross-sectoral integration, cooperation and coherence, including across the various regional and local government levels. It is worth noting that the Swedish governmental agency in charge of water management is responsible for marine and fresh water management, able to coordinate management from source-to-sea, nonetheless this holistic approach remains challenging to implement within the complexity of overlapping jurisdictions, boundaries and mandates (Mathews et al. 2019).

#### 2.1.2.4. MAL 4 – Charente River Basin – France

Table 4: Main local policy frameworks relevant for MAL 4– R=Rural, C=Coastal; M=Marine; CS=Cross-Sectoral; SV=Stakeholder Visions

Local Policy framework	Geographic area	Legal obligation	scale	Focus	Support Project objectives
Agricultural and agro-food chain strategic plans (Poitou-Charentes)	R	Soft	Local	Agriculture	CRC-CS
Neoterra roadmap Ecological and energy transition (2019)	R	Soft	Local	Sustainable development	CRC-CS
PRAD - PDRR -PRDAR - AEAP <sup>5</sup>	R	Soft	Local	Agriculture and Rural Development	CRC

<sup>5</sup> PRAD= Regional plan for sustainable agriculture of Poitou-Charentes 2013-2019; PDRR = Regional Programme for rural development ; PRDAR = Regional Programme for agriculture and rural development ; AEAP= Agri-environmental action plans

SCOT-SRADDET <sup>6</sup>	R-C-M	Hard / soft	Local	Planning	LSI-CRC-CS
Strategic plan for marine park of Gironde estuary and sea of Pertuis	M	Soft	Local	Environment	LSI-CRC-CS-SV
SAGE Charente (2019) – SDAGE and PGE <sup>7</sup> - Regional action plan “ReSources”	R-C	Hard/soft	Local	Water	LSI-CRC-CS-SV
A long-term roadmap (Charente 2050)	R-C	Soft	Local	Water	CS-SV
Schéma Régional de Cohérence Ecologique	R-C	Hard	Local	Environment	CS
Development Strategic plan of La Rochelle Maritime port (2019-2024)	R-C-M	Soft	Local	Port	LSI-CRC-CS

As in MAL 3, in MAL 4 water management (qualitatively and quantitatively) is the core issues, with sectors downstream (coastal tourism, shellfish industry) impacted by rural activities upstream (agriculture) creating land/sea interdependencies, tensions and conflicts across sectors, hence the need to have a holistic approach to territorial management from source-to-sea in the Charente river basin. As listed in table 4, an important number of local policy frameworks govern the territory in relation to water resource management with multiple policy tools specifically targeting the agriculture sector. This illustrates the complexity of water governance in France, characterized by a superposition of territorial public actions at different scale, creating an overlap of political authorities and policy tools (Duvernoy, 2016). The majority of the frameworks are cross-sectoral (except the specific agricultural policies) and should support land-sea synergies and coastal-rural collaboration however most of the governing bodies in charge of establishing those frameworks fail, to this day, to include all stakeholders, from upstream rural areas (agriculture sector) to the downstream coastal zone (e.g. tourism and shellfish sectors), in order to foster the development of a collective and cross-sectoral management of water as a common good. Above the policy frameworks, **reinforcing a land-sea stakeholder network** will be key for a sustainable and harmonious territorial development across rural-coastal regions.

Agriculture policies is the shaping the rural Charente river basin territorial development. Those public policies are still very focused on terrestrial issues and land sea synergies are not seriously considered, “*these are separate worlds*” (quote from stakeholder interview). Current agricultural policies do not take into account environmental conditionality and agro-environmental measures did not prove to be so efficient (regarding the increasing use of pesticides, the degradation of water quality in the previous years...).

<sup>6</sup> SCOT = Territorial master plan –SRADDET= Regional plan for sustainable development and territorial equality

<sup>7</sup> SDAGE= Water management plan ; PGE=Water storage management plan



**2.1.2.5. MAL 5 – Danube Mouths and Black Sea – Romania**

Table 5: Main policy frameworks relevant for MAL 5– R=Rural, C=Coastal; M=Marine; CS=Cross-Sectoral; SV=Stakeholder Visions

Local Policy framework	Geographic area	Legal obligation	scale	Focus	Support project objectives
Rural Development Plan 2014-2020 (NRDP) of Romania	R-C	Soft	National	Rural Development	CRC-CS-SV
National Program for Local Development (NPLD)	R-C	Soft	National	Development	LSI-CRC-CS-SV
National Strategy on climate change and low-growth economic growth carbon for the period 2016-2020 (CRESC)	R-C	Hard	National	Climate Change	CS

Beside the EU policy frameworks, the key policy frameworks relevant for MAL 5 are national policies driving the Danube Delta territorial development. Those policies have a land-sea / coastal-rural synergy dimension, and have been identified as having the capacity to support the local stakeholders' vision developed during the first inter-sectoral Multi-Actor workshop.

**2.1.2.6. MAL 6 – Mar Menor and Campo de Cartagena – Spain**

Table 6: Main policy frameworks relevant for MAL 6-- R=Rural, C=Coastal; M=Marine; CS=Cross-Sectoral; SV=Stakeholder Visions

Local Policy framework	Geographic area	Legal obligation	scale	Focus	Support Project objectives
"The framework of priority actions for the recovery of the Mar Menor (MAPRMM)	R-C	Soft	Local	Environment	CRC-CS-SV
'Integrated Management Strategy of Coastal Areas of the Mar Menor and its Surroundings'	C	Soft	Local	Environment	CRC-CS-SV
Law 3/2020, of July 27, on the recovery and protection of the Mar Menor	C	Hard	Local	Environment	CRC-CS-SV

Rural Development Programme (PDR) of the region of Murcia.	R-C	Hard	Local	Rural development	CS
Good Agricultural Practices Code	R-C	Soft	Local	Agriculture	X
Strategic Plan on Natural Heritage and Biodiversity	R-C	Soft	National	Environment	X
Regional park of Calblanque, Monte de las Cenizas and Peña del Águila + Parque Regional de Salinas y Arenales de San Pedro	C	Soft	Local	Environment	CS-SV
Protected landscape of Open spaces and islands of the Mar Menor; Mar Menor Ramsar site	C	Soft	Local	Environment	
Comprehensive Management Plan (PGI) of the Protected Areas of the Mar Menor and the Mediterranean Coast Strip of the Region of Murcia	C	Soft	Local	Environment	CS
Spanish Strategy of Coast Adaptation to Climate Change	C-M	Soft	National	Climate Change	CS
Spanish Strategy for Coastal Sustainability	C-M	Soft	National	Sustainable development	CS

The coastal lagoon Mar Menor is highly impacted by unsustainable practices in the rural Campo the Cartagena, thus a holistic coastal-rural territorial management fostering coastal-rural dialogue, collaboration and partnerships, involving all stakeholders and sectors is mandatory for the recovery of the Mar Menor and sustainability of local coastal activities (e.g. tourism, fishery). Those coastal-rural synergies are now promoted by the recent development of new policy frameworks from national to local level, in line with the COASTAL stakeholders' vision.

- At the national level, "The newly framework of priority actions for the recovery of the Mar Menor (MAPRMM) issue by the Minister for the Ecological Transition and the Demographic Challenge , integrating several actions for the ecological recovery of the Mar Menor socio-ecosystem, with an attribution of 484 million Euros, to be implemented between 2021 and 2026. This framework targets the sustainable management of inland (rural) and coastal areas and particularly the interaction between them. Specific activities are currently being designed and implemented.
- At the regional level, the Regional Government of Murcia developed the 'Integrated Management Strategy of Coastal Areas of the Mar Menor and its Surroundings' as a general policy framework, and accepted a 'Law for the restoration and protection of the Mar Menor (3/2020 of 27th of July 2020) that includes specific actions to protect and restore the environmental status of the Mar Menor.
- In July 2020, the regional government approved a 'Law for the restoration and protection of the Mar Menor (3/2020 of 27th of July 2020) that includes specific actions to protect and restore the

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environmental status of the Mar Menor, including measures for agriculture, tourism, capacity building, governance, spatial planning of coastal, urban, and rural areas around the Mar Menor lagoon, protected areas, wastewater treatment, fisheries, ports development, nautical activities etc.

### 3. BUSINESS ROADMAP FOR LAND-SEA SYNERGIES

The COASTAL business roadmaps (BRM) and policy recommendations are based on the combined outcomes of the stakeholder engagements (WP1), scenario analyses (WP5) and modelling work (WP4) conducted during the entire duration of the project. The STEP by STEP methodology used to develop the BRM is presented in COASTAL WP3 D10.

#### 3.1. Feedback on Best practices

The first WP3 deliverable (D09) compiled best practices, business opportunities and innovative solutions based on land-sea synergies and coastal-rural collaborations to support COASTAL Multi-Actor Lab (MAL) leaders and their local stakeholders in identifying a portfolio of actions (the BRMs) able to tackle the challenges faced in their region while creating business opportunities. Via an online questionnaire in local language (see COASTAL D10 Appendix 2), feedback on the best practices inventory were collected to identify which best practices were most relevant to which MAL, to be then used as inspirational example for a possible solutions, and trigger imagination within the co-creation process of the Business Roadmap. Stakeholders were asked if the proposed initiatives would, in their own region:

- Increase collaborations between coastal and rural activities
- Create synergies between land and sea activities
- Best answer the main challenges and issues identified within the project
- Create business opportunities

A total of 102 stakeholders replied, the response rate varies drastically from MAL to MAL (from 4 respondents in Greece to 45 in Romania), nearly half are from academia and research while the rest are spread-out across sectors (private and public). Table 7 summarizes the feedback collected, a best practice was considered relevant if at least half of the respondents agreed with the statement, due to the low response rate for Greece, the best practice was considered relevant if at least 3 out of the 4 respondents agreed.

*Table 7: Feedback from local stakeholders on the COASTAL best practices inventory - 1=MAL1 Belgium (24 respondents); 2=MAL2 Greece (4 respondents); 3=MAL3 Sweden (12 respondents); 4=MAL5 Romania (45 respondents); 6=MAL6 Spain (8 respondents)*

COASTAL best practices	Increase CCR	Create LSS	Best answered main challenges	Create business opportunities	Wish to see implemented
Exchange of good practices between local businesses of different regions or countries	2;3;5	2;3;4;6	2;3;6	1;2;3;4;5;6	1;2;3;5;6
Marine Spatial Planning plan including (and mapping) terrestrial activities	1;2;5	1;2;3;4;5	1;2;6		1;2;3;5
Cross-sectoral association for integrated water management	2;3;5	2;3;4;5	2;4;6		2;4;6
Online learning knowledge platform (e.g. for sustainable agricultural practices, sustainable tourism)	4;5;6	1;2;4;6	4;6		2;5;6

COASTAL best practices	Increase CCR	Create LSS	Best answered main challenges	Create business opportunities	Wish to see implemented
practices...)					
Local community participation in river management activities	3;4;5	3;4;5	4;6		
Local food consumption campaign	1;3;4;5		5	1;2;4;5;6	1;2;5;6
COASTAL defence development plan including nature-based solutions, recreational activity, saline culture research facility...	3;5;6	1;3;4;5	1;2;6	1;6	1;2;3;5;6
Flood protection management plan including public awareness	2;5;6	2;4;5;6	2;4;6		2;5;6
Independent forum of stakeholders to advise and promote sustainable development, discuss and exchange	3;4	2;3;4;5	2;4;6	2;5	
Promoting gastronomic local heritage: create local food tasting tours	2;5;6	2;4;6	2	2;3;4;5;6	2;5;6
Promote sustainable tourism focus on natural assets, bird-watching ...	5		2;4;6	2;3;4;5;6	
Using nature-based solutions to treat water (e.g. wetlands) and reusing waste water	1;2	2;4;5;6	1;6		2;5;6
School environmental education program link to local environmental assets (Latvia example)	4;5		1;2;6		2;5;6
Creating local fish market combining with an education centre (to promote fish culture and local heritage, develop public awareness on local food products)	5	2;6	2;6	1;2;3;4;5;6	
Territorial branding / local food branding	1;2	2		1;2;3;4;5;6	2;4;5;6
Aquaponic farming (combining fish and plant farming)	5	2	2;6	1;2;3;4;5;6	2;4;5;6
Combining tourism and fishing activities (Pesca tourism)	5	5		1;2;3;4;5;6	2;5;6

COASTAL best practices	Increase CCR	Create LSS	Best answered main challenges	Create business opportunities	Wish to see implemented
Renewable energy community project	2;5;6	2;6	2;6	2;3;4;5;6	2;4;5;6
Public-private partnership to promote innovative tourism (promote new products, new services, improve quality management...)	2;5	2;4	2;4	2;3;4;5;6	2;5;6
Use mobile app to promote alternative tourism route	5		2;6	2;3;5;6	2;5;6
Natural reserve with a visitor centre to promote local economy	3			2;3;4;5;6	
Cycling route network as a touristic route			6	2;5;6	2;5;6
Reuse of water as part as a farmer's cooperative for water management	1;2	2;3	2;4		1;2;3

Table 8: Count of relevant best practices per MAL- CCR= Coastal-Rural Collaboration; LLS=Land-Sea synergies; BAC= Best Answer local Challenge; CBO=Create Business Opportunities

	Increase CCR	Create LSS	Best answered main challenges	Create business opportunities	CCR or LLS + BAC+CBO	CCR or LLS + BAC or CBO
MAL 1	5	3	4	7	1	3
MAL 2	10	14	15	14	6	6
MAL 3	7	7	1	13	1	2
MAL 4	5	11	8	13	1	9
MAL 5	17	9	1	15	1	10
MAL 6	5	7	16	14	4	4

The answer varies greatly from MAL to MAL, being very context specific as each MAL is dealing with a different challenge requiring different solutions. The inventory has been useful for developing the Business roadmap to a certain extent depending on the MALs, for instance, very few BP ended up being relevant for MAL 1, MAL 3 and MAL 5 (Table 7).

Overall the survey shows that initiatives increasing land-sea synergies or coastal-rural collaboration are very often not perceived as being able to answer the local challenge or create business opportunities, very few are perceived as being able to do both. Out of the 30 best practices (BP) examples, only 9 have been identified by at least 1 MAL as being able to increase coastal-rural collaborations or create land-sea synergies while being able to answer the region's main challenge and at the same time create business opportunities. From those 9 BP, 4 have only been identified as relevant by Greek stakeholders (3-4 respondents). Thus, the survey tends to discard the initial hypothesis that synergies and collaborations can create job and/or provide solution to local coastal issues. However, the methodology followed to develop the inventory can be an explanatory factor of the low pertinence of many of many of selected initiatives. As already mentioned in WP3 second deliverable ("Methodological report on business roadmap and policy recommendations development"), excluding the screening of the MAL country itself automatically discard potential initiatives which could have been more pertinent to local stakeholders (similar context). Additionally the inventory was based on the initial generic challenges identified at the beginning of the project and not what turned out to be the main issue of the MAL (particularly for MAL1, MAL3 and MAL5).

Barriers for implementing synergetic / cross-sectoral initiatives across countries are similar, local stakeholders pointed out the legislative constraint and administrative burden, weak governance (lack of cooperation and coordination across administrations) but also in certain case a lack of leadership and vision combined with a conservative mind-set prevent the development of innovative initiatives. Opposite interests and needs between sectors doesn't facilitate collaborations while funding is always an issue.

## **3.2. Belgian coast Policy Roadmap (MAL1)**

The MAL 1 COASTAL activities took place in support of the new Spatial Implementation Plan (SIP) (phase 1) for the polder, which is to integrate land and water management in a sustainable and climate robust manner. They are based on a far-seeing exploration of the future, up to 2100, in which a range of societal developments were explored (see WP5 deliverables – D19 and D20). This means that we reviewed, for example, how the further urbanisation and population growth in this polder region could evolve. We also checked which agricultural practices we could expect in the Oudland Polder in the future. This implies that we had to take into account a great many uncertainties when developing these recommendations. One of the ways to do this was to work with scenarios, whether or not supported by modelling work. This means each of the recommendations presented in the following sections is substantiated by the insights arising from the scenario work. Furthermore, we involved a diverse group of stakeholders living and/or working in the region in this exploration of the future. Through their expertise in relation to the Oudland Polder, they provided a valuable contribution to the debate on the future of this polder region. What they brought to the table helped to contextualise and interpret results. Thirdly, where possible, we also made the link between European and Flemish policy lines that are aimed at the longer term and present some clear objectives for the coming decades.

Detailed information can be found in the COASTAL policy publication “Recommendations for a sustainable spatial development of the Oudland polder” (D’Haese et al., 2022; also available on the COASTAL KEP<sup>8</sup>). It is important to emphasize the logical workflow, starting from scenarios (available as scenario publication in the KEP) to guiding principles for development of the Oudlandpolder and concluded with policy recommendations which were discussed and validated by stakeholders. Detailed examples with figures demonstrating the principles behind the policy recommendations are included in the policy publication. In this document sufficient consideration was also given to the alignment of regional and EU policy frameworks.

### **3.2.1. Policy solutions proposed**

#### ***3.2.1.1. Maximum focus on the maintenance and restoration of high-quality open spaces***

One conclusion that undoubtedly arises from the workshops is that the participants fully appreciate the **historical growth of the polder landscape**, which is marked by meadows, polder canals, natural brushwood and small polder villages alongside old agricultural roads. There was demand for a maximum focus on preserving – and restoring – this traditional landscape. Old canal structures, linear elements such as dikes and agricultural roads and panoramic views should therefore, according to the participants, act as the point of departure when tracing out new spatial interventions in the region.

There was no denial that this principle conflicts with certain developments in the polder, and this was discussed at length during the workshops. A significant proportion of the participants were able to agree with a spatial policy that removes existing built-up areas that cannot be reconciled with this principle, such as isolated villages in the greenery. This was about a standpoint that, during the various workshops, seemed to develop into a connecting element among participants taking part in the open spaces debate with a very wide range of concerns. On the one hand, it seemed able to provide an answer to the spatial demand coming from the angles of both nature and agriculture, but

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<sup>8</sup> <https://h2020-coastal.eu/platform>



it also answered questions relating to the impact of such types of habitation on the local polder communities. The latter, namely the future of the local polder communities, was a theme that featured most prominently in the discussions on the polder villages. It lent a distinct tinge to the exchange of thoughts on the restoration of the open polder landscape in this workshop. The participants were able to agree on the standpoint **that the polder villages should not be expanded spatially any further**. The polder villages should continue to develop and grow, but this should be within the area they already occupy. In practice, this means that development and growth would only then be possible in the form of more collective housing, e.g. in larger, more historical properties and on larger plots. But such a model of using existing spaces naturally has its limits, meaning that spatial issues relating to the polder villages go hand in hand with discussions on the quality of life in the villages in the Oudland Polder: will it continue to be affordable for the villagers to live there in the future? Will it still be possible to find basic services, such as a shop, a post office, medical care or childcare? Will there still be any schools? The villages are gradually becoming 'dormitory villages' according to the participants, in which residents orient their lives around the urban area around Bruges and the coastal region. More and more residents no longer live or work in the villages, but only come home once they have been busy elsewhere. This is also causing the social and culture life in the polder villages to slowly die out, which is clearly being experienced as a negative development.

#### ***3.2.1.2. Make space for water***

With the exception of the urbanised coastal region and the urban outskirts around Bruges, the Oudland Polder has a rural character. The landscape is characterised by agrarian regions, alternating with pieces of nature. Given that the rainwater that falls in the polder is not used for process water or drinking water production, so the tap water in the Oudland Polder comes from elsewhere, this means that the greatest demand for water there is linked to nature and agriculture. We know from previous summers that the Oudland Polder struggles with water shortages during intensely dry periods. Natural areas dry out and there is not enough fresh water to keep the polder canals at a desirable level for agriculture. It is anticipated that the summers will be even drier on average in the coming decades. As a result, the question arises as to whether there will be sufficient rainfall in the Oudland Polder throughout the year to meet the water demand for nature and agriculture. A second question linked to this is how the available quantity of rainwater will evolve in the future. Answers to these questions may clarify whether the sustained retention of water in the polder, e.g. through creek ridge infiltration, buffer basins, general wetting of grounds and/or a more intricate system of polder canals could be a solution for handling the drought issues in the polder.

As it is anticipated that, as soon as this decade, we will be faced with summer periods almost every year in which the precipitation quantities in the Oudland Polder are nowhere near sufficient to meet the water demand for nature and agriculture. We see this pattern returning in each of the scenarios calculated (COASTAL D19, also presented in D'Haese et al., 2022). The more severe the climate scenario, the more severe the water shortage will be. Even in the most favourable scenario calculations, we see towards the end of the century that this structural drought will persist and will take on proportions that arouse a great many questions about the development potential for agriculture and nature in the Oudland Polder. Large-scale structural hydrological interventions, including the sustained retention of rainwater in the polder, will then become necessary. The analyses suggest that these water shortages can be reduced if a significant proportion of the Oudland Polder becomes natural, extensively managed grassland. The analyses also show that a well-thought out choice of cultivation schedules with a low water demand during the dry summer months. Such interventions, however, form only part of a possible solution and will not be sufficient to bring the water demand into line with the rainwater available in the coming decades.

Structural interventions in the water system in the Oudland Polder will consequently be needed, so that very high volumes of rainwater can be retained in the polder for long periods.

### ***3.2.1.3. Give ecosystems the necessary room for recovery***

**On both the agriculture and nature side, a spatial vision is supposed in which the delineation of the natural and agrarian structures in the Oudland Polder is based on core areas of nature and core areas of agriculture. These core areas are strictly protected nature reserves and zones in which agriculture has primacy, respectively. From an ecological perspective, it is recommended that these core areas are mutually connected via natural corridors that are permanently managed as nature and are protected under nature legislation, which fits in which the European biodiversity strategy for 2030.**

As to the spatial organisation of the natural and agricultural areas in the Oudland Polder, many people have strong opinions. This was clearly shown in the discussions during the COASTAL workshops. Although the opinions differ sharply at times on a range of points, it was also noted that there is consensus on the following matters:

1. The delineation of the natural and agrarian structures in the Oudland Polder should take place through a thoroughly substantiated long-term vision. All the affected parties, on both the agricultural and the natural side, are asking for clarity and certainty. On the one hand, as to the route to be charted in the coming years and decades, as well as to the steadfastness with which the route charted will be followed. Among nature managers as well as farmers, the need for a long-term perspective and legal certainty rang out clearly. They want to be able to plan for the future and make decisions whose implications will at times be felt down the generations.

2. The delineation of the natural and agrarian structures in the Oudland Polder should be based on core areas of nature and core areas of agriculture. These are large, adjacent clusters of ground in which only 1 type of land use is permitted. In other words, these are core areas of agriculture in which only agriculture is practised and core areas of nature that are strictly managed as natural areas. As regards the latter, i.e. the core areas of nature, the nature workshop considered an expansion of the cores in the existing nature reserves in the first instance. Within the contours of the area of the Oudland Polder covered by the current SIP process, this is mainly the Uitkerkse Polder and the Meetkerkse Moeren. The opinion of the participants was that, in order to achieve climate-resilient ecosystems in the Oudland Polder, **the areas of nature with only limited accessibility should be enlarged.** The regions in which nature 'can do its thing' undisturbed – which does not mean there would be no management work done in these regions (e.g. extensive grazing) – i.e. the cores of these nature reserves, should be enlarged. It automatically follows from this that the borders of the nature zones surrounding these centres need to shift. The pieces of nature in which a more multi-functional use of space is possible also require expansion given the rise in cyclists, walkers and other recreational users in the current reserve zones in recent years. **Pieces of nature where tourist and recreational purposes can be combined with the management of nature,** such as nature with walking and cycling routes crossing through it, waterways accessible to canoeists, areas of nature for camping, etc. **Investing in extra nature in the Oudland Polder could give the tourism and recreation sector in the region a major boost,** which then creates opportunities for farmers seeking to expand their activities with farmstead tourism, farmhouse shops or a catering establishment. **'Islands of nature', however, are not sufficient for achieving resilient natural areas.** As has become clear in the past few years, climate change will ensure that natural areas will face more and more stress, and for longer periods, as a result of drought, heavy storms or flooding. Isolation and fragmentation of natural areas will hinder the migration of species, especially plants and less mobile (small) animal species. Isolated populations are at greater risk as they will find it difficult or impossible to recover following drought, pollution or disease. The recommendation

is therefore to connect the core areas of nature in the Oudland Polder together through natural corridors that are guaranteed to be managed as **nature based on a substantiated long-term vision, such that a permanent natural network can be built up.**

Maintaining the traditional ‘provincial nature’ should be central to the areas of nature in the Oudland Polder. Since time immemorial, it has been an environment created by people, where agriculture was only made possible by gradually recovering land from the sea. This process, over the centuries, has resulted in the development of specific flora and fauna, a significant proportion of which are dependent upon agriculture. Birds such as black-tailed godwits, avocets and skylarks, or herbaceous plants growing in fields, poppies and cornflowers, cannot survive without (extensively managed) fields and grasslands. **The management of nature in the Oudland Polder will therefore go hand in hand with (extensive) agriculture.** This automatically means that more nature in the Oudland Polder does not have to be in conflict with the interests of the farmers in the polder, and that more sustainable development of agriculture in this region is possible. There are already some signs of this in the Oudland Polder (e.g. farmers sharing responsibility for grassland management) and the rapprochement between e.g. Natuurpunt and the General Farmers' Syndicate shows that major steps can probably be taken in the coming years as regards new forms of collaboration and innovation (e.g. carbon farming) as well.

The development principle encompassing all of this during the nature workshop, namely ‘Natural structures’ based on four large core areas connected by an uninterrupted network of natural elements’, is a close fit with a major objective formulated in the European Biodiversity Strategy. Central to this is that Europe's biodiversity must be on the road to recovery by 2030 at the latest. To make this possible, at least 30% of the land will be protected. One third of this surface area, i.e. 10% of the land, will be strictly protected. The natural areas in the Oudland Polder meet both of these criteria. For example, the habitat type ‘Identified dunes with herbaceous vegetation’, which is present in the dunes in the project region, has been established as a European priority habitat. This means it concerns a habitat that is in danger of disappearing (see also the Nature Report 2020). Flanders is very important for the preservation of this habitat within the European Atlantic region. Furthermore, it can also be noted in this context that a major proportion of the area subject to the present Oudland Polder SIP has been identified as a Habitat and/or Birds Directive area, and is therefore part of the European Natura 2000 network. In addition, the Biodiversity Strategy also emphasises the importance of ecological corridors.

Both the conclusions of nature managers on the ground and European and Flemish policy lines indicate that more stringent measures are necessary for a favourable state of conservation for the flora and fauna in Birds and Habitat Directive areas in the Oudland Polder. It is therefore self-evident that **these regions should be identified as natural areas.** During the COASTAL workshop on nature, a clear call was made **to respect the conservation goals for the Birds and Habitats Directive areas in the Oudland Polder.**

At both a Flemish and a European level, we are therefore seeing a development towards more stringent measures and legislation in support of the management of nature in SPZs. Along with the finding that further efforts will be needed to achieve the conservation goals already in force in the Oudland Polder, and the fact that a SIP is a critical tool for implementing long-term policy, it therefore seems advisable to us to develop towards a clear status for the SPZs in the Oudland Polder, namely natural areas. In accordance with the previous point in this recommendation, it would seem advisable here to designate a considerable area of the Uitkerkse Polder and the Meetkerkse Moeren as a core area. Beyond these core areas, nature objectives can then be combined with other land use functions. We are primarily thinking of tourism and recreation here. Finally, we would like to point out the importance of a natural corridor between the

Uitkerkse Polder on the one hand, and the Zeebos and the Oudemaars Polder on the other. Given the location of the N335 and N371, we will need to investigate how such a connection can best be made.

As the above summary of policy lines and legislation clearly shows, several themes come together in challenges linked to ecosystem and biodiversity restoration: nitrogen reduction, soil restoration, water quantity and quality, climate adaptation and mitigation, etc. our recommendation that the Oudland Polder SIP be approached with a future-oriented view and that steps be taken that allow for the current fragmentation in the climate, agriculture, nature and environment policy to be overcome.

**3. Larger nature reserves in the Oudland Polder will offer added value for nature and society. Not only can more nature of very high quality develop this way. Such an intervention will also lead to a clear improvement in the water quality in the polder, help with achieving the climate objectives and raise the region's potential for recreation. The added value of these natural areas could be even higher if we choose a considerable area of wet nature.**

When natural areas expand and ecosystems are given the chance to recover, this not only has a favourable effect on biodiversity, but also a broader societal impact. If the air quality rises, for example, the health conditions for local residents will also improve. Such 'services' provided by nature to our society are known as ecosystem services.

**4. Future-oriented nature management and expansion of living areas can no longer take place without taking account of the impact that climate change will have. This means that a way of dealing with the structural uncertainty that is becoming more and more characteristic for the continued existence of species and ecosystems must be found. The IPCC is therefore recommending that adaptation plans be drawn up allowing for targeted intervention in natural systems so as to promote the continued existence of species and ecosystems.**

The contribution to the Sixth Assessment Report from the IPCC's Working Group II was released in late February 2022. This report looks at the impact that climate change may have on ecosystems, biodiversity and human society. The general conclusion is harsh: if climate change persists as it is now, one third of all plant and animal species globally will have died out by 2070. The main reason for this is that many species are unable to adapt at the same rate as the changes they are (or will be) facing in their living environment. However, the section 'Terrestrial and freshwater ecosystems and their services' does contain a number of valuable insights as regards short-term actions that may help to improve the chances of survival for (vulnerable) species and ecosystems (see Will species go extinct with climate change and is there anything we can do to prevent it?). Although these insights are not unknown, we will summarise those that may also be relevant in the context of the Oudland Polder SIP here once more.

**1. Protect:** Plants, animals and entire ecosystems are under pressure. The consequences of climate change, such as water shortages, more frequent outbreaks of disease and new invasive species, are major stress factors, but not the only ones. The disappearance of habitats due to urbanisation and agriculture, pollution, disruption and other consequences of human activities, are putting nature under pressure. Moreover, research has clearly demonstrated that the degradation of natural ecosystems is worsening the impact of climate change on both nature and humanity. Protection of species and habitats by driving down pollution, disruption, fragmentation and other stress factors induced by humanity must consequently play a major role in conservation programmes. Just as in the EU Biodiversity Strategy land use functions. We are primarily thinking of tourism and recreation here. Finally, we would like to point out the importance of a natural corridor between the

Uitkerkse Polder on the one hand, and the Zeebos and the Oudemaars Polder on the other. Given the location of the N335 and N371, we will need to investigate how such a connection can best be made. As the above summary of policy lines and legislation clearly shows, several themes come together in challenges linked to ecosystem and biodiversity restoration: nitrogen reduction, soil restoration, water quantity and quality, climate adaptation and mitigation, etc. This was why the Netherlands recently decided to switch to a regionally focused, integrated approach in which nature, water and climate are addressed cohesively (Government communication to be found at this link). Where possible, measures will be smartly combined to improve nature, the soil and the water quality and to achieve the climate task. Binding objectives will also be established per region at a national level, after which lower-level authorities and actors involved can decide on the way to achieve these. This is how the Netherlands aims to use the available resources as efficiently and effectively as possible, so as to offer long-term certainty and security. Although a SIP should certainly not be equated with such a large-scale, regionally focused approach, the tool does lend itself to a more integrated way of looking at societal challenges. It is therefore our recommendation that the Oudland Polder SIP be approached with a future-oriented view and that steps be taken that allow for the current fragmentation in the climate, agriculture, nature and environment policy to be overcome.

**2. Connect:** Species need to be able to move from one natural habitat to another. This includes places where they were not to be found historically (passive assisted colonisation). By providing natural corridors between (protected) natural areas, species facing pressure from the changing climatological conditions will be given the opportunity to gradually migrate to more northerly latitudes or higher areas (climate-driven translocation). The natural corridors addressed in previous sections of this publication are therefore also proposed as part of the solution in this IPCC report.

**3. Restore:** Research indicates that species can survive in places where the conditions are more favourable thanks to a local micro-climate, whereas they would die out elsewhere. In such 'places of refuge', the climatological conditions are more moderate (e.g. cooler or more humid) than in the surroundings owing to specific local factors. Human interventions can also create such places of refuge, such as places where soils remain moist during intensely dry periods due to hydrological interventions, or places where it remains cooler during heatwaves. Populations that can survive with the aid of such places will migrate back to other places over time, once the conditions are more favourable. Due to the more frequent occurrence of quite extreme weather conditions in recent years, things are becoming harder and harder for natural systems. They are getting less and less time to recover and adapt. The IPCC is therefore pointing out the importance of adaptation plans that take account of potentially unavoidable and irreversible changes in ecosystem structures and processes. These are primarily aimed at actions that attempt to prevent such changes in natural systems.

#### ***3.2.1.4. Provide sufficient buffering for logistical and port activities***

Although the activities at the port of Zeebrugge are anticipated to grow, no spatial interventions have yet been made to reduce the noise pollution resulting from the port activities for the residents of Lissewege. Nonetheless, there does appear to be great support for this. During the workshop in which the future of the polder villages was discussed, the participants unanimously voted for the principle that 'The liveability of polder villages and hamlets such as Zwankendamme, Bredenedorp and Lissewege should be secured by sufficient buffering against industrial and logistical port activities'. This principle was not even discussed. It was immediately acknowledged by all those present that the logistical and industrial activities at the North Sea ports has a considerable impact on the residents of the surrounding polder villages, and that something needs to be done



about this. It is simply that, as far as anyone knows, no research has yet been done into potential measures (e.g. an embankment) for limiting this inconvenience.

### 3.2.2. Expected impacts and benefits for coastal-rural areas

- a. Maximum focus on the management and restoration of high-quality open space.

This will result in the preservation and restoration of the open polder landscape, while protecting the polder from ongoing coastal urbanization, resulting from further population growth, economic and real-estate development. This will have a beneficiary impact on ecosystem services, opportunities for recreation and environmental quality. Existing conflicts between key actors will be remedied and new potential ones avoided.

- b. Make space for water.

Differentiated, systemic water management at the operational and strategic level will improve the balance of water supply for different uses (agriculture, nature and population) making the water system more robust for the expected impacts of climate change (severe droughts, ongoing saline intrusion, flooding, ...). This will reduce or avoid damage costs related to extreme events and improve environmental quality. Optimal water management will also improve support for specific actions which are now controversial such as the temporary banning of canal intakes by farmers during droughts. In general agriculture and nature in the Oudlandpolder will be more adapted to the impacts of climate change.

- c. Give ecosystems the necessary room for recovery

Integrated planning of land management for agriculture, nature and other land uses will reduce the degree of fragmentation of natural landscape, with corridors connecting natural areas. An evidence-based, long-term vision on the spatial of the Oudlandpolder will create legal certainty for future generations and basis for multi-functional use of space. The requirements of the EU Birds Directive and EU Habitats Directive will be met through development of natural areas while considering the needs of (extensive) agriculture in a conflict-free manner. In the medium to long run water quality will meet the objectives as set in the EU Water Framework Directive. This is achieved through the redevelopment of agricultural land use to nature (including wetlands) and actions aimed at reducing the impacts of agriculture on water quality (eco-farming). Larger nature reserves will create added value through the increased or new ecosystem services created. Other potential impacts were analyzed with the Nature Value Explorer (a spatial scenario tool) and include: a drop in food production, improved air quality, soil carbon storage, water quality, potential for recreation and less soil erosion.

### 3.2.3. Synergies dimensions

One dimension is the synergy resulting from differentiated water management for agriculture and environment, improving climate resilience.

A second, important, dimension is the synergy created by a strategic land use planning, which will allow a sustainable and harmonized use of the polder between the nature and human activities

(rural settlement, agriculture, tourism), with society benefiting from the Outland polder's ecosystem services. Thus we can foreseen increased synergies between nature and tourism / recreational activities, but also between agriculture and tourism with for example the development of agro-tourism

### 3.2.4. Value proposition

The SIP offers a golden opportunity to give the oudlandpolder a climate-resilient and sustainable future.

The proposed recommendations support the sustainable transition of the Oudlandpolder to a to obtain a better between agriculture and nature, the two dominant types of land use in the polder. Water management is to be adapted in order to address the challenges of climate change (droughts, flooding and saline intrusion). The recommendations are fully aligned with the new Spatial Implementation Plan for the Oudlandpolder, the EU Biodiversity Strategy and the EU Birds and Habitats Directive.

### 3.2.5. Key sectors – actors

Looking at the current land use agriculture and nature are the two dominant spatial categories. The key sectors engaged in the stakeholder workshops underlying the analysis for the Oudlandpolder are related to the land use and include: the farming sector, environmental agencies and NGOs, the tourism and recreation sector and the real estate sector. For spatial planning the Flemish Land Agency or Vlaamse Land Maatschappij (VLM), a full project partner, is a key actor directly involved in the preparation and implementation of the new Spatial Implementation Plan for the Oudlandpolder and the COASTAL activities that resulted in the policy recommendations discussed earlier. Looking at urban sprawl the nearby coastal municipality of Ostende is certainly a key actor. The following is a non-exhaustive list of partners that will contribute to the implementation of differentiated water level management in the Oudlandpolder:

- Departement Omgeving
- Departement Landbouw en Visserij
- Departement Mobiliteit en Openbare Werken
- Agentschap Maritieme Dienstverlening en Kust
- Agentschap Wegen en Verkeer
- Agentschap voor Natuur en Bos
- Agentschap Onroerend Erfgoed
- Vlaamse Milieumaatschappij
- Vlaamse Waterweg NV
- Toerisme Vlaanderen
- Sport Vlaanderen
- Provincie West-Vlaanderen
- Stad Blankenberge
- Stad Brugge
- Stad Oudenburg
- Gemeente Bredene
- Gemeente De Haan
- Gemeente Jabbeke
- Gemeente Zuienkerke

### 3.2.6. Key policy recommendations

Table 9: Policy recommendations for MAL1

AIM	RECOMMENDATION 1	RECOMMENDATION 2	RECOMMENDATION 3	RECOMMENDATION 4
<b>Maximum focus on the maintenance and restoration of high-quality open spaces</b>	Safeguard all remaining open spaces.	Make infill development of existing centres in the urban coastal area and the city of Bruges a priority so as to accommodate the anticipated increase in residents and (economic) activities.	Make use of the strong and shared societal support that seems to exist for preserving the traditional polder landscape in the Oudland Polder and restoring it where possible	
<b>Make space for water</b>	Provide sufficient space (in the soil) for retaining rainwater in the polder for a long time. This water will be sorely needed in the agricultural and natural area during the dry summer months in the future.	Plan for natural and agricultural areas from a vision that looks at the water challenges in the Oudland Polder in an integrated manner. Through the water system in both natural and agricultural areas, ensure that micro-climates can form where it temporarily remains more damp than in the surrounding area.		
<b>Give ecosystems the necessary room for recovery</b>	Plan nature and agriculture from core areas in an integrated manner, and provide permanent, natural corridors that connect the core natural areas with one another.	Convert all bird and habitat guideline areas into natural areas.	Invest in wet nature that can make a major contribution in terms of water retention and carbon storage.	Link the SIP to a climate adaptation plan to the benefit of the nature in the Oudland Polder.
<b>Provide sufficient buffering for logistical and port activities</b>	Investigate how the noise pollution caused by the port of Zeebrugge in the area surrounding Lissewege can be limited.	Take account of the construction of a buffer strip in the agricultural area to the north		



### 3.2.7. Financial dimension

Financial investment will be needed to the water management actions that are already defined under phase 1 of the Oudlandpolder land development project. These costs can be allocated to 4 main categories, namely (1) land acquisition, (2) studies, (3) implementation initiatives, and (4) investments in water infrastructure. Implementation initiatives should be understood as small-scale projects that can be implemented within a timeframe of 2 years, and that contribute to the overall objectives of a land development project.

Investments are already planned to make the water system in the Oudlandpolder more climate resilient. In total, they represent 27.9% of the investments that are supposed to be needed to implement the actions that are currently defined under phase 1 of the land development project. The majority of these costs (56.7%) will be borne by the Flemish government through policy instruments other than the legal instruments linked to land development. When also the land development subsidies are taken into account, which are also provided by the Flemish government, 81.8% of phase 1 will be financed by the Flemish authorities. Only 6% of the total costs are expected to be covered by private capital.

In June 2022 an open call was launched to support small-scale infiltration and hydration measures with subsidies to a total amount of EUR 600.000, co-financed by the EU in the framework of the Blue Deal Plan of the Flemish Government”.

### 3.2.8. Key resources to be mobilized and main beneficiaries

Resource mobilized for the Spatial Implementation Plan (land development and water management) at threefold:

- Financial resources: budget to cover the costs of land acquisition, infrastructure works, specific measures aimed at improved operational and strategic water management;
- Technological resources: techniques and systems aimed at improved level-controlled drainage systems, monitoring of water levels, water buffering etc.
- Expertise: both scientific expertise and local knowledge are needed to improve understanding of the functioning of the water system and environmental and social-economic impacts of proposed land management decisions. A key role is given to exchanges between regional and local authorities, experts on water management and land use, stakeholders (farmers, environmental protection agencies, ...).

The main beneficiaries are coastal-rural:

- The agriculture sector: improved yields, increased resilience for extreme climate events (droughts, saline intrusion, ...), flood protection.
- Local and regional population: improved ecosystem services (environmental quality, opportunities for recreation), flood protection, ...
- Environment: improved quality of the habitat (for example for vulnerable meadow birds) with adapted regulation of water levels.
- Water managers

### 3.2.9. Policy review

The central issue addressed in the policy recommendations for the Oudlandpolder is to integrate land use planning and water management synergistically, with differentiated solutions for addressing water excesses and shortages for agriculture and environment. This will pave the way for a climate robust, sustainable development of the polder while meeting the objectives of the EU Bird and Habitats Directive, the EU Biodiversity Strategy and the EU Water Framework Directive simultaneously. Challenges and obstacles arise from both environmental and socio-economic developments, in particular climate change (droughts, flooding and saline intrusion of the polder), urban sprawl of nearby coastal cities, and rural gentrification (farmland being lost). The implementation of the new Spatial Implementation Plan for the Oudlandpolder will depend on land acquisition and the support of key actors involved, including the Boerenbond representing the farming sector, a key actor represented in earlier stakeholder engagements for COASTAL (see WP1 deliverable D04).

As can be read above, differentiated water level management involves a diversity of actions throughout the polder area. As a consequence, organizations with different responsibilities and people with diverse backgrounds will have to be involved. Although the main political hurdles have already been taken away by the Raamakkoord Oudlandpolder, coming to agreements in such multi-disciplinary settings remains a challenge. Differentiated water level management in the Oudlandpolder will help to reach the objectives formulated in the European Water Framework Directive. The policy recommendations discussed contribute to achievement of the objectives set out in the EU Birds Directive and EU Habitats Directive. Concerning the future of European water bodies, the Green Deal adopted the objectives of the European Water Framework Directive.

#### 3.2.9.1. SWOT analysis

Table 10 Policy MAL 1 SWOT analysis.

STRENGTHS (Internal positive factors)	WEAKNESSES (internal negative factors)
<ul style="list-style-type: none"> <li>• Proposed policy recommendations have been validated through a combination of scenario analysis, modelling and above all the approval of key stakeholders. The latter were brought together in additional workshops to discuss the options for sustainable development of the Oudlandpolder region;</li> <li>• The Oudlandpolder (around 175 km<sup>2</sup>) is manageable in terms of the size and limited residential land use. The dominant land use types are agriculture (mainly crop farming) and nature.</li> </ul>	<ul style="list-style-type: none"> <li>• The lack of a detailed water balance (hydrological) model to support operational water management decisions such as the intake of canal water and sea discharges on a daily basis. This model is currently under development (linked to but not in the context of the COASTAL project).</li> <li>• The legal complexity of land development projects needed to support the redevelopment of farming land where needed.</li> <li>• Budgetary constraints – the majority of the costs for land development will be born by the Flemish government, with limited private capital.</li> </ul>

OPPORTUNITIES (External positive factors)	THREATS (external negative factors)
<ul style="list-style-type: none"> <li>• The impact of urbanization and ribbon development of towns, pre-dominant along the coast and elsewhere in Flanders, is still limited. This gives more room for strategic land development. The Oudlandpolder is characterized by wide, open views.</li> <li>• EU subsidies to support water management with structural measures (Blue Deal, October 2022).</li> <li>• The increasing consideration in Flanders for systemic analysis of problems and solutions to support strategic planning (demonstrated in the COASTAL project).</li> <li>• Ecofarming and ecotourism can be developed to support the integration of land development, water management and recreation.</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing problems with water shortages and saline intrusion due to climate change</li> <li>• The risk of budgetary constraints due to large-scale economic problems and readjustment of financial priorities by the Flemish government.</li> <li>• The impact of urbanization and real estate development affecting land use decisions in the Oudlandpolder (gentrification and urban sprawl pressure).</li> </ul>

### **3.3. South-West Messinia (Greece) Business-Policy Roadmap (MAL2)**

*The case study of SW-Messinia, Peloponnese, Greece, is a representative example of an interlinked coastal inland area in the Eastern Mediterranean region. Agriculture (olive groves mainly) and coastal tourism are the two major economic activities in the area, while fisheries is another important aspect of primary economic sector for the area. Besides the presence of olive groves, the land cover consists of a variety of Mediterranean habitats included in the reference list of the Natura2000 initiative and several important cultural sites are scattered within the study area. (COATSAL D03)*

The aim of the roadmap is to establish the pathway towards the desirable future that had been developed during the first Multi Actor Workshop (D04). The central idea of the vision was to achieve the brand Name of *Sustainable Messinia* that would expand across all sectors and activities. It was agreed that in order to achieve this it would require:

- 1) Farming will follow more integrated and even organic practices. Thus making less use of agrochemicals and reducing plowing
- 2) Olive oil industry would follow a 2 step approach and there would be a reuse of dry waste – pomace and other by products
- 3) Tourism industry would move away from current Sun, Sea, Sand Model, which promotes urbanization of the land uses with the expansion of hotels
- 4) Fishing and aquaculture practices within the lagoon would be in accordance with the protected area policies and will promote controlled recreational fishing activities for tourists

Follow-up discussions with the stakeholders, during the second MAL, but also through interviews and questionnaires administered it was agreed that this change could only be brought forward if all interested parties agreed on a common scheme that would provide support to all activities. This scheme was formulated into three different business ideas all of which focused on protecting and developing the natural assets of the area in relation to the existing Natura 2000:

- 1) Creation of clusters between tourism, agricultural and fishing enterprises on the basis of an agreed local quality certification of producers participating in the cluster
- 2) A Cluster for the creation of a Destination Management Organization (DMO)
- 3) A business that would focus on the protection and the development of the natural capital of the region which would involve the public and private sectors

#### **3.3.1. Business solutions proposed**

##### ***3.3.1.1. Towards a Brand Name of a Sustainable Messinia***

Tourism and agriculture are the main economic activities in the area of NW Messinia. Agriculture and in particular olive farming shapes much of the cultural character of the landscape, giving it its characteristic Messinian identity, together with the Natural landscape of Gialova Lagoon. Stakeholder participants in COASTAL's MALs have identified these as assets which could be

capitalised as part of the Brand Name of Sustainable Messinia. This Brand Name was developed during the first MAL workshop as part of the vision to obtain a sustainable future for the region (Tiller et al., 2019). The brand name could help attract more tourists looking for sustainable destinations, but also improve the branding and of the main product of the area, olive oil. **The promotion of synergies between all main sectors and related actors in the area is an important issue and it can only be materialised if all actors agree on a specific partnership framework** where the roles of different partners and their goals is clearly stated and recognised. The shift would need to include important change in practices of all main economic activities and it was suggested that such a shift could be materialised if all interested partners were to join forces under a public-private partnership for the Protection, Development and Promotion of natural heritage and ecotourism.

### **AGRICULTURE**

Agriculture and in particular olive farming is an important economic activity in the area. It shapes much of the cultural character of the landscape, giving it its characteristic Messinian identity, which has been identified by the stakeholders as an asset which could be capitalised as part of the Brand Name of Sustainable Messinia. The region is considered one of the most important for the production of extra virgin olive oil in Greece. Some of the farms are irrigated and most of them are cultivated based on conventional practices (e.g. tillage, use of pesticides, herbicides and synthetic fertilizers) which result in higher run-off from agriculture and subsequently environmental degradation of coastal and marine areas (COASTAL D03; Berg et al., 2018).

### **TOURISM**

Tourism is expanding and goes hand in hand with infrastructure development (hotels, roads and airports), the creation of new job opportunities and it can provide opportunities for diversified livelihoods, but also increases the pressures on agricultural, water resources management and the environment (COASTAL D03; Maneas et al., 2019; Klein et al., 2015). Tourism is currently being recognised as a major economic driver for the area and most regional and National development policies also identify that there is space for potential for tourism expansion in Messinia. The area of interest is the first area in Greece that received the characterisation of a Region of Organised Tourist Development and as such tourist activities are constantly expanding within the case are of interest. This potential has been repeatedly discussed by the participants in our MAL workshops (COASTAL D4), who however identified the need to change the current Sun Sea Sand tourism model, as it results in highly concentrated arrivals during the summer months putting significant temporal pressures on the environment and the natural resources (fish stock and water demand) as well as the local infrastructures such waste and wastewater management capacity (high level of beach litter by the Natura 2000 area). These pressures could however have a more cumulative effect especially under different climate conditions. In addition, it has been recognised that there is land space conflict between agricultural activities and the expansion of the tourism sector and in particular the building of new hotels, which is enhanced by the lack of an overall spatial planning policy for the area. The effect is included in the System Dynamics models developed for the area, and the impact the urbanisation has on the landscape character of Messinia, especially near the water front. Furthermore, during the survey undertaken by HCMR (COASTAL D33) a very high abundance of beach litter (3,239 items/100 m) was recorded on Voidokilia beach, compared to both the baseline value for the Ionian and the Central Mediterranean Sea (241 items/100 m, Hanke et al, 2019), and the acceptable threshold value of 20 items/100 m, recently adopted by the Marine Strategy Coordination Group (MSCG) for European coastlines to achieve "Good Environmental Status" under the Marine Strategy Framework Directive (Van Loon et al., 2020). The beach litter abundance on Divari and Romanos beaches was 746 and 596 items/100 m, respectively. Plastics were the most abundant material on all beaches (more than 93%), with cigarette butts being the second most frequent item found on Voidokilia and Divari beaches, indicating beach-users as the main source of litter (Bray et al, 2022, COASTAL D2...).

In addition, it has been recognised that there is land space conflict between agricultural activities and the expansion of the tourism sector and in particular the building of new hotels, which is enhanced by the lack of an overall spatial planning policy for the area.

### **MANAGING GIALOVA LAGOON**

The Gialova lagoon complex, situated along the South-Western coast of the Greek Peloponnese, is host to a large variety of fauna and flora, including over 270 species of bird (Norrby, 2017). In recognition of its ecological importance, the entire complex (the lagoon, the semi-enclosed bay in which the lagoon is connected too, and the offshore coastal area) is included in the Natura 2000 network (GR2550008, GR2550004, and GR2550010 respectively). The coastal zone also hosts significant formations of Phoenician juniper (*Juniperus phoenicea*) on the sand-dunes of the Voidokilia beach tourist hotspot. However, despite the lagoon being designated almost 20 years ago under the Birds Directive as a Special Protected Area (SPA) (Directive 79/409/EEC later amended to 2009/147/EC), there are **no implemented management plans for any of the sites** (European Commission Vs. Greece, Case C-849/19) (Bray L., et al 2022). The brand name of Sustainable Messinia cannot be adopted if the natural ecosystems of the area are not in a good environmental status. Currently the coastal zone is classified as being at a high or good ecological status and seems scarcely impacted by anthropogenic pressures, but the Gialova Lagoon is severely degraded due to high nitrogen levels and alterations to the hydrology of the system (Bray et al, 2022). Over the years, the combined effects of increased salinity and limitation in water circulation have led to extensive reed and cattail mortality, which are typical habitats for water birds (Maneas et al., 2019). The survival of commercially important fish species found in the lagoon, is also affected by salinity. Under future drier and warmer conditions, salinity in the lagoon is expected to increase even more, unless freshwater inputs are enhanced by restoring hydrologic connectivity between the lagoon and the surrounding freshwater bodies (Manzoni et al., 2019). At present the volume from the nearby ditches is either diverted to the sea due to pollutants or is used for irrigation without any regulation for water usage. This uncontrolled irrigation has led to conflicts between lagoon fishers and farmers. The lagoon fishers, purchase a five year licence to use the lagoon as an extensive aquaculture site and use low scale extensive practices to exploit the grounds for fishing by adjusting the adjusting the outflow of water and thus fishing individuals ensnared at the mouth of the lagoon (Bray L., et al 2022).

Currently the company that operates fishing in the Lagoon is obliged by contract to *conduct a viable and sustainable exploitation of the lease and make the best utilisation of the fishery products with a view to ensuring the ecological balance and the preservation of biodiversity*. At the same time the lease holder is responsible for maintaining the site and collaborating with the Protected Area Management Body. At the same time the contract allows for the establishment of recreational fishing activities in the area that will be managed by the lease holder. The current lease holder through their website is promoting recreational and fishing tourism activities in the lagoon, as well as bird watching and gastronomic experiences (<http://yialovalagoon.gr>). Restoration of the natural flows and the maintenance of the sea canal is also important for improving the ecosystem of the lagoon and it has been included in the actions of the proposed roadmap.

#### ***3.3.1.2. Creating partnerships with power asymmetries***

Partnerships between different actors like those proposed by the stakeholders and adopted as part of the business plan for the implementation of the vision for a Sustainable Messinia, are often being proposed as transformative solutions to complex social and environmental problems (Gray, B., et al, 2022, Schwarz and Kunzel, 2021). Nevertheless, there are many examples where they fall short on their original aspirations (Gray, B., et al, 2022) or they fail soon after their initial success

(Varthalamis and Iliopoulos, 2020). Stakeholders participating in the MAL have stated that before entering in such partnership it is important that *all actors should clearly define their goals, aspirations and responsibilities within the partnership*. Such process would include the definition of structures within the partnership as well as a set of common decision rules and a shared understanding between all partners. Reported experiences suggest that when these rules follow a respectful and inclusive design then the partnerships are more likely to be successful (Schwarz and Kunzel, 2021). However, not all actors or groups have the same capacity to influence decisions and there are often asymmetries in favour of the most empowered actors (Castells, 2016). These asymmetries in power can have a range of undesirable consequences, as low-power actors may be co-opted, ignored, over-ruled, or excluded by dominant parties, resulting in a partnership that only benefits some stakeholders while excluding others, especially when relations are so unbalanced that one of the actors can basically impose its will on the others (Dewulf and Elbers, 2018). These power asymmetries have been present during the discussions and we have considered their effects as part of the scenario development for the implementation of the vision and the possible development pathways in Messinia, following the descriptions of Integrated (SSP1), Aligned (SSP2), Fragmented (SSP4) and Top-Down (SSP5) (Vayaliparampil M., et al, 2021).

### 3.3.2. Expected impacts and benefits for coastal-rural areas

A shift towards integrated farming activities which could potentially leads even to a shift to organic agriculture, would reduce the amount of pesticides and fertilisers leaking into the groundwater resources and eventually the lagoon and the coastline, thus improving the ecosystem in the lagoon. In integrated farming, irrigation is based on data availability (e.g. soil humidity), and not only on farmers' experience or habits which quite often result in overuse of groundwater resources (COASTAL, D03). At the same time a synergy between all sectors could generate increased awareness towards the use of aquatic resources, which is particularly important in drought prone areas such as the SW Messinia. More sustainable agriculture, needs to build on young generations, exploit technological advances (e.g. smart agriculture) and respond to new requirements of the Green Deal. In Messinia, where the land is highly fragmented in terms of ownership the use of smart agriculture as well as any change in agricultural practices cannot be cost effective unless it is done in a collective and participatory manner such as through an agricultural cooperative or collaborative business (N.4673/2020(ΦΕΚ Α'52/11.03.2020). Cooperatives can play a major role in providing knowhow and supporting agronomists for full time farming consultation to all members, support the application of smart agriculture and relevant data management with support from academic experts, take over the task of branding, marketing and promotion under the guidance of relevant experts. According to Iliopoulos and Valentinov, (2018) farming cooperatives are very important actors in most countries with well-developed agri-food production systems. The effect of a farming cooperative or agricultural collaborative partnership is clearly shown in the system dynamic models developed for the Multi Actor Lab of Messinia, especially with regards to its effect in supporting the transition towards integrated and organic farming, also supporting bottling and branding actions by sharing the expenses of individual small scale farmers. However national policies which allowed governmental interventions internally, and corruptive leaderships have led to a depreciation of the institution of cooperatives by those that need them the most, the small to medium sized farmers (Varthalamis and Iliopoulos, 2020, Iliopoulos and Valentinov, 2012). This has also become clear during the MAL discussions, when mainly the farmers participating have often objected the use of the term, although they have shown interest in finding a different form of collaborative organisation of their activities (COASTAL D03).

The transition will have a direct effect on the ecological quality of Gialova lagoon as it will allow for the restoration of natural freshwater flows to return to the lagoon of Gialova. As such it will also improve the habitat conditions for the economically important fish species such as sea bream with a

salinity tolerance between 20-40 g/lit. The restoration of the Gialova lagoon natural flows and the maintenance of the sea canal are also important for improving the ecosystem of the lagoon, it will also allow the sustainability of the recreational activities in the lagoon (fishing tourism activities bird watching combining with gastronomic experiences). The producers adopting the changing practices could also be supported with a local labelling or certification scheme for the quality of the produce and the sustainable management of the land.

Looking at the impacts on the tourism, it is a sector that has been seen as a life jacket for the Greek economy since the financial crisis (Smith, H., 2017, Theodoropoulou, S., 2022) and as such national policies and actions have been very favourable towards expansion of tourism activities. Here it is recognised that there are new opportunities in tourism development that are not by default connected to an increase in the number of beds, but are focused in diversifying the tourist products. These opportunities are based on exploiting the image of Messinia and can be connected to other practices, such as fishing and agriculture, as well as making use of the natural characteristics and the cultural history of the area. These changes would also need to be supported by relevant changes in policy and by developing a spatial plan that limits further urbanisation.

The most important benefits recognised by the stakeholders are summarised in table 9.

*Table 11: Benefits of proposed actions (MAL2)*

Environmental	Economic	Social
Improve protected area management capacity by concentrating responsibilities for management and protection of NATURA 2000 sites	Increase employment (positions such as security guards, scientific staff, development and rehabilitation workers, hosting services, tour guides, etc.) or in positions related to the protection of the natural environment.	Educational programs for population and school children
Monitoring system of the condition of the environmental sensitive areas	Promoting the area as an eco-tourist destination, could bring additional revenue, creating new employment opportunities extending to the full range of services offered.	Establishment of tourism carrying capacity and tourism monitoring scheme which would benefit local communities and improve tourists' experience
Restore freshwater flows in the Lagoon which will improve its quality (Maneas et al 2021)	Higher valued produce (olive-oil)	
	Farmers income from bottled olive oil sales	

What is clear by all proposals is that the tourism sector is the main beneficiary. The other sectors have been described mainly as acting in support of the concepts and their benefits could include



increase of product market value as well as an increase of possible customers as local produce would be promoted. The emphasis on the tourism sector is also evident in the prioritisation of proposed actions. However, it is proposed that tourism activities diversify rather than further expand. Agricultural activities are in line with the Green deal and the Farm to Fork strategy focusing on improving the environmental standards of primary production in the area. In addition, the proposals aim in enhancing the use of local products in tourism businesses and improving tourists experience by including educational or experiential tours and discovering local practices. The proposal highlights the need to protect and manage the protected areas (PAs) in the region and create a plan to regulate tourism carrying capacity, promoting the natural environment and landscape as an economic asset and an added value for local communities. Through this concept a barrier on further developing and urbanising the agricultural land should be implemented, thus addressing another challenge of territorial sustainable development.

### 3.3.3. Synergies dimensions

The proposed partnership and the vision for joining forces to create a *Sustainable Messinia* brand name requires a change of practice and a transition or better even a transformation to a more sustainable and inclusive society. During the MAL discussions, stakeholders clearly stated that for such a synergy to be successful it would need clarified targets and possible benefits by all parties. As the partnership is being proposed now, it includes representatives from all the relevant management authorities and representatives of stakeholders in the local community, but concentrates on the collaboration between tourism and public administration bodies. Additional sectors (farmers, fishers, food manufacturing industry) are supplementary participants though participating in the labelling scheme of approved business (see below). For enhanced benefits and increased synergies, farmers and olive mill owners could enter the partnership after the creation of their own cooperative or collaborative organisation using the policy framework provided by the most recent policy on the creation of inter-professional organisations (N.4673/2020(ΦΕΚ Α'52/11.03.2020). As suggested by Vayaliparampil et al., (2021) in partnerships where single actors can basically impose their will on the others, a partnership approach does not apply – interdependencies are missing – hence it is better that synergies are achieved through agreed collaboration rather than partnerships.

### 3.3.4. Value proposition

The vision of the Brand Name of a sustainable Messinia is built upon successful management of the PAs that can be promoted as the added value of the area. The development of a sustainable agriculture, and the branding of the olive oil will also allow the rural population to maintain good living conditions, in cooperation rather than in conflict with the other activities in the area, while also maintaining a natural environment that ensures health and well-being.

- The individual steps such as product labelling schemes etc can provide incentives to local artisanal businesses, farmers and fishers to participate and support the change.
- The proposed business collaboration provides steps towards the transition of the tourism model and promotion of eco-friendly tourism in line with the proposed vision.
- Planning and characterisation of adventure tours (walking – boating) with cultural and ecological interest that can be used by tourists and locals alike also offered to visiting schools for educational purposes will enhance place based identity and place attachment.

Overall the proposal adopts and advises on a code of practice for all activities in the area and, if successful, it can promote share ownership between local population and shareholders, thus increase levels of participation and enhance awareness.

Through the actions in the proposal

- The agricultural sector will strengthen their business capacity through enhanced collaboration and in addition their ability to organize and make informed decisions will be strengthened.
- Support the management of the natural Protected Area, the responsibilities of which is currently shared between many local institutions and managed centrally (NECCA)
- Organize and manage shared responsibilities with respect to the PAs
- Improve the ecosystem status of the lagoon
- Develop a system to measure tourism capacity based on infrastructures but also on environmental, social and tourist satisfaction studies
- Provide incentive to farmers operating in the area to adopt environmental friendly practices

### 3.3.5. Key sectors – actors

All sectors of MAL2 are involved in the proposal (Agriculture and Olive Oil industry, Tourism, Fishery, Environment).

With regards to capitalising on the natural assets in connection with the Gialova lagoon, the implementation will need to be led by the Regional Administrative Body of the Natural Environment & Climate Change Agency (NECCA), responsible for managing the site. NECCA is the new public agency whose role is the management of protected areas, biodiversity conservation, promotion and implementation of sustainable development actions and climate change mitigation.

With regards to the activities for the shift to integrated farming, the implementation will need to be led by the farmers with support from the food manufacturing (olive mills) industry and the Developmental Anonymous Company of Messinia Local Authority. Farmers, fishers, tourism and olive making industries need to participate to improve the lagoon status. Local NGOs can also be involved in support of the implementation process and can participate in educational tours, running educational programs and assist in monitoring the environmental and ecological status of the PA, together with the management body.

### 3.3.6. Key steps for solutions' implementation

The key steps for implementing the roadmap are included in table 10 below. Many of the initial actions are based on strengthening networks and the establishment of the management bodies and cooperatives that will be the baselines for developing the business partnership or collaboration cluster. Actions also concentrate in increasing awareness and knowledge on ecotourism which if clear and with firm guidelines on what it is and what it isn't can contribute to the protection of nature, but also of cultural heritage, and to the social and economic development of an area.

Table 12: Business Roadmap MAL 2

MAL 2		ACTIONS				
Aim	Within 2 years	Led actors	Within 5 years	Led actors	Within 10 years	Led actors
<b>Improve water management</b>	Water quality monitoring in the lagoon	Researchers, local municipalities	Restoration works for restoring the Natural Flows in Tyflomitis	Researchers, local municipalities	Restored natural flows in Tyflomitis and establishment of monitoring actions	Researchers, local municipalities
<b>Sustainable agriculture</b>	Strengthening subsidies for agri-environmental systems	<i>European Parliament, National &amp; regional agriculture policy makers (Agriculture Ministry)</i>	Identification and development of branding for local produce	Messinia Regional Authority and Development Agency	Technological modernization in agriculture	Farmers, Ministry of Agriculture
	Networking activities and establishment of new farmers' cooperative	All Sectors need to be involved and they can decide on the form of the enterprise	Standardization, traceability of production products in the area -	Primary producers – farmers	New technologies for monitoring and recording water savings for irrigation	Farmers for implementing, Water management Agency for monitoring
			Establishment of a cross sectoral organization in the food sector			

### Deliverable D11 - Strategic Business Road Maps and Policy Guidelines for Coastal-Rural Synergies

			Additional income for farmers for CO2 mitigation	EU	
<b>Sustainable territorial development</b>	Development human resource training programs				
	Establishment of a Regional Management Body for the PA	All sectors and local actors	Spatial Planning Strategy	Regional and local authorities	Platform for rewarding good management practices Pylos Municipality, Messinia Regional authority, local businesses
<b>Sustainable tourism</b>	Beach Management System for monitoring tourist capacity in beach	Public authorities or tourism industry			
	Improve waste management facilities at beaches	Pilos Municipality and hotel industry	Increasing wastewater management capacity	Public authorities (local municipalities) and hotels	
	Diversify tourism activities (fishing tourism, recreational fishing, ecotourism, agro-tourism etc)	Local tourism actors			Technological modernisation in tourism industry hotels, tourism agency, Ministry of tourism

### 3.3.7. Business Case focus

#### 3.3.7.1. Overview

##### **TITLE BUSINESS CASE:**

A public – private partnership protection, development and promotion of natural heritage and ecotourism

##### **PROBLEM TO BE SOLVED BY THE PROPOSED BUSINESS INITIATIVE:**

Cover the gap of a protected area management body, but also develop and promote the area as an ecotourism destination

##### **LOCAL CONTEXT:**

Tourism and agriculture are the main economic activities in the area of South-West Messinia. Agriculture and in particular olive farming shapes much of the cultural character of the landscape, giving it its characteristic Messinian identity, together with the Natural landscape of Gialova lagoon. Stakeholder participants in COASTAL's MAL 2 have identified these as assets which could be capitalised as part of the Brand Name of Sustainable Messinia. The brand name could help attract more tourists looking for sustainable destinations, but also improve the branding and of the main product of the area, olive oil. The promotion of synergies between all main sectors and related actors in the area is an important issue and it can only be materialised if all actors agree on a specific partnership framework where the roles of different partners and their goals is clearly stated and recognised. The shift would need to include important change in practices of all main economic activities and it was suggested that such a shift could be materialised if all interested partners were to join forces under a public-private partnership for the Protection, Development and Promotion of natural heritage and ecotourism.

##### **On-going initiatives**

At a local scale, NEO (COASTAL partner) researchers together with colleagues from Greek institutions, technology experts, *Gialova* fishing company, environmental managers, local authorities and foundations, have joined forces to study and co-design management suggestions on how to gradually restore the wetland, enhance its ecosystem services (ESs) and pave the way for nature conservation, sustainable fishing, and eco-tourism development in the years to come.

The project is entitled "*Science-Policy-Society interactions for water management in Gialova lagoon wetland*" (hereafter called as the GIALOVA project), it is coordinated by NEO and it is supported by the local fishing company. The project was officially initiated in November 2020 and has a duration of three years. The aim is to "*Identify the necessary management measures for the improvement of hydrological, environmental, and ecological conditions and the enhancement of wetland Ecosystem Services in the Gialova Lagoon wetland*". In particular, the project will:

- Examine the hydrological status of the wetland in relation to: (a) the conservation status of the fish fauna, (b) the conservation status of rare, endangered and protected species and habitats and (c) the needs of other users within the wetland.
- Set the goals for water management under a changing climate, and provide suggestions (and interventions) for: (a) improving fish production, (b) maintaining and enhancing (as far as possible) ecosystem services provided by the wetland and (c) meeting the needs of other wetland anthropogenic activities.

The success of Multi-Level Governance is a challenge for all Natura 2000 network areas in Europe. The experience of the scientific team from the implementation of the COASTAL EU program in the region demonstrates that such a type of governance is feasible and can be achieved through structured meetings and the use of innovative tools (Tiller et al., 2021). The pilot application of the

tools of COASTAL EU for the integration of ecosystem services in a multi-level governance aspires to create a pilot tool for the adoption of the new governance model in the management of the protected areas networks in Greece and in Europe. The GIALOVA project is fully compatible with water management at catchment level, as defined in the Regional Management Plans based on the EU Water Framework Directive (2000/60), as well as with the national objectives for the conservation of biodiversity. The integration of ecosystem services into the governance of Protected Areas, as well as the adoption of Multi-Level Governance models are key objectives of the national framework of priority actions for the Natura 2000 network (MDP, 2021-2027<sup>9</sup>).

The work under the GIALOVA project is expected to strengthen science-society-policy linkages and foster a common basis for system understanding and multi-stakeholder participation in the governance of the region, and it can pave the way for the implementation of the COASTAL Business Roadmap for the area of South-West Messinia. The consortium is already active in identifying relevant EU proposals such as LIFE projects.

At an EU scale, NEO has added the area in a new PRIMA project entitled **SALAM-MED**: “Sustainable Approaches to LAnd and water Management in MEditerranean Drylands”. The project aims to combine top-down ecosystem assessments with bottom-up capacity processes based on social learning, to generate opportunities for local communities, women and youth. For the case of Greece, the focus will be on the sector of olive-oil production and it builds on COASTAL outcomes with regards to the adoption of sustainable farming practices. The project will be based on a Living Lab approach and it is expected to foster collaborations among the farmers and within the local society, which is also in line with the COASTAL Business Roadmap for the area.

#### **OBJECTIVE:**

Develop and promote the area as an ecotourism destination, while also promote sustainable agricultural activities and protect the natural environment and cultural identity of the Messinian rural coastline. Such partnership will include representatives from all the relevant management authorities and representative stakeholders from the local community. Still, it mainly concentrates on the collaboration between tourism and public administration bodies for the enhancement of the tourism product. Primary sectors (agriculture and fishing) as well as secondary sectors (olive oil industry) are supplementary participants though by supplying the tourism industry with local sustainable products and participating in the labelling scheme of approved business.

#### **EXPECTED IMPACTS:**

Environmental benefits:

- Improve protected area management capacity by concentrating responsibilities for management and protection of NATURA 2000 sites
- Monitoring system of the condition of the environmental sensitive areas

Economic benefits:

- Increase employment (positions such as security guards, scientific staff, development and rehabilitation workers, hosting services, tour guides, etc.) or in positions related to the protection of the natural environment.
- Promoting the area as an eco-tourist destination, could bring additional revenue, creating new employment opportunities extending to β the full range of services offered.

Social benefits:

- Educational programs for population and school children
- Establishment of tourism carrying capacity and tourism monitoring scheme which would benefit local communities and improve tourists' experience

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<sup>9</sup> [https://ypen.gov.gr/wp-content/uploads/2021/04/PAF-EL\\_FINAL.pdf](https://ypen.gov.gr/wp-content/uploads/2021/04/PAF-EL_FINAL.pdf)

**IMPLEMENTATION STAGE:**

Table 13: MAL 2 Business Case Implementation stage

<b>SHORT TERM action (within a year)</b>		
Setting-up the scene led by NEO: build the partnerships between Farmers Association, Yialova Fishing Company, CVF, Nileas, AlfaLaval (Sweedish Company – olive mills), TEMES/Costa Navarino, Local Authorities, Outdoor activities, Olive oil manufacturers	Develop trust and will to collaborate through Partnership project, through constructive dialogue, Sound awareness project (funded by the region and private sector – type of Leader+ program, or ESPA or Life)	Installation of monitoring equipment in Gialova Lagoon
<b>MEDIUM TERM actions (within 2 to 5 years)</b>		
<ul style="list-style-type: none"> <li>• Agree on the specific actions and outputs (a new structure?) to implement as identified in the BRM</li> <li>• Finalize the financial framework, revenue stream such as Eco labelling, Eco tourism activities, (guided tours etc.) selling of local produce, cycling economy framework.</li> </ul>	Development of Strategic Plans for the Spatial and Residential Organization of Open cities (ΣΧΟΟΑΠ) that are harmonized with the European Landscape Convention	Finalize Gialova Restoration plans
<b>LONG TERM actions (within 10 years)</b>		
Technological Modernisation in agriculture and tourism	Facilitate the appropriation of investment funding for sustainable development for the region	Recognize the role in shaping the landscape and managing the olive-orchards as agro-ecosystems for the production of several ESs (such as carbon sequestration, soil and water quality regulation biodiversity support) is recognized.

**3.3.7.2. SWOT analysis**

Table 14: MAL 2 Business case SWOT analysis

<p><b>STRENGTHS</b> (nternal positive factors)</p> <ul style="list-style-type: none"> <li>- Awareness of the local population</li> <li>- Natural Assets and characteristic identity</li> <li>- Willingness among partners to foster collaboration in the regional part of the vision of the Brand Name of a sustainable Messinia</li> <li>- Limited financial resources needed to start with</li> <li>- Expected outcomes are modeled and can be discussed with associated stakeholders</li> <li>- On-going initiatives (lead by NEO) focusing on natural resources monitoring and management, networking and dissemination of outcomes.</li> <li>- New EU projects in the area which similar to COASTAL promote the active engagement of SHs.</li> </ul>	<p><b>WEAKNESSES</b> (internal negative factors)</p> <ul style="list-style-type: none"> <li>- Limited interest among targeted users</li> <li>- Administrative burden to set-up such partnership</li> <li>- Lack of trust among the parties involved</li> <li>- Power asymmetries between partners</li> <li>- Population aging</li> <li>- Olive grove abandonment</li> <li>- Increased pressures for land use change</li> </ul>
<p><b>OPPORTUNITIES</b> (External positive factors)</p> <ul style="list-style-type: none"> <li>- General awareness for ecological issues among tourists</li> <li>- Increased awareness on environmental issues (General Population)</li> <li>- Increased awareness of the institutions and governance structures</li> <li>- CAP implementation goals and associated subsidies.</li> <li>- Implementation of NATURA 2000 policy framework</li> </ul>	<p><b>THREATS</b> (external negative factors)</p> <ul style="list-style-type: none"> <li>- Increased drought conditions with impacts in the quality of the lagoon</li> <li>- Forest Fires</li> <li>- Bureaucratic model of producers teams or cooperatives especially with respect to financial programs Lack of land use spatial planning Delays in policy implementation</li> <li>- Wetland collapse</li> <li>- Economic instability due to pandemics and war.</li> <li>- Unstable policies</li> <li>- Financing</li> </ul>

### 3.3.8. Financial dimension

Some indicative financial solutions that could be implemented have been identified:

1. Part of the expenses of the management body would be state covered as a public institution
1. Protected areas are usually eligible for many national and Community funding programs (Life, Interreg, Leader, Structural Funds, Operational Programs, etc.)
2. Some running costs could be covered by
3. Entrance tickets to the PA (something that could be policy related as it not currently found in Greece) – an alternative example is what National trust does in the UK with parking tickets for visitors.
4. Visitors shop with books, maps, guides clothes etc.



5. Establishment of approved PA labelling scheme in local produce or services (Participation of other sectors) – part of the cost of the label would go to the management body – produce would be sold in the visitors shop
6. Participated tourist businesses could offer voluntary contributions which could be included (or not) in the room (or restaurant) rate and the customer could choose to “opt – out” after being informed about the contribution
7. Contribution box: Can be placed in the Information Centre or anywhere else (e.g. entrance or exit to the area). The visitor leaves at will an amount for the protection of the area.
8. A scheme of members/friends of the area with benefits for participants and an annual membership fee
9. Symbolic adoptions of animals / species: It has a great impact, especially at young ages, and at the same time allows an area to be identified with a species (e.g. the local species of chameleon).
10. Businesses operating in the area such as travel (and adventure) agencies, should buy an annual permits for using the area

### 3.3.9. Key resources to be mobilized and main beneficiaries

The **tourism sector is the main beneficiary** and if the implementation follows strict environmental protocols the coastal and rural area would benefit as well as the natural assets on which the DMO will be based

### 3.3.10. Policy dimension

#### **3.3.10.1. Policy context**

Currently the policy framework governing Public-Private partnerships (PPP) in Greece describes them *as long term contracts between private and public sector entities, aiming at implementing projects and delivering services with distinct roles*. The roles of the two parties, as described in the existing policy documents (figure.3), do not cover the needs of the business plan, as that has been developed through the stakeholder workshops and questionnaires. This resulted in dissatisfaction with the use of the term by some of the powerful stakeholders during the final MAL workshop, although others did not oppose to it. Still, the way a partnership for enhancing land-sea synergies in the area has been described by all stakeholders, there is a need to connect public and private interests. This is because the described proposal centralises the development and promotion of natural heritage and ecotourism through the exploitation of the natural assets associated with the proximity to a Natura 2000 area, and including within its descriptions activities that are directly connected to the management, protection and restoration of Gialova wetland.

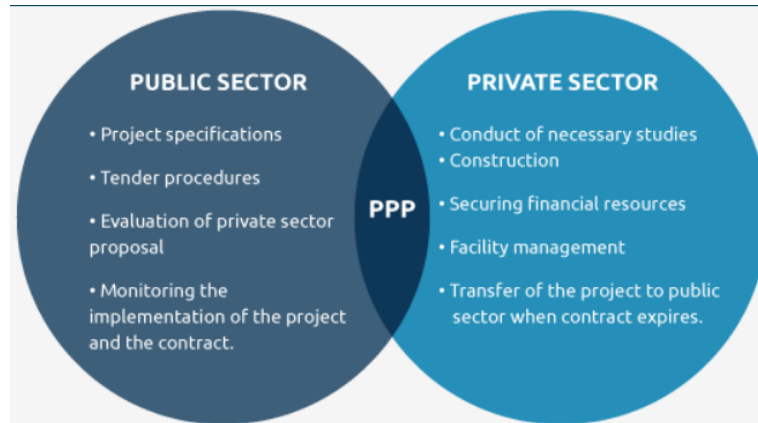


Figure 3: Public and Private Sector roles as described in current PPPs policy in Greece<sup>10</sup>

Through the lists of existing PPPs in Greece we have not been able to identify the existence of a partnership that focuses on biodiversity conservation or protected area management. However, through literature research we have identified that such partnerships have indeed been successful in enhancing the protection of National Parks and Protected Areas as well improving sustainability with regards to social outcomes under very different socioeconomic conditions. Examples of these partnerships were identified in Africa (Saporiti N., 2006), Australia (Thackway R., and Olsson K. 1999) and Sweden (Björstig, T. 2017). Such partnerships in Greece usually involve improvement and maintenance of infrastructure, such as waste and wastewater management or urban greening. Still, even within the Greek setting as identified by others (Manos B., et al, 2014) *local-based PPPs* focusing on environmental and rural sustainability in rural areas *may provide an efficient tool by adopting, integrating and implementing actions based on awareness and participation of a set of different players*. As it has been reported previously (Manos B., et al, 2014) but also realised throughout the course of this study and identified during the MAL discussions the inconsistency of State legislation and different political decisions, makes it difficult for local partnerships to exercise their power and turn from government to governance in order to cope with the environmental challenges and tackle inequalities faced in rural areas. For example policies relating to the Management of protected areas in Greece have changed twice since the beginning of the project in 2018 causing the establishment and cancelation of a PA management body within a time span of two years. PAs are now managed centrally by the N.E.C.C.A. and, as identified by the stakeholders within the MAL, these changes have caused delays in the completion of a protection framework. In addition, these changes have caused increased uncertainty and have undermined the efforts of an agreement for a common partnership framework at a local level, since now the body responsible for managing the protected area is located outside the region. Several of the stakeholders identified that the creation of an established ecosystem based management framework for the protection of Gialova Lagoon is a prerequisite for the successful implementation of such a partnership. This new policy framework provides the legal tools to the regional implementation office that allows for the creation of the proposed partnership. In addition to that, as the actions of the partnership involve the participation of different sectors, it also includes within its framework the creation of a cross sectoral cluster between farmers, tourism industry, fishing industry and olive-oil industry (Idea 1). Such a partnership could also lead to a Destination Management Organisation if the partners agree to have this as their goal (Idea 2).

<sup>10</sup> <http://www.sdit.mnec.gr/en/information/PPP/what-is-PPP>

### **3.3.10.2. Policy recommendations**

Central to the successful implementation of the vision is the status of the Gialova Lagoon, a designated NATURA 2000 area, which, due to the lack of environmental management, is under pressure (Maneas et al., 2019). The policy relating to the protection and conservation of biodiversity has been very unstable in the recent years in Greece and this has caused impacts in many of the designated sites including the Lagoon of Gialova. When COASTAL project begun there was no acting environmental Management Body in the area, which was established by law in 2019, but it was soon dismantled again. At present, the management of protected areas has been transferred from regional bodies to a central national office, which once fully established will allocate regional officers, but the whole process is being delayed. Thus to support the environmental management for the area, which was also recognised as a prerequisite to the development of the BRM by our stakeholders, much of the modelling work concentrated on identifying actions and policy solutions. As a result many of the actions identified through the procedures of COASTAL have also been included in the proposals of the updated Special Environmental Study that is currently under consultation (Chlykas and Skolou (eds), 2021).

Most interestingly, the study proposes the **adoption of multi-level governance system as a management decision support system to achieve a satisfactory conservation status in the wetland** (action MM25510CJ0201 in Chlykas and Skolou (eds), 2021), which if established will facilitate the development of the partnership envisioned by the stakeholders. However, for the implementation of the partnership the legislation regarding public-private partnerships will also need to be aligned, to avoid inconsistencies. These **inconsistencies in state legislation and political decisions, are often barriers** for local partnerships to exercise their power and turn from government to governance (Manos B., et al, 2014).

Additional actions identified in the BRM and have been included in the proposals for the management of Gialova lagoon include:

- Action plan for the restoration of hydrological conditions and wetland habitats in the Gialova lagoon (action MM25510CJ0301)
- Recording, mapping, evaluation and valuation of the ecosystem services of the protected area (action MM25510MB0201)
- Development of programs to raise awareness of the productive sectors, local bodies and society for all ecosystem services and their benefits (action MM25510MB0202)
- Environmental Information, Awareness and Education (action MM25510MB0203)
- Elaboration of a thematic Management Plan for the Agriculture Sector for the regulation of agricultural activity, through the implementation of agro-economic measures and providing incentives for the use of best farming practices (action MM25510MB0205)

And finally,

- a study of the carrying capacity and a Visitor Management Plan in the terrestrial and marine environment (action MM25510CF0301)

In order to strengthen the landscape protection, it is suggested that there is a need for a **Strategic Landscape Study** which will allow the long-term management of the area and define the protection and promotion of the cultural landscape in the direction of the experiential approach expressed by the stakeholders. This will allow establishing protection zones of incompatible land uses and preserving the landscape character of olive orchards, as a valuable agro-ecosystem. These actions

would be in-line with the Council of Europe Landscape Convention which has been ratified by the Greek State but has not yet been considered in national policies and the development of regional

*The Baltic Sea is one of the world's largest brackish water bodies, with a land catchment area about four times larger than the sea surface area. In the Swedish part of the Baltic catchment, the Norrström drainage basin and its adjacent and surrounding coastal zones is a key area with a large human population. It includes the Swedish capital of Stockholm as well as agricultural and industrial activities, contributes considerable nutrient loading to the Baltic Sea, and suffers from eutrophication and harmful algae blooms resulting from such loads also in the archipelago and coastal waters. International agreements and environmental regulations put in place since decades still have not managed to sufficiently decrease the nutrient loads from land and combat the severe eutrophication, hypoxia and algae bloom problems in the coastal and marine waters of the Baltic Sea. How to achieve sufficient management and mitigation of the nutrient loads in the short and long term, under changing human pressures and hydro-climatic conditions, is a key problem to address for the sustainable development of this coastal zone and its rural and urban hinterland areas, as for the entire catchment and coastal region of the whole Baltic Sea. (COASTAL D03)*

plans for Spatial and Residential Organization of Open Cities.

### **3.4. Norrström Basin & Baltic Sea (Sweden) Business-Policy Roadmap (MAL3)**

The purpose of MAL 3 business roadmap is to address to current water-related problems in the Black Sea region

#### **3.4.1. Business solutions proposed**

In the second Multi-Actor lab, the overall objective was to suggest and discuss potential solution alternatives aiming to improve rural-coastal synergy and development. These alternatives should take into account the role of systemic transitions and boundaries at different spatial and temporal scales, and follow the overarching goal of the Helsinki Commission (HELCOM)<sup>11</sup> for the region as “achieving an unaffected Baltic Sea by pollutions”. Figure 4 shows the list of solution alternatives discussed and suggested by workshop participants for MAL 3. In this figure, categorized solutions were developed for this case as part of a similar project<sup>12</sup> to COASTAL where Stockholm University (the MAL3 lead partner) and Stockholm Environment Institute – SEI (the MAL3 local partner) were involved. These solution alternatives were developed based on the synopses of new measures and actions collected by HELCOM at the end of 2019 from relevant regional stakeholders, to update the

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<sup>11</sup> HELCOM (Baltic Marine Environment Protection Commission – Helsinki Commission) is an intergovernmental organization (IGO) and a regional sea convention in the Baltic Sea region (<https://helcom.fi/>), consisting of ten Contracting Parties, namely Denmark, Estonia, the European Union, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden.

<sup>12</sup> BONUS RETURN: <https://www.sei.org/projects-and-tools/projects/bonus-return/>

Strategic Plan for the Baltic Sea Action Plan (BSAP)<sup>13</sup>. The list of solution alternatives was organized in four categories of coordination support solutions, data support solutions, eco-technology and policy solutions (highlighted with a colour code in Figure 4). It includes a combination of technical and policy innovations as well as financial and economic incentives to address water quality and eutrophication problems in the local scale of the MAL3 case as well as the whole Baltic Sea region scale.

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<sup>13</sup> HELCOM (2020). Baltic Sea Action Plan: New actions are proposed during HELCOM stakeholder event. <https://helcom.fi/baltic-sea-action-plan-new-actions-are-proposed-during-helcom-stakeholder-event/>

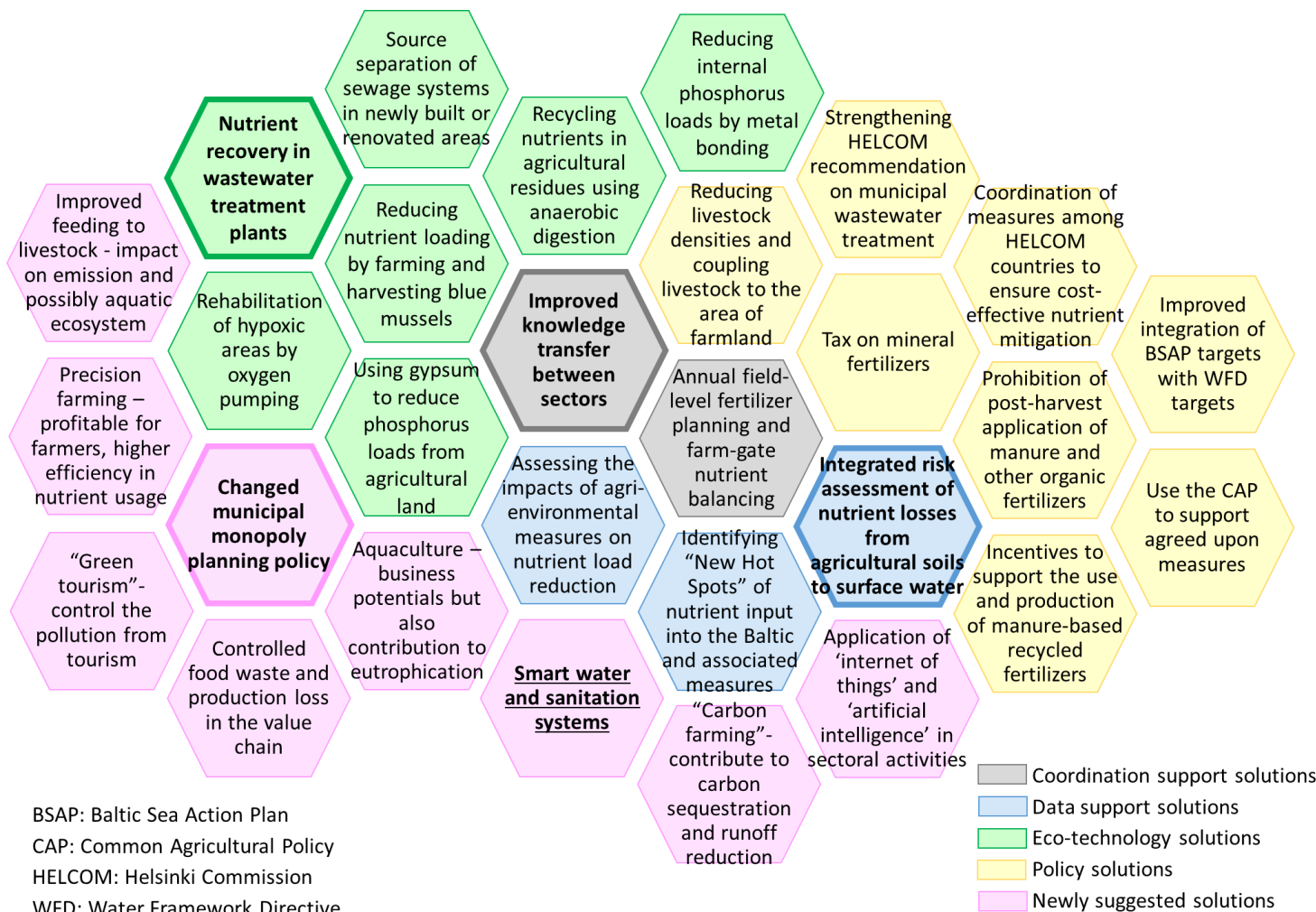


Figure 4: Business and policy solution alternatives suggested and discussed by local and regional stakeholders during the 2<sup>nd</sup> multi-actor workshop for MAL3. Different solution categories are shown with different background colours. The prioritized solution alternatives by all MAL3 stakeholders at the workshop are highlighted with Bold format and thick borders. An additional solution alternative for which complementary information was also provided by one of the MAL3 local partners (NIRAS Sweden AB) and is shown underlined and with Bold format.

Based on an online voting process, four solution alternatives were selected by MAL3 stakeholders as the top priorities for this case. These solutions include “Improved knowledge transfers between sectors”, “Integrated risk assessment of nutrient losses from agricultural soil to surface water”, “Nutrient recovery in wastewater treatment plants”, and “Changed municipal monopoly planning policy”. Stakeholders were asked to discuss different aspects of these prioritized solutions according to the guiding questions provided on the canvas and the outcomes are summarized in the following sections. After the workshop, stakeholders were also invited to provide the same information for an additional solution alternative that is not among the top prioritized ones, but they believe it can be an important and efficient solution to be considered for the MAL3 case. One of the MAL3 local partners, NIRAS Sweden AB (an industry sector), provided additional information for a solution alternative “Smart water and sanitation systems”, which is included in the final section of this document.

#### ***3.4.1.1. Improved knowledge transfers between sectors – prioritized by all stakeholders***

Policies and support mechanisms should foster knowledge transfer from research to practical actions; both in national and international context. Often language used for communicating messages is too official and poorly understandable for the potential target groups. In most cases, direct contact methods (e.g. meetings and workshops) are the most efficient means of knowledge transfer. Direct contacts should also be promoted for direct communication between scientists, policy makers and economic sectors.

The proposed action will support better understanding of different roles, for instance, between agriculture, water/wastewater treatment plants and businesses that process and handle nutrients and pollutants. It also provides a better overview of the problem complexities as well as the possibilities for innovative solutions to address them.

#### ***3.4.1.2. Integrated risk assessment of nutrient losses from agricultural soil to surface water***

In order to efficiently reduce losses of nutrients from agricultural soil into fresh water bodies, it is essential to first understand the associated risks and increase knowledge for management of nutrient legacies. Despite national research and data available in this field (e.g. SLU Uppsala<sup>14</sup> and SLU Alnarp<sup>15</sup>), this solution alternative proposes the risk assessment of nutrient losses from agricultural land to surface water to be conducted across the Baltic Sea region including the MAL3 catchment. There are new agricultural practices (e.g. low till and perennials farming) that support nutrient loss mitigation from agricultural soils. Many organizations including the Federation of Swedish Farmers (LRF) and the Board of Agriculture and Extension Services (Hushållningssällskapet) work together to reduce the impacts of agriculture based on innovative practices. The trend is now away from mono crop towards more diverse, perennial cultivation systems. Agriculture is a source but also an important sink for carbon, and also other pollutants that are conserved in water bodies while they can be broken down in soils.

Methods that reduce leakage and runoff are also positive for reducing nutrient emissions and restoring the quality of soils; such methods are raising interest and are being introduced in the region.

#### ***3.4.1.3. Nutrient recovery in wastewater treatment plants***

This solution aims to remove and capture nutrient (nitrogen and phosphorus) and carbon (BOD) as part of wastewater treatment in order to improve the water quality of emitted wastewater from municipal sewage treatment plants, and to provide materials for reuse. It will clean the effluents and recovering nutrients

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<sup>14</sup> <https://www.slu.se/om-slu/orter/uppsala/> (in Swedish)

<sup>15</sup> <https://www.slu.se/om-slu/orter/alnarp/> (in Swedish)



(nitrogen and phosphorus) that would be otherwise discarded into the environment to create environmentally friendly fertilizers (end products). There is a lot of potentials in new technology<sup>16</sup>. Moreover, there is a real demand from the end users of the nutrient products refined through the treatment processes. The technologies have to be developed in collaboration with the end-users. There is also a need for relevant legislations to produce refined nutrient-based products as well as to use them for appropriate purposes. Biogas has been a more useful and acceptable end product so far.

#### **3.4.1.4. Smart water and sanitation systems**

Sweden has a history of having plenty of water in general. In recent years, this has changed in many places due to weather conditions with less rainfall. Interest in saving water and seeing water as a resource is growing in both industry and municipal sectors. Most households in Sweden are connected to a municipal sewage treatment plant, but about 1 million people still have individual sewage treatment plants. Sweden runs R&D and smart technologies in, among other things, advanced sanitation systems but also source-sorting wastewater systems for efficient utilization of the water resource. This solution enables the reuse of polluted water and non-sewered sanitation, and eliminates the discharge of effluents.

### **3.4.2. Policy solution proposed**

#### **3.4.2.1. Changed municipal monopoly planning policy**

The Swedish administrative system formally consists of three levels – the national level (the state), the regional level (counties), and the local level (municipalities). The Parliament and the national government guide land-use planning through legislation and policy making<sup>17</sup>, for example, the Planning and Building Act<sup>18</sup> and the Environmental Code<sup>19</sup>. Another state-level actor with significant impact on spatial planning is the Transport Administration<sup>20</sup>, which is responsible for the planning and delivery of transport infrastructure through the national road and railway networks<sup>21</sup>. In terms of formal structures, the Swedish planning system awards substantial power over land-use planning to the local level (municipality). The Swedish municipalities control the formal instruments for land-use planning, including the comprehensive municipal plans (which are mandatory but not legally binding) and the detailed development plans. Consequently, it can be argued that from a formal perspective, the municipalities have a “planning monopoly”. Theoretically, this means that municipalities have the power to plan what should be built and where and when it should be built. Currently within the frame of the municipal planning policy, municipal decision makers can overrule and plan for land-use, of course, with relevant motivation (most commonly to create employment opportunities). If no objection is raised against the suggested plan, municipalities can also bypass some legislation that might relate to their planning. Changing the monopoly power of municipalities in land-use planning can benefit other sectors, support a shared use of available land, and in some cases even further protect natural environment including the coastal regions.

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<sup>16</sup> <https://www.slu.se/institutioner/energi-teknik/forskning/enheten-for-kretsloppsteknik/> (in Swedish)

<sup>17</sup> Persson, C. (2013). Deliberation or doctrine? Land use and spatial planning for sustainable development in Sweden. *Land Use Policy*, 34, 301–313. <https://doi.org/10.1016/j.landusepol.2013.04.007>

<sup>18</sup> <https://www.boverket.se/en/start/building-in-sweden/swedish-market/laws-and-regulations/national-regulations/pbl-pbf/>

<sup>19</sup> <https://www.government.se/legal-documents/2000/08/ds-200061/>

<sup>20</sup> <https://www.trafikverket.se/en/startpage/>

<sup>21</sup> Larsson, G. *Spatial Planning Systems in Western Europe*; ISO Press: Amsterdam, The Netherlands, 2006.



### 3.4.3. Expected impacts and benefits for coastal-rural areas

#### Improved knowledge transfers between sectors

New business opportunities, more efficient recycling and use of nutrients, synergies and economizing limited resources available for solving complex problem, better sharing of knowledge and promotion of learning about nutrient and pollutant management among sectors, and more informed policy and action plans

#### Integrated risk assessment of nutrient losses from agricultural soil to surface water

Depending on methods used (low till, cover crops), it can increase productivity for farmers and decrease pesticide use which will impact positively on the water bodies. The solution alternative can decrease nutrient loading to the Baltic Sea and its coastal zones by improved guidance and focus of agro-environmental management practices with more accurate knowledge of risk areas. It can also reduce farmers' costs by more effective fertilization according to crops' needs.

#### Nutrient recovery in wastewater treatment plants

It can improve wastewater emission quality, and yield reusable products including biogas, sludge, phosphorus mineral, etc. that can have commercial value and increase circularity of nutrients and carbon. It can reduce the emissions of nutrients into water bodies and facilitate recovery of phosphorus-rich fertilizers (phosphates are in the list of Critical Raw Materials of the EU).

#### Smart water and sanitation systems

It can enable more people to live disconnected from municipal water and sewage systems. This can reduce the cost to establish a home or community of homes – for both local county authorities and for individual home owners – and get more people to live in areas far away from centrally serviced locations.

#### Changed municipal monopoly planning policy

It can lead to economic development. It might also lead to increased real estate prices which may drive pressure for more land exploitation - this could influence traditional economic activities such as fisheries – e.g. disturb breeding areas etc. In many rural municipalities, farming land is being exploited and little attention is given to the fact that agricultural lands are national and not municipal interests. It is easier to build on agricultural lands. This is a problem across different scales of regional, national, and global. As we are entering a decade of global restoration, Swedish farm land may be even more attractive with implications, e.g., for climate change and should be more protected.

### 3.4.4. Synergies dimensions

#### Improved knowledge transfers between sectors

It involves different sectors. It is important to understand that different sectors and their activities in MAL3 are interconnected. They are all trying to solve different parts of water-related problems. Coordinated and synergistic efforts can lead to more innovations, cost savings and mutual understanding of the different roles of various sectors.

#### Integrated risk assessment of nutrient losses from agricultural soil to surface water

If new and innovative farming practices continue, they will keep the landscape open, making it more attractive for tourism.

#### Nutrient recovery in wastewater treatment plants

It can reduce one of the anthropogenic pressures on the natural resources. It needs multi-sectoral collaboration between municipalities, technology developers, and research institutes.

#### Smart water and sanitation systems

It can enable more people to live in e.g. coastal areas (Stockholm archipelago), drive growth and services, and generate space for more people to improve their living conditions. Many actors can be involved, including planners, school authorities, service providers (stores, communication), research institutes and technology developers.

#### Changed municipal monopoly planning policy

A revision of the monopoly planning policy is required, as decisions are taken at municipal level where there is not as much competence as needed for environmental aspects. Changing this will imply revision of legislation that may result in changes in relevant policies and plans for coastal and rural activities. It may also result in changes in civil society and financial and trade organisations, e.g., fisheries, etc. As the planning monopoly is related to land-use, changing it can also affect various sector activities at the coast, and motivate them to collaborate more with inland sectors.

### 3.4.5. Value proposition

The proposed solutions support transition towards sustainable desirable futures based with good environmental status of the Baltic Sea ecosystem by fostering cross-sectoral cooperation and partnerships, following circular economy principles (e.g. reuse of material), and improving connections between water management and agriculture sectors.

Smart water and sanitation systems can remove two major hurdles to decentralized living – availability of clean water and management of sewage flows - in line with circular-economy principles and nature-based solutions.

The policy recommendation to revise decision making structures at municipal level can also strengthen nature-based principles, encourage more circular principles, and enhance collaboration and communication across municipalities and with regional/national agencies.

### 3.4.6. Key sectors – actors

Overall, all active sectors in MAL3 should be involved: agriculture and environmental agencies, fertilizer producing industries, municipalities, research institutes, research and development institutes, policy makers (national to local), environmental and civil society organizations, and real estate developers.

### 3.4.7. Key steps for solutions' implementation

Table 15: Business Roadmap MAL 3

AIM	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6
<b>Improved knowledge transfer between sectors</b>	Remotely and locally collected data analyzed into user-friendly and tailor-made information, derived from cloud-based sources into each users' individual phone/computer etc . <i>(Actors involved: competent authorities, research institutes)</i>	Development of data center locally when possible <i>(Actors involved : Competent authorities for data center creation and operation)</i>	Increase knowledge exchange of EU projects such as COASTAL, BONUS to relevant stakeholders in the Baltic Sea region. Refine further action protocols regarding abatement of nutrient emissions. Support results implementation. Create national (e.g. COASTAL KEP) <i>(Actors involved : Competent authorities)</i>	Creation of a coordination body in charge of local cross-sectoral participation, promoting the implementation of viable solutions developed through research projects. <i>(Actors involved : Competent authorities)</i>		
<b>Integrated risk assessment of nutrient losses from agricultural soil to surface water</b>	Development of nutrient-indices, including joint sharing of input data parameters and a common nutrient-index model, resulting in the capacity to map croplands and fields in the Baltic Sea region according to their nutrient levels and risks of nutrient loss. <i>(Actors involved : Research institutes)</i>	Proposal of norms for nitrogen and phosphorus fertilizing for the most common crops; introduction to countries and regions within the Baltic Sea drainage basin where such norms are not implemented or improvement of their implementation. <i>(Actors involved : Research institutes - HELCOM - National &amp; local authorities)</i>	Verifying the effects by simulations with various watershed assessment models. <i>(Actors involved : Research institutes)</i>			

<p><b>Nutrient recovery in wastewater treatment plants</b></p>	<p>Bring the new technology to the Swedish market <i>(Actors involved: technology developers, research institutes (IVL Swedish Environmental Research Institute)</i></p>	<p>Investments at the municipal level to upgrade existing wastewater treatment plants and include eco-technologies required. <i>(Actors involved: National, EU funding programs via project grants)</i></p>	<p>Review and reform of water and sanitation use fees. <i>(Actors involved: Municipal authorities)</i></p>	<p>Development of a new supply chain: Collecting and redistributing the recovered nutrients (e.g. phosphorus) in the market for production of biogas, sludge, phosphorus mineral... <i>(Actors involved: Nutrients distributor Agriculture sector)</i></p>		
<p><b>Smart water and sanitation systems</b></p>	<p>Coordination by regional planning authorities and research funding to finance and develop new technology options; <i>(Actors involved: Competent authorities, research institutes)</i></p>	<p>local testing <i>(Actors involved : Competent authorities, research institutes)</i></p>	<p>Policy revisions, allowing new systems <i>(Actors involved : Competent authorities)</i></p>	<p>Promotion, dissemination <i>(Actors involved : Research institutes, competent authorities)</i></p>	<p>production and market availability new systems <i>(Actors involved : Private businesses)</i></p>	<p>Installation in household / group of household <i>(Actors involved : Household owners - real estate developers)</i></p>
<p><b>Changed municipal monopoly planning policy</b></p>	<p>National politicians will need to present this suggestion in the parliament.</p>	<p>Municipal actors will be better informed about laws regulating nature conservation etc. and might stop exploitation of municipal land where it is not allowed or recommended.</p>	<p>Planners and real estate agencies, building companies, etc. should also take responsibility when their land exploitation is contradicting national laws.</p>	<p>Planners and real estate agencies, building companies, etc. should also take responsibility when their land exploitation is contradicting national laws.</p>		

### 3.4.8. Business Case focus

#### 3.4.8.1. Overview

##### **TITLE BUSINESS CASE:**

Integrated risk assessment of nutrient losses from agricultural soils to surface waters (related business opportunities)

##### **PURPOSE**

A business case for addressing and solving coastal water quality and eutrophication problems in the local MAL3 case and the whole Baltic Sea scale.

##### **LOCAL CONTEXT:**

This business case has been co-created with and validated as highly prioritized by local MAL3 partners and stakeholders. Multiple possible business and policy solution alternatives were first discussed and formulated at a virtual workshop for exploring possible circular interventions for healthy coasts, sea and inland waters in the Baltic region, organised by the local MAL3 partner SEI, June 10, 2020. Thereafter, the relevance and effectiveness of these various solution alternatives were further discussed with local partners and stakeholders in a virtual MAL3 workshop (November 20, 2020), with their comments and contributions collected in a GoogleDoc. At that MAL3 workshop, participants were also asked to identify their highest priority solutions for MAL3 through an online survey tool. Business roadmaps were further jointly developed by asking the local partners and stakeholders “How to implement the prioritized business and policy solution alternatives in MAL3?”. Four possible solution pathways, namely “Improved knowledge transfer between sectors”, “Integrated risk assessment of nutrient losses from agricultural soils to surface waters”, “Nutrient recovery in wastewater treatment plants” and “Municipal monopoly planning policy”, were identified as highest priorities in this process. The local MAL3 partners and stakeholders were further asked to suggest different actions with timelines for these prioritized solutions with their input provided in a GoogleDoc file during the week following the workshop. Among these highly prioritized solution pathways, “Integrated risk assessment of nutrient losses from agricultural soils to surface waters” has been selected as best suited for further Business Road Map (BRM) development, testing and validation using the MAL3 systems dynamics model.

##### **OBJECTIVE:**

To reduce agricultural nutrient (nitrogen and phosphorus) losses and loads to inland, coastal and marine waters. This BRM thus aims to reduce a major anthropogenic pressure on aquatic ecosystems and can promote important rural-coastal synergies, for example by exploiting the discarded nutrients that pollute coastal waters to produce seaweed and mussels that can in turn be used, e.g., for chicken feed, fertilizer or biogas production.

##### **EXPECTED IMPACTS:**

Reduction of agricultural nutrient losses and loads to inland, coastal and marine aquatic ecosystems can be achieved by a combination of measures selected on the basis of integrated risk assessment. Potential measures include direct ones at the source, such as changes in agricultural practices (e.g., fertilisation, catch crops, precision farming) and leakage reductions (e.g., P mining, upstream wetlands/ditches), as well as downstream measures that capture resulting nutrient loads to aquatic environments (e.g., downstream wetlands, mussel/seaweed farming). In combination, these measures can reduce nutrient loads to water bodies and their negative impacts on different time scales, and are consistent with the objectives of



increasing recycling and reuse and reducing environmental pressures. P-mining may also enable the production of phosphorus fertilizer, which is in the list of Critical Raw Materials of the EU. Nature-based solutions, such as seaweed and mussel farming, can promote the circular reuse of nutrients and increase rural-coastal connections and reuse of materials by producing new fertilizers and chicken feed. Moreover, these solutions are in line with the EU Blue Economy agenda, which encourages sustainable production of valuable goods from the sea, and can drive novel circular economy market(s) and other agricultural and environmental technology and service developments and business opportunities. The risk analysis, monitoring and knowledge-system developments required for efficient adaptive measure selection, implementation and follow-up can also drive novel related developments and business opportunities in AI, IoT and other digitalisation, robotics, Earth observation, modelling/forecasting, R&D, higher-education and life-long learning sectors.

**IMPLEMENTATION STAGE:**

Table 16: MAL 3 Business Case Implementation stage

<b>SHORT TERM Actions</b>		
Start of risk assessment process by compiling, enhancing and synthesizing data on agriculture, farming practices, nutrient concentrations and nutrient-carrier flows in leakage-receiving groundwater and downgradient surface waters, and mitigation measures taken so far to reduce nutrient loads.	Performance assessment of implemented measures and test projects, and complementary implementation, monitoring (before and after), and assessment of additional new projects to test various sets of measures for different local and implementation conditions.	Creation of integrated open-access knowledge system(s), synthesizing data, interpretation models and results for the risk and measure assessments and projects.
<b>Stakeholders involved</b>		
<i>Agricultural sector, responsible agricultural and environmental authorities, including also involvement of research organisations, with national and EU (e.g., regional support and R&amp;D) funding support</i>		
<b>MEDIUM TERM Actions</b>		
Based on the results from the above risk and measure assessments and projects, and the developed open-access knowledge system(s):		

<p>Assess characteristics of successful measures and develop and apply policy instruments (e.g., economic, regulatory, educational) and incentives for the agricultural sector to implement them.</p>	<p>Create management guidelines and handbook of best practices to assist farmers, municipalities, and other supervisory and monitoring authorities in selection, implementation, and monitoring of effects of measures.</p>	<p>Assess, forecast scenarios for, and communicate with farmers, municipalities, and other supervisory and monitoring authorities about expected effects and their evolution time frames and associated uncertainties, for relevant follow-up and adaptive management based on what actual monitored effect evolution looks like.</p>
<p><b>Stakeholders involved</b></p> <p><i>Government, responsible national authorities, including also involvement of research organisations</i>   <i>Agriculture sector, responsible national authorities, including also involvement of research organisations</i></p>		
<p><b>LONG TERM Action including key partners involved</b></p>		
<p>Promoting development of a circular economy market and associated supply chains:</p> <p>For collection and redistribution of recovered nutrients (e.g., phosphorus) for production of, for example, animal feed, biogas, fertilizer, etc.</p>	<p>Continuous effect monitoring and tracking of results and result analysis, both via and updating the open-access knowledge system(s):</p> <p>For adaptive management with best suited measures, enhancing associated innovation and business developments, e.g., in agricultural and environmental consultancy sectors</p>	<p>Driving innovation and business developments for AI and other types of modelling for enhanced forecasting capability and Big Data handling (from and combining ground/in situ, remote sensing, automated-sensor, robotics-based monitoring/measurements, and model data), and other digital technologies and services</p>
<p><b>Stakeholders involved</b></p>		

<p><i>Government, national authorities, agricultural sector and fertilizer production-consumption actors</i></p>	<p><i>Agriculture, environmental, and related consultancy, R&amp;D, higher-education and life-long learning sectors</i></p>	<p><i>AI, IoT and other digitalisation, robotics, Earth observation and modelling, and related consultancy, R&amp;D, higher-education and life-long learning sectors</i></p>
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### 3.4.8.2. SWOT analysis

The basic problem to be solved by this proposed business initiative is that of excess nutrients (as well as other agrochemicals) continuously leaking from agricultural areas to soils, groundwater and down gradient surface and coastal-marine waters, and causing eutrophication (and other types of pollution) of the aquatic environments. This business initiative has been co-created with and validated as highly prioritized by local MAL3 partners and stakeholders. It considers several potential nutrient reduction measures that need to be selected based on novel risk analyses and systematic effect monitoring, tracking of results, and enhanced result analysis and forecasting capabilities. The nutrient reduction measures per se involve changing agricultural practices (e.g., fertilization, catch crops, precision farming), leakage reduction (e.g., P mining, upstream wetlands/ditches), nutrient compensation (e.g., downstream wetlands, mussel/seaweed farming), and can drive novel circular economy market(s) and other agricultural and environmental technology and service developments and business opportunities. The risk analysis, monitoring and knowledge-system developments required for efficient adaptive measure selection, implementation and follow-up can, in turn, drive novel related developments and business opportunities in AI, IoT and other digitalisation, robotics, Earth observation, modelling/forecasting, R&D, higher-education and life-long learning sectors.

Table 17: MAL 3 Business Case SWOT analysis

<b>STRENGTHS</b> (Internal positive factors)	<b>WEAKNESSES</b> (internal negative factors)
<p>Combination and variety of potential solutions facilitates efficient adaptive measure selection, implementation and follow-up.</p> <p>Technology is available for most of the potential measures identified.</p> <p>Measures aimed at changing agricultural practices could reduce the cost of fertilizer for farmers, offer commercial benefits (e.g., organic farming) and reduce environmental problems at source.</p> <p>Leakage reduction measures can reuse nutrient stores already in the soil and reduce environmental problems before they spread to surface waters.</p> <p>Nutrient compensation measures promote circular reuse of nutrients, as well as coastal-rural synergies, by producing new fertilizers and poultry feed.</p>	<p>The diversity of local conditions requires an assessment at local scale that depends on the particular conditions. Thus, the choice of the optimal set of measures is difficult and non-trivial to generalize, and requires extensive data collection.</p> <p>Potentially end users (farmers) may not be interested due to:</p> <ul style="list-style-type: none"> <li>lack of know how</li> <li>measures that take a long time to produce results</li> <li>positive results are not directly observable and may be indicated by an absence of change (e.g., yield remaining constant).</li> </ul> <p>Measures aimed at changing agricultural practices could reduce yield and here also, their effects are difficult to observe.</p> <p>- Nutrient compensation measures may be perceived by the farmer as very disconnected and indirect, and may require creation of new market and supply chains to</p>



	commercialize the recovered nutrients
<p><b>OPPORTUNITIES</b> (External positive factors)</p> <p>The potential measures identified are all aligned with EU targets to reduce consumption and environmental impacts, and to increase recycling and reuse.</p> <p>The risk analysis, monitoring and integrated open-access knowledge-system developments required for efficient adaptive measure selection, implementation and follow-up can also drive novel related developments and business opportunities in AI, IoT and other digitalisation, robotics, Earth observation, modelling/forecasting, R&amp;D, higher-education and life-long learning sectors.</p> <p>For measures relating to change in agricultural practices and soil P mining, data generated by research and projects together with development in IT would decrease the price of selecting and optimizing a set of local mitigation measures.</p> <p>P-mining may also enable the production of phosphorus fertilizer, which is in the list of Critical Raw Materials of the EU.</p> <p>In addition to nutrient retention, wetlands are nature-based solutions that can also increase biodiversity.</p> <p>Nature-based solutions, such as seaweed and mussel farming, can promote the circular reuse of nutrients and increase rural-coastal connections and reuse of materials by producing new fertilizers and chicken feed. Moreover, these solutions are in line with the EU Blue Economy agenda, which encourages sustainable production of valuable goods from the sea, and can drive novel circular economy market(s) and other agricultural and environmental technology and service developments and business opportunities.</p>	<p><b>THREATS</b> (external negative factors)</p> <p>Many of these options may not be economically viable at current prices and may require external incentives (e.g., pricing of nutrients) or a change in current incentives.</p> <p>Some measures may also require development of a circular economy market and associated supply chains.</p> <p>Inadequate and insufficient information exchange between sectors (industry, agriculture, consulting, government) and sectoral scales (municipal, regional, national) can hamper the cross-sectoral collaborations necessary for the integrated risk analysis</p> <p>These incentives also depend on other agricultural regulations and policies (e.g., CAP), which can be at odd with best management practices to reduce nutrient losses.</p> <p>The complexity of environmental laws and bureaucracy may discourage farmer from implementing these measures.</p> <p>Some measures can have negative environmental impacts (e.g., dense mussel farms can produce anoxic bottom areas).</p>

### 3.4.9. Financial dimension

Funding from multiple sources will have to be mobilized to implement the Business Roadmap: EU funding programs via project grants as well as national and municipalities, depending on the type of action.

### 3.4.10. Key resources to be mobilized and main beneficiaries

The development of data centers require land availability often taken from agricultural area following the tendency observed in the region of Skåne (southern Sweden). This can create land-use conflict since arable

lands are protected as national interests and resources that need to be available in time of crises and isolation.

### 3.4.11. Policy dimension

#### 3.4.11.1. Policy context

Several policy barriers have been identified. As previously mentioned, there is still a lot of ‘silo thinking’ mind set on national and regional level and not so much interaction compared to what would have been desired. However, many decisions on land use are taken at local level where municipalities have the monopoly on planning. This monopoly could really end all efforts to implement recommendations for a positive impact on the environment. More distributed and available information and more connectivity have to go hand in hand with appropriate policies.

The Swedish municipal planning monopoly tends to drive shifts from agricultural land to real estate and urban development. Change in this monopoly needs to protect agricultural land.

Finally the Swedish sludge investigation can be a barrier to implement some of the proposed solutions/.

#### 3.4.11.2. Policy recommendations

The Norrström drainage basin and its adjacent and surrounding coastal zones in the Swedish water management district Northern Baltic Proper (MAL3) contribute considerably to the nutrient loading and associated eutrophication, hypoxia and algal bloom issues of coastal and marine waters of the Baltic Sea. Environmental regulations, such as the Water Framework Directive (WFD), focusing on coastal and land water, and international agreements such as the HELCOM Baltic Sea Action Plan (BSAP), focusing on the Baltic marine environment, have not been able to reduce nutrient loads from land sufficiently (Destouni et al., 2017). The systems dynamics (SD) model for MAL3 tackles issues of water availability and water quality - including seawater intrusion (SWI) risks into fresh coastal groundwater - related to the WFD and BSAP. The SD model has been used to simulate three management alternatives considering reduction of (i) nutrient concentrations and loads leaching from agricultural soils, (ii) nutrient concentrations and loads discharging from wastewater treatment plants, and (iii) total surface and groundwater nutrient concentrations and loads to the coast, by integrated measures that also consider and target long-term legacy sources from earlier nutrient leaching and discharges.

Results show that measures targeting only reductions in current nutrient leaching from agricultural land or discharges from wastewater treatment plants yield limited reductions of total nutrient loads to the coast. This is because remaining long-term legacy nutrient sources diffusely distributed in soils, groundwater and sediments, are the main contributors of current nutrient loads to the MAL3 coast, for both nitrogen and phosphorus (Chen et al., 2021). Hence, **tackling both the currently on-going agricultural leaching and wastewater discharges as well as the remaining legacy sources emerges as paramount to achieving significant reductions in nutrient loads to the coast.** Implications of these results for management measures have been discussed with local partners and actors in the context of Swedish policy and possible further actions for achieving the WFD and BSAP objectives. **Combinations of different types of water management measures are needed that include more efficient fertilizer use and enhanced removal and reuse of nutrients from wastewater, which reduce current source leaching and discharges, and wetland restoration and construction of different types of reactive barriers, along with mussel and seaweed coastal farming, placed so that they can significantly capture legacy source releases of nutrients on land and at the coast.** The coastal load contributions of both legacy source releases and currently active source leaching and discharges need to be assessed together in order to determine effective local combinations of different management measure combinations. These measure combinations will need to be spatially differentiated as local conditions can be widely variable. However, **current policies generally target homogeneously each**

**type of current nutrient source, while neither considering legacy sources nor the need for spatial differentiation of local measures to effectively combat coastal eutrophication.**

The emergent dominant role of legacy sources reflects a global water quality and eutrophication challenge for multiple actors (Basu et al., 2022). Addressing and mitigating the coastal nutrient concentration and load contributions from legacy sources requires multiple integrated management actions. For example, enhanced nutrient recycling would be particularly valuable for phosphorus, an increasingly scarce resource, for example through mining of phosphorus legacy reserves in soils and sediments, and productively **re-using sludge-based fertilizers from wastewater treatment plants** instead of continuously feeding additional new fertilizers to the soil. Establishment of a nutrient market could drive these types of measures, but both MAL3 model and data-driven study results (Vigouroux et al., 2020, 2021) and local MAL3 partners and actors agree that such nutrient market establishment would not be meaningful if limited only to a local coastal scale but would require application over the whole regional Baltic Sea scale to be relevant for BSAP achievement. In addition, reducing nutrient losses from currently active sources is still crucial, as today's active nutrient inputs determine the future coastal nutrient loads and associated eutrophication problems in fresh, coastal and marine waters. Ultimately, **the crucial role of legacy sources of both nitrogen and phosphorus calls for changes in management frameworks and policies to account for long lag times from management measure** to actual effects, apply spatially targeted measures, and identify new synergistic uses of legacy resources (Basu et al., 2022).

Issues related to **needed policy changes** have also been discussed with MAL3 partners and actors for the whole Baltic coast of Sweden. The implementation of integrated nutrient management measures throughout Sweden requires a national strategy and management planning for both groundwater and surface waters, and for the nutrient loads that these waters carry to the coasts. However, the **first two cycles of Swedish Water Management plans according to the WFD have not yet managed to sufficiently reduce nutrient loads**. The proposed plans for the third cycle (2021-2027) have met heavy criticism and remain yet to be finally decided. Previous Swedish water management reports to the European Commission have also been criticized on various grounds, further highlighting the needs for Sweden to improve its water management plans and action programmes. The integrated measures advocated by our MAL3 results also call for **better communication, coordination and planning between municipalities**, which is currently lacking in Sweden. The **Swedish water management authorities do not have overarching responsibility or mandate for overseeing that the decided programs of measures are actually carried out, and insufficient guidelines with little or no extra funding are given to municipalities to identify, decide on, and implement the required combined measures**. Reducing these policy and implementation gaps is essential for Sweden to move forward on combatting Baltic coast and marine eutrophication. Furthermore, **effective implementation of the required combined measures also requires effective communication between municipalities, national authorities and economic sectors** (agriculture, tourism, forestry), which further calls for an integrated approach to account for and handle various conflicting values involved in combatting eutrophication.

### 3.5. Charente River Basin (France) Business-Policy roadmap (MAL 4)

The aim of this roadmap is to achieve, by 2040-2050, a “desirable future”, as defined with local stakeholders through a series of collaborative workshops.

In this future territory, more sustainable in its three dimensions, economic, social and environmental, there is far greater collaboration between various stakeholders, with the aim of preserving the land-sea continuum. There has been a conscious effort to avoid excessively concentrated populations in coastal areas, as well as over-specialization of industrial and/or commercial activities. The use of a land and industry mosaic, along with governance at finer temporal and spatial scales, has increased the territory’s ability to withstand climatic and economic fluctuations. Inclusion of local stakeholders in networks, as well as a more effective territorial dialogue, have led to better sharing of knowledge, and a vision focused on the whole territory rather than individual sectors. Traditional coastal activities have continued. Shellfish farming has developed new practices that are better suited to its surroundings, including notably a more efficient way of managing marshland transition zones, a more relevant system of regulation, and greater adaptability in the way inland and coastal waters are managed. Mass tourism and pleasure boat activities have been reduced. Some non-developed areas of the coastline have been abandoned to the sea, with marshland serving as a buffer zone. The ports share their space with other coastal activities, generating new forms of collaboration with proponents of other businesses and industries in the area. Further inland, new integrative policy-making has encouraged the development of new farming systems. Crops are more diverse, with 100% of farmland now using organic methods, although exceptions remain possible, most notable for the vines of the Cognac area. These new, less water and pesticide-intensive farming methods or at least agro-ecological methods, allow better management of water resources, meaning that water is only stored when necessary and shared with other users. New supply chains have been created with the relocation of processing units in the area and the development of short circuits that promote local synergies.

#### 3.5.1. Business solutions proposed

##### *3.5.1.1. Towards a 100% agro-ecological territory*

The evolution of agriculture in synergy with the other activities of the territory is a major issue. As a major economic activity, it shapes the landscape and interacts with the environment and continental and marine hydro-systems. The evolution towards a 100% sustainable agriculture (organic, agro-ecological) and the development of land-sea synergies imply a new approach for the preservation of water resources, a collective and participative way of managing the water uses at the scale of the territory. **The objective is to take into account the global water demand (including ecosystems) and to reinforce the attractiveness of the territory by achieving a sustainable marine and continental water resource.** This attractiveness of the territory will strengthen the valorization of local products and the making of a diversified and harmonious, preserved social and economic fabric.

#### **CHANGING SYSTEMS AND PRACTICES**

A range of actions aim at changing farming systems and practices. Although they must start in the short term to reach the 2030-2040 target, these changes can only be achieved in the medium or long term. They require at first the exchange of knowledge and know-how, the building of networks, infrastructure and changes in the governance of the territory. Moving from the current 5% of organic farming to at least 20% of the agricultural area constitutes the greatest challenge (short term): once the setting up of supporting structures and the development of organic and agro-ecological farms is achieved the evolution towards the “new agriculture” is likely to accelerate due to an “spill-over” effect (80% in the medium term, generalisation in 2040).

#### *Diversifying crop rotations*



The evolution of agricultural systems towards organic or at least agro-ecological farming implies diversifying crops, developing short supply chains (at least 20%) and employment while reducing the environmental impact of agriculture (zero pesticide, less nitrogen loads, more biodiversity). These new systems take into account the market demand (currently strong) for more vegetal food: more protein crops, field vegetables, food and feed production. Organic and agro-ecological farming systems tend to be more diversified and this incentive is being reinforced by the new CAP (see Policy dimension). The 2014-2020 CAP has already strengthened incentives for more diverse crop rotation and agro-environmental effort (AEI), via the green payment, which represents 30% of decoupled aid, i.e. approximately 80 €/ha in the Charente basin. Diversification of crops implies diversification of commercial outlets, both for food and non-food products: economic operators, agricultural cooperatives and traders, are multiplying initiatives in the area to develop local supply chains (lentils, chickpeas, popcorn, vegetables, fruit, essential oils, aromatic herbs, etc.) or feed (soya, beans, legumes, etc.). These local operators are also developing other commercial outlets, such as hemp (insulation, textiles, etc.) or plants for energy use (agro-fuel, methanisation). Organic crop rotations have to be balanced in terms of nitrogen and nutrient inputs must come from organic/sustainable agriculture. The choice of crops for non-irrigated crop rotations is therefore limited (triticale, winter bean, sunflower, etc.). Part of the production (alfalfa) could be traded locally to livestock farmers - contributing to the maintenance of high quality breeding and associated grasslands- or even left in the field for part of it. This evolution of systems must be completed by a better management of winter cover crops, which have a positive effect on limiting the transfer of diffuse pollution and on carbon storage.

#### Evolution of the irrigated area and water efficiency

The volume of cereals produced is likely to remain at the same volume and innovative practices with improved water efficiency should make it possible to achieve water savings of around 30% for the same yield (Neoterra programme). Water savings will be mandatory for all human activities in the territory in order to adapt to the new climatic conditions. The question is how to deal with the decrease of the water volume withdrawn versus the evolution of the irrigated area. Due to the pressure on water resources and the cost of infrastructure for water storage, the irrigation costs are likely to increase strongly. Therefore, irrigation would be profitable only for crops with a high benefit. The business road map accompanies the probable reshaping of the irrigated area with incentives towards the most “environmentally friendly” crops. Several annual or perennial crops could be profitably irrigated: irrigated soybeans, vegetable seeds, field vegetables (peas, green beans, etc.), tree crops (hazelnuts, almonds, plums, chestnuts), spring crops (spring barley, malting barley, peas, spring beans, irrigated alfalfa, etc.). The new composition of the irrigation area will depend on several drivers: water availability, regulations (administrative authorizations, quotas and subsidies), price, quality of the territorial dialogue and new synergies in the territory. Conventional irrigated farms will switch to an organic irrigated system. But mixed systems can be envisaged with a few irrigated crops in the rotation as well as the development of more drought-resistant crops (e.g. like sorghum). Less irrigation but more spread over farms could be the new normal. Finally, climatic change could lead to a demand for vineyard irrigation, not currently favored by the profession.

#### Labels, certifications... a complicated roadmap for some farming systems

The roadmap can also encourage the development of environmental certification, certification for carbon storage by agriculture (for livestock, beef carbon, dairy carbon for milk, etc.) All these labels, by emphasizing the quality of practices and products, contribute to the attractiveness of the territory and open the door to collective valorization of the local products.

This evolution of agriculture will be complicated for certain high-yield and export-oriented farming systems (for instance, irrigated crops exported via the port of La Rochelle) or for the Cognac vineyards, also an export-oriented model, committed to HVE certification and agro-ecological farming rather than to 100% organic farming. However, the roadmap's gamble is that new modes of consumption, social demand, regulations and the rise of new agricultural systems will lead these systems to a radical change.

### **FACILITATE THE EVOLUTION OF AGRICULTURAL SYSTEMS AND A DYNAMIC RURAL FABRIC**

The evolution of agriculture is a major issue (which was discussed at the workshops) and must be accompanied by new legal and employment structures. Various actions must be implemented in the short term by facilitating access to land (including with structures such as “lease with option to buy”), by being more flexible on the legal status of farms (possible sharing between several young farmers) and by better matching between sellers and setting up candidates, young people or professionals. A dedicated structure could monitor the land for sale and on setting up projects, in order to maintain the agricultural area and a dynamic rural fabric.

### **CREATE NEW SUPPLY CHAINS IN THE TERRITORY**

A specific policy is needed to develop new crops/rotations with a relocation of processing units. Various possibilities can be mentioned: soya, market gardening, arboriculture (fruit and vegetables), drought-resistant crops (sorghum, etc.), agro-fuels, hemp, etc. This action requires the implementation of new marketing tools: short circuits, logistic circuits, etc.

### **COLLECTIVE WATER MANAGEMENT AND STORAGE FOR AGRICULTURAL USE**

Agriculture, even organic and sustainable, and even regarding a better potential water efficiency, will need water resources to maintain and develop. Current climate scenarios point out scarcer water resources and longer periods of water deficit. The year 2022 is a good example of this new context. Agriculture like other activities of the territory will have to adapt to this new reality. **This evolution of agricultural systems will only be achieved by cooperating with an enlarged water stakeholder network in the area, in the context of an innovative territorial dialogue advocated by the roadmap:**

- An evolution of irrigated surfaces and crops with innovative or mixed systems, more water efficient (30% savings by 2030 - Neoterra) complying with the goal of water savings
- Access to innovative monitoring techniques for all farmers,
- A water storage managed in the public interest by the actors of the territory. Several hypotheses for water storage are proposed whether by farmers or local authorities (up to 25 million additional cubic meters are currently envisaged by 2030), but there is a controversy: some stakeholders and NGOs point to the negative impact of this storage on the water cycle-reinforced by climate and in particular on the recharging of the aquifers. The solution can therefore only emerge through a renewed territorial dialogue that involves all the stakeholders and takes into account the public interest, considering water resources as a precious asset for the territory. All water needs must be scanned included the needs of the ecosystems to function correctly and preserve the good ecologic state of marine and continental waters. In the desirable future, a more sustainable management of water resources should limit the total capacity of reservoirs as much as possible.

### **HELPING TO CREATE A MORE EFFICIENT TERRITORIAL DIALOGUE**

This cross-cutting action calls on all the stakeholders and was unanimous in the workshops. It implies developing new tools for territorial dialogue, involving economic activities, managers, associations and elected representatives to initiate a transition of activities and a "territory" vision, a new paradigm. It is particularly important for a shared definition of water as a “public good” to be protected and managed in the public interest.

### ***3.5.1.2. Towards a sustainable shellfish industry rooted in the territory***

In the context of the overall synergy of activities in the Charente catchment area and the associated coastal zone, shellfish farming, as a major activity in the coastal zone, **must redefine the conditions for its sustainability and the relationships it has with the other activities in the area.**

#### **IMPROVING WATER QUALITY AND REDEFINING RELEVANT INDICATORS TO FEED TERRITORIAL DIALOGUE**

Improve water quality to ensure the development of human activities after meeting the requirements of environmental issues (water law). This objective requires a **redefinition of water quality indicators which will be used in current and new territorial dialogue structures:**

- **An indicator that integrates the notion of salinity.** The quantity of fresh water in rivers and its corollary in the sea, salinity, requires management on the catchment area/coastal zone continuum, i.e. to develop indicators that go beyond the Interim Flow Objectives (DOE) and integrate the notion of salinity. Such an indicator linked to volumes is a basis for exchanges between land and sea on trophic or pollution indicators. The notion of acceptability of environment, pollution level or trophic capacity (minimum value, thresholds, maximum values, etc.) need such an indicator.

- **An indicator of trophic capacity for shellfish farming:** this is the capacity of the (marine) environment to provide all the shellfish in the same body of water with the volume and quality of nutrients to ensure the environmental issues and the growth in meat and shell of the animals. This trophic capacity is dependent on the properties of the water mass under stress from the ocean, rivers and of the interactions in the littoral zone, characterized by intertidal mudflats. An indicator of trophic capacity must therefore be built beyond the mere interest in measuring the quantity of food necessary for the survival and reproduction of shellfish. Not only are shellfish part of a wider ecosystem (other farmed or wild species) but also, in order to improve the meat quality of the shellfish, a greater trophic capacity must be considered than that deduced from current growth performance. The trophic capacity of the near shore water body must also be linked to the outputs carried by freshwaters. The quality and quantity of nutrients or pollutants must be integrated into the indicator. Like the previous indicator, it can be built using research inputs and empirical/expertise knowledge.

#### **ACTING ON THE DENSITY OF SHELLFISH FARMING**

The trophic capacity is related to the number of animals having access to this resource. Growth performance and meat yield depend on this. The spatial distribution of the number of animals is also an important factor. This can be called “stocking density”.

- **Stocking density** is the ratio of the number of individuals per unit area. At constant trophic capacity, this indicator is a proxy for growth and flesh rate: the lower the density, the more food is available. Stocking density can be calculated at different spatial scales, which correspond to different regulations. At the overall basin scale, the total shellfish stock can be linked to the trophic capacity. This was done in the work of the 1985's which showed that the trophic capacity reached led to low growth performance and high mortalities. The public debate then focused on farm density, on abandoned oysters and on the inputs from the catchment areas. The regulations were only able to influence licensed farming areas. Since then, farmed area can no longer be increased and the local stocking density remained unchanged.

At the scale of the bank or park, the regulations require that one third of the surface area can be occupied and that all the concessions can be occupied. These principles could be reviewed in order to address the reduction of density in the shellfish farming area. Either by lowering the 1/3 rule or by leaving some concessions unoccupied.

On the scale of the floating bags, the density of oysters is about 13 kg for oysters in the maturing phase. Technical innovations should be able to reduce the local density of oysters through a better distribution in

space and thus accessibility to the nutritional resource. The use of the height rather than a single water layer in the case of bags on tables, and Australian bags are a technique to consider.

- **Increase in the shellfish farming area** can be part of density management and therefore of improvement of the meat rate. In the current state, this proposal is not likely to succeed unless the area of a farm is increased in exchange for a reduction in another. It was already proposed when deep-sea shellfish farming was envisaged, with each deep-sea concession being the subject of the abandonment of a foreshore concession. These procedures require flexible, adaptable regulations that allow for rapid, revocable decisions.

- **Cleaning and maintenance of the leases** is also a factor in decreasing density. In contrast to the reduction in the number of farmed oysters, the aim here is to eliminate farmed but abandoned oysters or those that have settled on supports and are competing with farmed oysters. This does not refer to wild oyster beds that have shown their interest in reproduction and biodiversity.

### **BIODIVERSITY MANAGEMENT**

Monoculture is not a viable option in the intertidal zone. Mortality on farmed species undermines the economies associated with these practices. The intertidal area where shellfish farming is performed has been divided between oyster and mussel farming. The restoration of biodiversity is desirable. This should apply to farmed species (polyculture) but also to all levels of the trophic chains. In the same way, sedimentary facies must be diversified to accommodate various ecological niches. The mosaic formed by the concessions can be the basis for biological diversity but also for human activities through various methods such as fishing on foot or breeding techniques. The aim of this action is to increase the resilience of the eco-socio-systems.

### **LAUNCHING NEW LABEL (SEE DETAILED ACTION IN ANNEX 1)**

The Protected Geographical Indication (PGI) label for Marennes-Oléron oysters would appear to no longer be suited to current farming conditions, which are significantly affected by climate change. Today's consumers no longer demand perfectly shaped shells and consistently high flesh content. While it is relatively easy to achieve the former, the latter is a much greater challenge. For this reason, some producers are abandoning PGI in favor of their own brands, while others are moving to production areas where a high flesh content can be more easily obtained. In the desirable scenario (Scenario 1), a new label is created, based on the quality of the product and covering the whole of the area in question. Current flesh content requirements are maintained. Creating a new label such as this will call for increased knowledge of the trophic environment in which the oysters grow, and how production is spread out both spatially and over time. Using two or three-year-old oysters, it ought to be possible to use the biological characteristics of breeding sites to fatten oysters as required. Alongside this, there needs to be a formal process of collecting empirical information and knowledge from the oyster producers themselves and sure that it is shared across the local oyster farming community. Both of these processes should be carried out as part of a single approach. In the short term, both dammed and open saltmarshes should once again be able to ensure a link between watersheds and the coast. It will be necessary to identify the trophic conditions in the area, heavily influenced by nutrients leaving the watershed and the production of the micro-algae needed to maintain oyster stocks. Scientists, local administrations, and professional groups will then be able to negotiate an oyster stock whose volume does not overwhelm the trophic capacity of the ecosystem, thus guaranteeing the requisite flesh content. There will also be a more formal set of procedures to manage oyster stocks based on trophic conditions and experience from producers in the field. These procedures need to be sufficiently flexible to be implemented and modified quickly, both in terms of timeframes and locations. This kind of dynamic management is well suited to the changeable nature of coastal zones and their development. This dynamism, already applied to "natural" (i.e. environmental) and "human" (i.e. user) systems should also be applied to the regulatory system. The aim of such an approach is that coastal



watersheds are no longer seen as a succession of different states punctuated by transition periods, but as a single system moving smoothly forward, driven by knowledge and experience.

### ***3.5.1.3. Water resources as a land sea continuum and a structuring element of the territory***

The vulnerability of the water resource, continental and marine hydro-systems in the MAL 4 territory (quantity and quality) and the presence of human activities that all require quality water make it a major issue for the development of the roadmap towards the desirable future co-constructed with the stakeholders. **The role of water is central to the territory.** Rivers and tributaries, wetlands, groundwater, coastline and soils must not be considered as reservoirs and storage sites, but as systems, with unique particularities and specificities that are spatially and temporally linked to form a territory. Hydro-systems must not be perceived solely as a resource but as a common public good that contributes to the good ecological status of the territory, to the preservation of biodiversity, to its identity and attractiveness. Rivers, surface and deep water tables, fresh and salt marshes and coastal waters, all participate in the water cycle and maintain remarkable ecosystems.

#### **A TERRITORY THAT IS GLOBALLY MORE WATER EFFICIENT AND DEVELOPED TO BE MORE RESILIENT TO CLIMATE CHANGE**

**Access to a good quality water resource is a major concern for the main economic activities in the area** (agriculture, shellfish farming, tourism, etc.) and a necessity for the maintenance and sustainable development of these activities. The problem is going to get worse with the prospects of climate change (cf. Charente 2050 prospective scenarios). Indeed, water needs have long been with the idea that volumes of water (the resource) are greater than the needs and that the quality of the water can be controlled by treatment. The strong increases in water needs and the effects of climate change put into question two notions: the water resource is not infinite and the constraints of food security would require treatments for which the technologies are not yet known. Achieving the goal of the roadmap towards a harmonious territory, means considering the water-territory system as a whole. For example, the use of drinking water for all domestic purposes is not free of costs for the territory or for the society. The same is true of excessive land development. Individual saving actions, collective actions, laws and regulations, good practice guides, urban planning, landscape management, resource protection, are all levers that could be activated to achieve a new way of considering the territory. This could be done by reinforcing a stakeholders' network, enlarged and more inclusive in particular for coastal stakeholders. This will allow developing a collective and cross-sectoral management of water as a common good (sharing issue) through these enlarged consultations and new management rules (policies).

Various actions are proposed to avoid wasting a water resource that will be increasingly under pressure if the hypotheses of an increase in population and tourism on the coastal strip are confirmed, in parallel with climate change:

- Limiting the concentration of the population on the coastal strip and thus the problem of water production and treatment infrastructures,
- More efficient wastewater treatment systems and decentralization
- Reduction of leakage in the networks
- A collective citizens' water saving policy (an agency launched at regional level by the water agency)
- Reuse of wastewater wherever possible (don't use drinking water when it is not necessary)
- Adapt infrastructure to achieve sustainable exploitation of the resource (WWTP capacity, water network, housing, etc.)

**Spatial planning can also better consider the need to preserve the functioning of ecosystems, water and carbon storage** through various measures "if there is no more water, there will be no more for anyone" (quote from a workshop):

- Decreasing the artificialization of land
- Reforestation of parts of the territory
- Restoration of wetlands (already partially underway)

As previously mentioned, water policies have been striving for several years (water law, GEMAPI law, SDAGE SAGE) to be territorial and participative. Nevertheless, the land-sea synergy dimension is still not established and not all the stakeholders are yet around the table for the territorial dialogue called for in the roadmap. **The increase in pressure on the resource must go hand in hand with strengthened governance, independently of private interests**, which can consider and prioritize uses in the light of the general interest and the interest of the territory as a whole. In particular, the question of water storage, taking into account its impact on the water cycle and hydro-systems on the one hand, and the needs expressed in terms of drinking water and the economy on the other, must be decided within the framework of this renewed territorial dialogue.

#### ***3.5.1.4. Towards an attractive and spatially diverse territory, promoting its quality products***

**By using a mosaic for the space and its associated activities, as well as applying governance strategies at finer temporal and spatial scales, it is possible to make the territory more resilient in the face of economic and climate change.**

#### **MANAGING COMPETITION FOR SPACE IN THE COASTAL ZONE**

It will also be a major challenge in the face of climate change and rising sea levels, which may lead to a retreat of part of the territory by the end of the roadmap.

This strategic retreat should take into account the demographic pressure (population, tourism) by preserving, as best as possible and as a priority, the agricultural soils with the highest biological value and the natural areas, before a low-density urbanization.

**THE PARTITION OF SPACE HAS BEEN REVISED: NATURAL AREAS ARE INCREASED IN URBANIZED AREAS TO CREATE NEW SPACES WHERE PEOPLE CAN INTERACT WITH THEIR ENVIRONMENT IN A SUSTAINABLE WAY. THE SIZE OF THE HOMOGENEOUS AREAS IS ADAPTED TO THE HEALTH OF THE BIO-SYSTEM. THIS SMALL-SCALE MOSAIC OF LANDSCAPES AND ACTIVITIES MANAGE TO PRODUCE BIODIVERSITY CORRIDORS. THE ATTRACTIVENESS OF THE TERRITORY**

It will be beneficial for the promotion of local products (synergy between land and sea). Alliances between sectors of activity have to be found to promote different products together:

- Quality offer referring to a health and environment dimension
- Territorial offer, associated with "sustainable" tourism
- Better quality multi-product offer, new markets

#### **LIMIT MASS TOURISM**

This can be done by regulating the tourism offer ((facilities, infrastructure) and find incentives to maintain a residential population balanced throughout the territory. It means also:

- avoid gentrification to preserve the possibility for all inhabitants (all social categories) to live and work in the territory

- Ensure supplies, space, opportunities and outlets over the territory for all private and individual activities
- Use a new enlarged, coastal-rural and inter-sectoral frameworks and policies to build a very long-term resilient territory on all aspects (quality of life, food supply, sustainable water resource and facilities, low vulnerability to climate change, etc.)

#### **LARGE-SCALE INVESTMENT, ALONG WITH SUPPORT FOR LOCAL DEVELOPMENT.**

This means that public services (including digital services) and infrastructure are available across the territory, preserving its rural and coastal fabric, and allowing local residents to continue to work while remaining in the area. These developments are accompanied by legal and economic innovative changes, with decentralized sources of water and energy making the territory even more independent and resilient. Soils have to be reclaimed from artificial development, transport is as low impact as possible, energy production and rainwater management are decentralized.

### **3.5.2. Expected impacts and benefits for coastal-rural areas**

Actions proposed for moving toward a 100% agro-ecological territory in the Charente basin should make it possible to maintain and develop a dynamic and diversified rural fabric, by enhancing local and quality production, creating jobs, preserving landscapes, biodiversity and the long-term health of the soil.

The search for **better product quality** in the shellfish farming industry is the guarantee of a **better use of environmental resources shared with other stakeholders**. Balanced management of nitrogen, potassium and silica levels, better definition and use of river and coastal biodiversity, better management of freshwater volumes and salinity are the main levers for increasing the synergy of the territory. The benefits are environmental and beyond that, economic and social. Stakeholders and the territory as a whole share them. Overall the modeling results (COASTAL D20) show that the implementation of the BRM will lead to the large development of an agro-ecological sustainable agriculture (75% of the UAA). Although the objective of 100% agro-ecological agriculture, as described in the BRM and the desirable future, is not fully reached, this result is very good and quite realistic. We know that some agricultural systems in the area are very profitable in current conditions and therefore will be less prone to undergo an agro-ecological transition. In addition, we have to consider that the price difference between organic farming products and conventional ones is an important parameter. We assume that this difference will diminish, as agro-ecological production will become a large part of the agricultural production.

The development of a sustainable agriculture, combined to the other actions in the BRM, allow preserving the annual water streams flow significantly when compared to the other trajectories.

Following the BRM induces a more suitable environment for shellfish production, which can maintain its margin while locally producing high quality oysters (underlying result of the model). This makes the conditions for the complete relocation of the activity on the territory.

An interesting result is that more sustainable agriculture or shellfish farming, despite lowered production, do not lead to important economic losses. Sustainable activities remain profitable (with significant variability though).

Finally, implementing all the actions in the BRM allows increasing the global attractiveness of the territory. An attractive territory includes a healthy and rich environment, a wealthy population and sustainable economic activities, including an important share of local products that benefit from and promote land-sea synergies.

### 3.5.3. Synergies dimensions

Actions aiming at a 100% agro-ecological territory will maintain and develop a dynamic and diversified rural fabric keeping the population not concentrated on the coastal line, promoting tourism and services in rural areas, adapting to climate change in coherence with the institutional roadmaps or forecasts under consideration (Charente 2050, Neoterra, Acclimaterra, territorial food projects (CH), zero-carbon territory projects, etc.). Synergy also lies in strengthening the general attractiveness of the area and possible rural-coastal cooperation for the commercialization of products, the development of local supply chains and new commercial outlets (ports, local markets). Finally, a major synergy achievement remains water resources thought of as a land-sea continuum and appropriated asset.

The solutions proposed for the oyster farming sector are based on a new synergy with land-based activities, which **requires a change of paradigm since it is the territory in all its components that is the support for this synergy and not the sum of the sustainability of the different activities**. The indicators can no longer be indicators specific to each activity (e.g. reducing shellfish waste) but **indicators that make sense for the territory as a whole** (shellfish waste management in its impact on the environment or on other activities). It is possible to **imagine the definition of indicators of well-being and good living applicable to humans, non-humans, landscapes, businesses, sectors, resources and the territory as such**. These indicators require thinking about the continuity between all the entities of the territory. For example, it will not be possible to consider the benefits of the synergy around water without considering a land-sea continuum.

### 3.5.4. Values proposition

The main benefits of actions on the agricultural sector are the development of a sustainable agriculture that allows the rural population to live in good economic and social conditions, in cooperation rather than in conflict with all the other activities in the area, in a preserved environment that ensures health and well-being. While the actions targeting the shellfish industry aim to develop a preserved and sustainable shellfish industry, but also to connect shellfish farming to other environments and activities specific to the coastal environment. The relationship with agriculture through water quality is a good example. Often, the agriculture-shellfish farming relationship is seen in terms of upstream-downstream linkages and thus the pollution emitted by one and received by the other. In the coastal project, the resolution of this conflict is no longer based solely on the responsibilities of each party, but rather on the measurement of the added value at the territorial level, i.e. the development of a win-win situation in which the new synergy of the territory offers guarantees to the various users.

Actions addressing water resource management and territorial planning tackle more specifically the major issue of preserving and restoring the quality of continental and marine hydro-systems in the territory

### 3.5.5. Key sectors-actors

Sectors: all six sectors of Mal 4 are concerned (Agriculture, Shellfish industry, Port and shipping, Tourism, Environment and territorial development, Water)

Without being exhaustive, the key actors for undertaking the proposed actions can be divided into the following categories:

Public Authorities: various state services at both national and local level, and at the level of human activities and the environment.

- Direction Départementale des Territoires et de la Mer (DDTM), a prefectural service, manages both agriculture and shellfish farming. For the latter, it issues regulations for the use of the

coastal strip and, in particular, shellfish farming concessions and the uses that result from them. It also has an environmental mission.

- Regional Directorate for the Environment, Development and Housing (DREAL) is placed under the authority of the Regional Prefect. At sea, it prevents the risks of climate change (erosion, flooding) and ensures the preservation of resources (water, biodiversity).
- Directorate for Agriculture, Agro-industry and Forest (DRAAF) is responsible, under the authority of the regional prefect, for implementing national and Community policies in the agricultural, forestry and food sectors at regional level.
- The Interregional Directorate for the South Atlantic Sea (DIRM) coordinates policies for the regulation of activities at sea. It is a decentralized government department under the Ministry of the Sea in the Ministry of Ecological and Solidarity Transition. It leads the Council Maritime de Façade and implements the Strategic Framework Directive for the Marine Environment (SFDME) as well as the Bay of Biscay Marine Environment Action Plan (MEAP)

State agencies and public institutions: these bodies are distinct from the State and carry out a non-market public service mission on its behalf.

-Adour-Garonne Water Agency (AEAG). It is a public body whose mission is to fight against pollution and protect water and aquatic environments. It is placed under the dual supervision of the Ministry of Ecological Transition and the Ministry of the Economy and Finance. Discussions are organized in a "basin committee" for which the agency provides the secretariat. The agency implements the objectives and provisions of the Master Plan for Water Development and Management (SDAGE) and its local versions, the water development and management plans, by promoting balanced and economical management of water resources.

-EPTB: the interdepartmental institution for the Charente river. Its mission is to promote water management on the scale of the Charente basin. It is responsible for drawing up the Charente SAGE.

-Water bodies managers. Examples: The water Syndicat of Charente-Maritime (Eau 17), a political body for drinking water, collective sanitation and non-collective sanitation. The SYMBO groups together several water syndicates and carries out studies, works, maintenance and development of watercourses, on the scale of the catchment area and in the communes included in the SAGE perimeter.-the French Biodiversity Office, through the Gironde Estuary and Perth Sea Marine Natural Park, integrates all public policies aimed at preserving biodiversity. The reconciliation between the preservation of biodiversity and the sustainable development of activities is discussed in a Management Council.

-Local authorities with their respective competences finance and act on behalf of the community. These are the regional councils, departmental councils, EPCIs and municipalities.

- Research organizations and technical centers such as IFREMER, INRAE, the university and CAPENA support the development of the sectors and their interaction with environmental protection. They produce knowledge and innovative solutions to this end.

- Shellfish farming professionals: they are represented in their bodies at different spatial scales.

- Charente-Maritime Regional Shellfish Farming Committee represents the interests of the industry and supports businesses. The structure plan for marine culture farms and its environmental assessment provides a prefectural framework for shellfish farming uses on the Public Maritime Domain.

- the quality group is the professional body that carries the product certifications and in particular the meat content values that meet consumer demands.

- Agricultural professionals: represented at different spatial scales. They are specialized by geographical area, by type of crop (annual, perennial, vine) or livestock or by specialty (economics, aid, installation, legal, etc.); agricultural advisors work directly with farms.

- Departmental chambers of agriculture (Charente-Maritime, Charente) and the regional chambers of agriculture (Nouvelle Aquitaine).
- For organic farming, the national (FNAB), regional (FRAB) or departmental (GAB) federations
- BNIC (bureau inter-professionnel du cognac) represents the Cognac producers.

- Conventional or organic farming cooperatives. They can have many members and are involved in both technical and commercial aspects.
- "organismes uniques" (which may or may not come from the agricultural profession) bodies which manage the water resource for irrigation purposes in part of the catchment area.
- Ports (La Rochelle, Tonnay Charente) present on the territory
- Tourism sector representatives (departments, Charente countries), representatives of rural tourism (chambers of agriculture)

### 3.5.6. Key steps for solutions implementations

Table 18: Business Roadmap MAL 4

AIM	Short term	Actors involved	Mid term	Actors involved	Long Term	Actors involved
Management of water as a land sea continuum	Provide a continuous vision of water bodies and a common vocabulary (in particular a definition of water quality meaningful for the whole territory) for fresh, marine and transition waters	DREAL DIRM Cities EPCI EPTB Charente Water bodies managers River basin agency Farmers and shellfish farmers representatives All stakeholders involved in water resource framework Research	Improve the collective and cross-sectoral management of water as a common good (sharing issue) through enlarged consultations and possibly new management rules	EPCI Local authorities EPTB Charente Water bodies managers River basin agency Farmers and shellfish farmers representatives Coastal-rural stakeholders network	Implement new simpler, multi-scale and integrated policies and administrative structures that support all water-related actions and their governance on the territory in order to reach a quality resource and ensure drinking water and marine products supply	Cities EPCI Local authorities (urban areas, coastal zone, environment, biodiversity) EPTB Charente Water bodies managers River basin agency Farmers and shellfish farmers representatives All stakeholders involved in water resource management Research
	Further sensitize citizens to water savings		Better coordinate and integrate existing policies together (water framework directive, maritime strategy directive, SAGEs, territories plans	Local authorities (urban areas, coastal zone, environment, biodiversity) Regional authorities Research		
	Define indicators of water quantity and quality that make sense for the territory as a whole			Use wastewater for different activities, diminish water use in all activities and improve water efficiency	Cities EPCI Water sector companies Local authorities Regional authorities	

		Adapt infrastructure to achieve sustainable exploitation of the water resource (WWTP capacity, water network, housing, etc.)	Research	
Towards a sustainable shellfish industry rooted in the territory	Collect and spread producers' and scientific knowledge about how the water quality, the input of freshwater and the trophic resource affect shellfish production in the marshes, in the estuary and at sea	Give more importance to empirical knowledge gathered from the producers in the management of the activity	Research Local authorities Administration Producers	Negotiate a common total stock of farmed oysters to efficiently and sustainably exploit the trophic capacity of the system (guarantee of a flesh content satisfying the constraints of the label)
	Restore the multi-functionality of the dammed and free salt marshes and the link between inland watersheds and the coastal zone on the basis of a dialogue procedure	Adjust areas, ideally extending them, and densities to achieve a product quality compatible with the market demand	Shellfish industry Regional aquaculture development plan (DIRM) Structure plans for marine farming operations (DDTM marine farming department) Competent prefectural environmental authority (DREAL) Researchers Shellfish producers Administration Ifremer CAPENA	Manage the common total stock according to a constant monitoring of the trophic resource and the feedback from professionals in the field
		Ensure a good maintenance of concessions and a limited impact of oyster farming equipment on sandy or muddy bio-systems to restore interface areas and abandoned oyster beds		



			<p>Develop and use new farming technologies to produce higher quality products and reduce environmental impacts</p> <p><b>Launch a territory label to support local high-quality production</b></p>	<p>Researchers Shellfish producers Administration Region</p> <p>Local authorities Administration Shellfish industry Region</p>	
Towards a 100% agro-ecological territory	<p>Foster the exchange of knowledge between coastal and rural stakeholders to raise awareness about the interdependencies between their activities</p>	<p>Agricultural advisers and professionals Agro-industry Professionals of water sector Administrations Education</p>	<p>Reach 100% of agro-ecological vineyards</p>	<p>BNIC Chambers of agriculture FRAB Certification organisms</p>	<p>Foster an effective territorial dialogue that gathers all the professionals of the sector (cultures, husbandry and vineyards) around the objective of generalizing agro-ecological systems to convince the remaining reluctant part</p> <p>Professionals both in conventional and organic farming Cooperatives and supply chains Cognac companies Administration Region Ministries of agriculture and forestry, environment Conservatoire du littoral Water sector NGOs Water managers Shellfish professionals Tourism Local authorities Agro-industry and cooperatives</p>
	<p>Continue the sensitization of consumers and support the commercialization of agro-ecological products</p>	<p>Food sector Local authorities Professionals Regional agencies</p>	<p>Implement new agro-ecological systems with reasonably sized plots in a modernized landscape (new crops, irrigation techniques, agroforestry, etc.)</p>	<p>Agricultural advisers and professionals both in conventional and organic farming Agro-industry and cooperatives Research</p>	

	<p>Help the conversion of livestock farming towards agro-ecological systems (more extensive with higher quality) in order to maintain the activity and the associated grassland areas</p>	<p>Agricultural advisers and professionals both in conventional and organic farming Local supply chains Agro-industry Research</p>	<p>Create a regulation unit that helps farmers to transit towards agro-ecological farming systems</p>	<p>Farmers representatives Local authorities Professionals Regional agencies</p>	
	<p>Financially support the conversion to agro-ecology and the creation of dedicated supply chains, and provide details about the new promising opportunities (new crops, etc.) and the new organization of the sector (relocation of processing units, etc.) Promote the installation of young farmers and the transmission of farms, through new legal and employment structures and new installation incentives</p>	<p>Agricultural advisers and professionals both in conventional and organic farming Agro-industry Region/state</p>	<p>Create new supply chains and increase commercial alliances to jointly promote products "from the territory"</p>	<p>Professionals Region Regional agencies (development) Organic farming agency Agro-industry and cooperatives Region, administration, cities Land management authorities Lawyers, research Agricultural sector (professionals) Rural stakeholder network</p>	
	<p>Further include and consider all water users in</p>	<p>CRANA FRAB Professionals both in conventional and organic farming Administration Regional authorities (support) Jurists (innovation) EPCI Local authorities</p>	<p>Maintain the agricultural area and a dynamic rural fabric thanks to a structure that monitors land acquisition</p>		

	<p>the collective management of water storage for agriculture (in particular downstream users)</p>	<p>EPTB Charente Water bodies managers River basin agency Farmers and shellfish farmers representatives Water stakeholders network</p>				
<p><b>Towards a harmonious and diversified territory</b></p>	<p>Foster new forms of tourism (rural, alternative, seasonal, etc.) less concentrated during the summer period and on the coastal zone</p>	<p>Spatial planners Tourism industry Region, cities Local authorities</p>	<p>Regulate the tourism offer (facilities, infrastructure) to limit mass tourism</p>	<p>Spatial planners Tourism industry Region, cities Local authorities</p>	<p>Ensure supplies, space, opportunities and outlets over the territory for all private and individual activities</p>	<p>Cities, EPCI Local authorities Administration Coastal rural stakeholder network Region</p>
			<p>Avoid gentrification to preserve the possibility for all inhabitants (all social categories) to live and work in the territory</p>	<p>Spatial planners Stakeholders network Region, cities Local authorities</p>	<p>Use the new enlarged, coastal-rural and inter-sectoral frameworks and policies to build an attractive and very long-term resilient territory on all aspects (quality of life, food supply, sustainable water resource and facilities, low vulnerability to climate change, etc.)</p>	<p>Region, cities EPCI Local authorities (urban areas, coastal zone, environment, biodiversity) Research EPTB Charente Water bodies managers River basin agency</p>
			<p>Improve the attractiveness of rural areas with more services, infrastructure, job opportunities, etc.</p>	<p>Professionals Region Regional agencies (development) Organic farming agency Agro-industry and cooperatives</p>		

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		Find incentives to maintain a residential population balanced throughout the territory	Spatial planners Stakeholders network Region, cities Local authorities	
		Improve land use planning policies to better manage competition for space between multiple activities in the coastal zone		
		Limit land artificialisation	Spatial planners NGOs Region Local communities, cities DREAL Local authorities	



### 3.5.7. Business case focus

#### 3.5.7.1. Overview

##### **TITLE BUSINESS CASE:**

Launching new label for the shellfish industry

##### **PROBLEM TO BE SOLVED BY THE PROPOSED BUSINESS INITIATIVE:**

Sustain the local shellfish industry by adapting to new consumer's demand and rapidly changing climate conditions

##### **LOCAL CONTEXT:**

The Protected Geographical Indication (PGI) label for Marennes-Oléron oysters would appear to no longer be suited to current farming conditions, which are significantly affected by climate change. Today's consumers no longer demand perfectly shaped shells and consistently high flesh content. While it is relatively easy to achieve the former, the latter is a much greater challenge. For this reason, some producers are abandoning PGI in favour of their own brands, while others are moving to production areas where a high flesh content can be more easily obtained.

##### **OBJECTIVE:**

Define a new label, based on the quality of the product and valid for everything on the entire site considered, while maintaining the current flesh content rate criteria.

There needs to be a formal process of collecting empirical information and knowledge from the oyster producers themselves and sure that it is shared across the local oyster farming community. Both of these processes should be carried out as part of a single approach. In the short term, both dammed and open saltmarshes should once again be able to ensure a link between watersheds and the coast. It will be necessary to identify the trophic conditions in the area, heavily influenced by nutrients leaving the watershed and the production of the micro-algae needed to maintain oyster stocks. Scientists, local administrations, and professional groups will then be able to negotiate an oyster stock whose volume does not overwhelm the trophic capacity of the ecosystem, thus guaranteeing the requisite flesh content. There will also be a more formal set of procedures to manage oyster stocks based on trophic conditions and experience from producers in the field. These procedures need to be sufficiently flexible to be implemented and modified quickly, both in terms of timeframes and locations

##### **EXPECTED IMPACTS:**

Creating a new label such as this will call for increased knowledge of the trophic environment in which the oysters grow, and how production is spread out both spatially and over time. Using two or three-year-old oysters, it ought to be possible to use the biological characteristics of breeding sites to fatten oysters as required.

This kind of dynamic management is well suited to the changeable nature of coastal zones and their development. This dynamism, already applied to "natural" (i.e. environmental) and "human" (i.e. user) systems should also be applied to the regulatory system. The aim of such an approach is that coastal watersheds are no longer seen as a succession of different states punctuated by transition periods, but as a single system moving smoothly forward, driven by knowledge and experience

##### **IMPLEMENTATION STAGE:**



Table 19: MAL 4 Business Case Implementation stage

<b>SHORT TERM actions</b>			
Harness knowledge on the shellfish trophic resource	knowledge in terms of spatial and temporal distribution according to location and breeding calendar	Decision making based on empirical knowledge from producers: collect, formalized and communicate information, to other producers	the dammed and free salt marshes must regain their functionality and re-establish the link between watersheds and the coastal zone
<b>Stakeholders involved</b>			
Research and shellfish industry	Research and administration	Administration	
<b>MEDIUM TERM actions</b>			
Determine the trophic conditions dependent on the relationship between the watershed exports (nutrients) and the production of microalgae necessary for the shellfish stock			
<b>Stakeholders involved</b>			
Researchers & Shellfish producers			
<b>LONG TERM actions</b>			
<p>Negotiate together a stock level of farmed oysters in such a way that the trophic capacity of the system is not exceeded (guarantee of a flesh rate satisfying the constraints of the label)</p> <p>- Formalize management methods for this stock according to the temporal conditions of the trophic resource and the feedback from professionals in the field. Stock management methods must be flexible enough to be able to be implemented and adapted quickly in time and space</p>			
<b>Stakeholders involved</b>			
Scientists (research and experts), Spatial planners (administrations) and Professionals (representative organization, quality group)			

### 3.5.7.2. SWOT analysis

Table 20: MAL 4 Business case SWOT analysis

<b>STRENGTHS</b> (Internal positive factors)	<b>WEAKNESSES</b> (internal negative factors)
<i>Existing labels are accepted by consumers but are not well suited to current conditions. This new label would meet a need to maintain and develop</i>	<i>Lack of enthusiasm among professionals for the existing labels (heavy workload).</i>

<p><i>a sustainable shellfish industry rooted in the territory.</i></p> <p><i>The introduction of the label requires knowledge of the complexity of the spatial distribution of trophic resources (plankton, organic matter), the density of farming and professional know-how (farming techniques). Many previous studies are available as well as local expertise (professionals) BUT there is a need to share this knowledge effectively.</i></p> <p><i>The new label thus responds to the need for the shellfish industry to adapt to new natural and economic conditions.</i></p> <p><i>It is easy to implement (quality index) but relies on hydrobiological conditions of the eco-hydro systems that are continually changing due to seasonal climate variations and climate change.</i></p> <p><i>Consumers support local production and would be reassured by a label.</i></p> <p><i>The new label would be an extension of the existing labels in new areas physically linked to the watersheds.</i></p> <p><i>It will be based on scientific data but also on the expertise and experience of professionals, regarding sustainable use of trophic resources and management of the catchment area.</i></p>	<p><i>New label competing with existing labels (IGP, label rouge)</i></p> <p><i>Low consumer awareness of shellfish farming products.</i></p> <p><i>Europeanised shellfish farming more profitable and looking to establish farms abroad to achieve required quality rather than trying to achieve it locally.</i></p> <p><i>Political support with a lack of demand</i></p> <p><i>There is a need to identify efficient “know-how” and to define “ad hoc densities” and trophic conditions for each location</i></p> <p><i>Lack of knowledge among some professionals of the development of consumer demand.</i></p> <p><i>Irrelevant definition of water quality for shellfish farming (chemical pollution vs. trophic capacity).</i></p> <p><i>Lowering influence of shellfish farmers in local institutions</i></p> <p><i>Development of “on the farm” tasting, which could be more flexible in terms of standards.</i></p>
<p><b>OPPORTUNITIES</b> (External positive factors)</p> <p><i>Political decision makers are concerned about the future of shellfish farming and keen to support the activity.</i></p> <p><i>Eco-conditionality requirements for labelling.</i></p> <p><i>Development of a more integrated management of water resources: new Marine Protected Areas,</i></p> <p><i>Better understanding on the complexity of land-sea interface (rural coastal solidarities).</i></p> <p><i>The new label could help developing an extended “territory” label: opportunities for joint marketing of rural and coastal high quality products, based on enhanced attractiveness of the territory.</i></p>	<p><b>THREATS</b> (external negative factors)</p> <p><i>“Letting go”, social fatigue (lowering of requirements, lack of confidence in labels, doubt about the improvement of water quality in the context of local action plans).</i></p> <p><i>A climate of conflict around water resource management (water storage in “basins”, nutrients and pesticides fluxes).</i></p> <p><i>The label would be meaningless if the quality of coastal waters decreases significantly.</i></p>

### 3.5.8. Financial dimension

Beyond the individual or collective economic choices that activities can make, the proposed actions require an ambitious plan at the regional level and/or adapted aid at the national level, with the possibility of aid that transcends sectors:

- Partnerships with elected representatives and regional or departmental authorities are essential to initiate massive actions at local level with a share of funding, including for the maintenance of infrastructures and services in rural areas, the development of a digital economy (highlighted in the discussions of the rural week, 2021)
- Specific aids could support agriculture for the setting up of farms: working capital grant, zoning of subsidies, simplification of modulations: outside the family, agro-ecological transition, flat-rate investment aid, etc.

### 3.5.9. Key resources to be mobilized and main beneficiaries

The synergy of the territory can only be improved by the awareness of the complexity of the system. This complexity cannot be tackled only by dividing it into sectors of human activity and environmental resources to be shared, as is currently the case. **The roadmap proposes to change the logic and to think on a territorial scale instead of engaging in a logic of sharing and power relations.** The sharing of resources can be improved to achieve relative social peace between the actors concerned, but unfortunately does not take into account the territory as a whole. Climate change, for example, may be subject to sectoral and/or spatio-temporal adaptations, without the coherence of the territory as a whole being taken into account. The increasing scarcity of water availability, for example, affects each sector, but it is probably not sufficient to propose new bases for adaptation for each of them. **The scarcity of the resource must also change the type of relationship between the sectors and the sectors themselves must adapt and transform themselves.** It will no doubt no longer be a question of sharing, when the resource is still sufficient, but of **cooperation** when certain sectors are structurally affected. The sectors will thus have to evolve themselves because of the new interactions they will have to build under the "authority" of the territory. One might think that it is the State, guarantor of the public interest, which must assume the role of facilitator and final decision maker.

The key resource becomes the territory as a whole. The different components of the territory have the new mission of bringing this complex element to life. It is more a question of safeguarding, protecting and sustainably managing resources than of using them, and making them live and reproduce. These inhabitants should not only consume these resources but consider that they themselves are part of the resources. Oyster farming needs the territory as much as the territory needs oyster farming. The same goes for agriculture.

Training and the exchange of know-how, share of scientific and local knowledge, cross-dialogues and between all the actors of the territory are also essential to the success of this action.

**The main beneficiary of this roadmap is the territory as a whole.** From the status of a sum of activities, surfaces and environmental issues, COASTAL proposes to endow it with a certain number of indicators that define it as a whole and in the interactions of these parts. The well-being and the good life of the territory applies, of course, to humans and non-human living beings, but also to companies, sectors of activity, cities, rivers and the coastline. **The evolution of agriculture and shellfish farming towards sustainable activities benefit these professions but also the inhabitants who can remain living and working on site in a harmonious territory.** Ecosystems and biodiversity also benefit if the roadmap targets are met, making the territory more attractive and resilient.



### 3.5.10. Policy dimension

#### **3.5.10.1. Policy context**

The stakeholders who attended collaborative workshops have highlighted the following points :

- The need for more integrative policies at the scale of rural and coastal areas was highlighted during all the collaborative workshops. c This is even worse for land-sea interface areas.
- Similarly, some aids or incentives are only aimed at professionals in a single sector of activity (farmers, shellfish farmers, tourism operators, etc.), whereas actions to strengthen land-sea synergies must be "territorial" and not sectoral, and therefore accessible to different economic actors.
- Spatial planning policy must be geared towards a harmonious spatial distribution of the population and activities between coastal and rural areas, taking into account the preservation of natural areas, particularly at the land-sea interface; it is likely that it will be necessary to abandon certain parts of the territory to the sea due to rising sea level. Competition for space is exacerbated in the coastal zone and the preservation of areas dedicated to food production must be a priority in the choices that will be made.

The SDAGE or the SAGE can be the right place to develop useful indicators for the roadmap. Consultation between land and sea stakeholders is essential for the construction of this indicator, if only to share scientific vocabularies and to integrate the empirical knowledge of stakeholders in the field.

As far as agriculture is concerned, the next post-2020 CAP, which will be implemented from 2023, will considerably strengthen the agro-environmental transition over the next decade. In the current state of negotiations, here are the points aimed at strengthening the agro-environmental architecture of the CAP, in particular to fit into the framework of the "new green deal" (40% of CAP aid must be earmarked for mitigation/adaptation to global warming and agro-environmental transition):

- o The green payment becomes compulsory: diversity of crop rotation and protection of agro-environmental infrastructures and natural grasslands must be respected to receive the first euro;
- o Eco-regimes will replace it: farmers will have to go further in diversifying crop rotation, in particular by introducing nitrogen-fixing plants, intermediate crops and plant cover (carbon storage), changing practices (tillage, reducing synthetic chemical inputs, crop auxiliaries and bio-control, adapted rotations, etc.);
- o The MAECs (agro-environmental and climatic measures) will be adapted to support farms in the transition over the long term, with a "production system" approach, and territorialized according to specific issues (drinking water, biodiversity, etc.);

Animal welfare, and in particular the conditions under which animals are reared in closed buildings, will be reinforced (lower densities, floor rearing, daylight, ventilation, open air, exercise areas and runs, etc.), as well as initiatives to prevent antibiotic resistance and epizootics.

The BRM takes into account what is proposed or reflected in other more institutional bodies, for example:

- i) the "regional plan for planning, sustainable development and territorial equality" (SRADDET), which sets climate, air and energy objectives for the region, covering adaptation to climate change, the fight against air pollution, the control of energy consumption, both primary and final,
- ii) the Neoterra roadmap (New Aquitaine region) aims to adapt the regional economy to climate change with different components (water, practices, innovations, savings for agriculture, biodiversity). Other roadmaps focus more specifically on the preservation of water resources (Charente 2050, water savings agency).

In complement, shellfish farming has a strong need for consultation with the other sectors of activity. The weakness of professional representation and the differences in experience of the territory with the "terrestrial" require long-term resources so that a "marine" if not "coastal" culture can be integrated by the non-marine and, conversely, that a "terrestrial" culture can be assimilated by the coastal world. The definition of cross-cutting land-sea indicators is also a costly and long-term action.

### 3.5.10.2. Policy recommendations

There are many initiatives in MAL 4 Charente river Basin to govern land-sea interdependencies. Nonetheless those initiatives face a number of specific difficulties in the capacity to fully govern a land-sea continuum in all its dimensions. The critical challenge remains to change the paradigm, and go beyond a ‘discursive territorialisation’ (Evrard and Pasquier, 2018) to stabilizing a negotiated and institutionalized territorialisation, i.e. developing a logic of public action which is codified, and is supported by sufficient resources (human and financial resources). At the very least this will require a **renewed territorial dialogue** (despite the presence of multiple fora of discussion), **making connections between land and sea**, premised upon a deep and generalized understanding of the vulnerability of the territory facing global change risks, and finding synergies in strengthening the general attractiveness of the area. Raise of awareness over the land-sea continuum is more readily achieved when it comes to proximity, rather than far-distant, land-sea interdependencies. In short, **governing land-sea interdependency becomes increasingly complicated once public action goes beyond the question of the coastline** (Carter and Drouaud, 2022).

Table 19 presents MAL4 policy recommendations for land-sea synergies based

Table 21: MAL 4 policy recommendations

Issue area	Policy recommendations for governing land-sea interdependencies
Management of water resources as a land-sea continuum	<p>Enlarge the composition of water governance bodies to include coastal stakeholders and especially shellfish farmers, in order to initiative a territorial vision</p> <p>Provide financial and staff resources to ensure equality of participation of different stakeholders</p> <p>Redefine water quality indicators taking into account the needs of coastal stakeholders (salinity, trophic capacity, biodiversity).</p> <p>Improve the collective and cross-sectoral management of water as a common good (sharing issue) through enlarged consultations and new management rules</p>
Energy transition as a land-sea continuum	<p>Encourage local institutional innovation to fill an important governance gap addressing synergies and tensions emerging from state-based energy choices</p> <p>Define a new and applicable paradigm for renewable marine energy as a land-sea continuum (and not just discursive territorialism)</p>
Coastal sustainable development and sustainable development of activities	<p>Strengthen existing initiatives and actions encouraging sustainable tourism (e.g. GIP Littoral)</p> <p>Generate and share data and empirical knowledge on the environmental impact (biodiversity, carbon emissions) of maritime leisure activities to ensure sustainable coastal management respecting equality in environmental effort between all maritime activities</p> <p>Improve awareness of cross-cutting issues in the implementation of land-use planning policies to more legitimately manage competition for space between</p>

	<p>activities in the coastal zone.</p> <p>Encourage regional oversight of the elaboration of shared criteria for product specification for the promotion of quality 'territorial' products ensuring equal representation of land-sea producer interests.</p>
<p>Rural sustainable development and sustainable development of activities</p>	<p>Encourage the evolution of both the legal status of farms and the body charged with monitoring usable agriculture land for sale (UAA), including new farming projects</p> <p>Promote the installation of young farmers and sustainable farms, through new legal and employment structures and new installation incentives (Region)</p> <p>Encourage innovative and/or mixed agriculture systems, more water efficient and complying with regional goals of water savings (DRAAF; river basin agency; CLE)</p> <p>Encourage a regional oversight leading to the elaboration of shared criteria for product specification for the promotion of quality 'territorial' products ensuring equal representation of land-sea producer interests</p>

Additionally, EU policies are still 'in silo'. Hence many challenges remain for local actors in order to implement a cross sectoral policy approach.

- The application of European policies must take into account the national and local context of the different regions (e.g. specific indicators)
- Despite efforts to "break down the silos" and make EU policies (land, sea) more integrated (WFD, MSFD, IMP...), much work remains to be done in order to apply them at the local level considering a land sea continuum. . Hence many challenges remain for local actors in order to implement a cross sectoral policy approach.

Reports from the EU itself have been highlighting the fact that EU decision-making remains in silos. For instance, fisheries policy processes often follow their own internal logic, so a focus on fisheries yields and economic outcomes may overlook other priorities, such as the urgent need to deliver on wider EU environmental requirements and commitments

### **3.6. MAL5 : Danube Mouth and Black Sea (Romania)**

The case study region is a unique area, with a high value of biodiversity, high productivity ecosystems and a rich diversity of local communities. The case study area comprises a large system, complex and varied passing constantly through natural and anthropogenic changes. It owns a good potential for ecotourism, which offers increased local awareness and economic incentives for nature conservation and environmental protection. Overall, there is an increasing demand for nature and cultural tourism activities and other special forms of tourism, for which this region has a significant potential

However, Tulcea region has the lowest population density in the country. The productivity of the main crops in Tulcea County is lower than the national and EU averages. Differences in yields are explained by the peculiarities of the study case area, namely: low soil quality (sandy, high humidity), as well as unfavorable climatic conditions (high temperatures and low rainfall).

Related to tourism the main issues are related to lack of essential infrastructure to limit the negative impact of tourism (waste, wastewater, destruction of natural resources) and low capacity to implement an environmental protection regime and limit the undesirable behavior of some visitors

#### **3.6.1. Business solutions proposed**

During stakeholder consultation and exchange of ideas that was accomplished throughout COASTAL development several future narratives came into light, built on the main economic sectors (tourism, aquaculture and agro-ecology) that have high development potential for the case study area. Further, they were designed in the form of business solutions based on the input variables of the SD models created in WP4 and validated by the stakeholders.

##### **INCREASING THE SUSTAINABILITY OF AGRICULTURE SECTOR**

Combined with promoting the integration of producers in the agri-food sector in the value chain (eg. Increasing organic production area; planting of forest protection belts as an effective method of the climate change risks reduction; sustainable nitrogen management; agriculture sector revenues)Support for developing sustainable practices in the tourism industry

##### **DEVELOP SUSTAINABLE PRACTICES IN THE TOURISM SECTOR**

Monitorization of *tourism attractively*, *tourism pressure*, and *pollution from touristic activities*, while increasing the *local revenues* and *creation of jobs* by establishment of *slow tourism* in the area)

##### **STRENGTHEN THE PRODUCTIVITY AND PROFITABILITY OF COMMERCIAL FISHING AND AQUACULTURE**

##### **INCREASING KNOWLEDGE, AWARENESS AND ACTION ON ENVIRONMENTAL PRESSURES**

Based on environmental performances (increasing fish farm revenues, jobs creation, monitoring **water quality**, **spatial pressure from aquaculture** development and nitrogen management)

To reduce river pollution (this suggestion comes from stakeholders during the meetings along implementation. It will not be modelled, but it will be validated with stakeholders)

#### **3.6.2. Expected impacts and benefits for coastal-rural areas**

The proposed solutions will bring a positive impact to the coastal rural area environmentally, socially and economically.

Table 22: Benefits of proposed actions (MAL5)

Environmental	Economic	Social
Preventing losses of biodiversity and ecosystem services	Development of local green economy based on sustainable consumption and production by valorizing the locally available resources, such as: land, fish stock workforce, natural & cultural heritage	Enhancing employment and territorial cohesion
Improving environmental management		Improving production systems towards producing healthy food
Enhancing the local communities' responsibility on environmental issues		Improving the exploitation of the wealth of cultural and natural heritage in the area

### 3.6.3. Synergies dimensions

The synergy is given by the diversity of the solutions proposed, including a large area of applicability, from social to economic and environmental level. In the same time, the envisaged development of the three sectors has a common goal: economic growth and new business opportunities in the area while maintaining and protecting the environmental state.

### 3.6.4. Values proposition

The proposed business actions will foster the development of a green economy in the area, including the management of local natural values through science-guided environmental management and strengthening local communities in their role as proactive protectors of the environment.

### 3.6.5. Key sectors-actors

#### National Administration

Ministry of Regional Development and Public Administration

National Agency for Fishery and Aquaculture

Ministry of Agriculture and Rural Development (MARD) and the Organisations that are within it (Agricultural Directions, APIA, AFIR etc.)

Ministry of Waters, Forests and Environment (MWFE) and the Organisations that are within it (ANANP, Environmental Guard, etc.)

Ministry of Investment and European Projects (MIPE)

Ministry of development (MD)

Ministry of Research, Education and Digitalisation (MRED)

#### Danube Delta Administration

Administration of Danube Delta Biosphere Reserve (DDBRA)

Association for Intercommunity Development – ITI Danube Delta

**Local & Regional Administration**

Local Action Groups - LAGs

Fishery Local Action Groups – FLAGS

Administrative Territorial Units – ATU

Town halls

Farmers and their professional networks

Entrepreneurs, Hospitality Industry, Business environment

Tulcea County Council

Public Local authorities – approx. 40

Local Inhabitants

### 3.6.6. Key steps for solutions implementation

Table 23: Business roadmap MAL 5

AIM	Lead actors	ACTIONS		
		Short term (within 1 year)	Medium Term (5 years)	Long Term (10 years)
Increasing the sustainability of agriculture sector and promoting the integration of producers in the agri-food sector in the value chain	Local administration - Agriculture Directorate - Farmers professional networks - Research and Innovation facilitators	Organizing information / awareness campaigns on advantages of production under organic system/ planting forest belts		
	MARD -Technology transfer, Research and Innovation facilitators	Set up advisory services for farmers		
	-Specialized institutions in market research	Development of market analyzes regarding consumer behavior		
	Research Institutes, MARD, NGOs		Introduce the principles of circular bioeconomy circular: nutrient recovery, multiple of waste streams composting, sustainable agriculture	

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	MARD and subsequent institutions - Farmers professional networks	Development of market access strategies		
	MRED -MARD	Improving access to qualified workforce (training programmes for ecological farming, sustainable agricultural practices, project management, funding instruments, how to write a business plan)		
	MARD	Modernization of facilities for production / collection / processing / marketing of agricultural crops.		
Support for developing sustainable practices in the tourism industry	Ministry of Culture Ministry of development	Restoration of cultural sites and cultural heritage monuments and museums		
	National administrations - Ministry of development	Improving infrastructure access (transportation)		
		Improving of ecotourism sites (info-kiosk, signing boards, restoration of sites, users facilities, etc.)		
	National administrations, Ministry of tourism, Ministry of development, Ministry of Culture , National Tourism Agencies Association (ANAT) tourism agents, rural tourism representatives, marketing agents			Supporting the diversification of activities with tourism activities related to : "fish-for-tourism", agro-tourism cultural heritage, eco-tourism to create jobs, encouraging the active involvement of local communities



	National Tourism Agencies Association, Ministry of tourism, Local authorities, local tourism association			Develop and promote environmentally friendly tourism including cycling routes, sports and wellbeing tourism, nature tourism, and cultural routes;
	-MRED			Improving access to qualified workforce (training programmes for touristic guide, crafts, project management, funding instruments, how to write a business plan)
	Specialized institutions in market research			Development of market analyzes regarding consumer behavior
	Ministry of tourism, Local authorities, local tourism association		Marking and signing of strictly protected areas, infrastructures, activities allowed and implementation of a monitoring system, (including automatic systems)	
Strengthen the productivity and profitability of commercial fishing and aquaculture based on environmental performances	National Agency for Fishing and Aquaculture MARD	Develop the regulatory framework for aquaculture		
	fishermen, Government, EU fund...		Incentives for renewal of fishing boats and equipment to increase performance of economic operators and reduce pollution	

	fishermen, Chamber of commerce, National Agency for Fishing and Aquaculture, media, schools		Support the commercialization of new species currently unattractive (e.g. promotional campaign to consumers, partnerships with local restaurants...)	
			Extending the ecological certification of fish caught and other products from fish in conjunction with the creation of a local brand of traditional products from the Danube Delta	
	MARD and subsequent institutions Farmers professional networks	Development of market access strategies		
	Research Institutes, Environmental Engineering, fish farms			Introduce the principals of circular economy: multitrophic aquaculture, the use of filtering species or use of lower trophic niches.
	RBDD, Water Administration (ANAR)		Unclogging channels - keep the hydrological balance	
Fish farmers			Use of feed, feed supplements from sustainable sources	

	<p>Local authorities, Environmental Engineering, fish processing companies.</p>			<p>Connect processing fish center to wastewater treatment plants / Install Nature-Based waste water treatment system to isolated structures</p>
<p>Increasing knowledge and awareness and action on environmental pressures</p>	<p>Local administration Agriculture Directorate Farmers professional networks Research and Innovation facilitators</p>	<p>Organizing information / awareness campaigns on importance biodiversity and environmental protection</p>		
	<p>LAGs Farmers professional networks - Research and Innovation facilitators</p>	<p>Improving the access of the local administrations, population / local farmers to information on the possibilities to obtain external funds for compliance with environmental standards</p>		
	<p>-Research an innovation organizations</p>	<p>Development of hydrological modelling tools for assessment of water needs</p>		
	<p>MRED MARD</p>	<p>Investments in controlling and reducing water nitrate pollution Modernization of facilities for production / collection / processing / marketing of agricultural crops</p>		
		<p>Improving access to qualified workforce (training programmes for ecological farming sustainable agricultural practices, sustainable fish farming practices project management, funding instruments, how to write a business plan)</p>		

### 3.6.7. Business case focus

#### 3.6.7.1. Overview

##### **TITLE BUSINESS CASE:**

##### **Local Gastronomic Point**

##### **PURPOSE:**

Enhancing sustainable rural economy by additional revenues sources from gastronomic tourism based on sustainable aquaculture and organic farming

##### **LOCAL CONTEXT:**

The main types of economic activities in this region are those related to tourism, trade and agriculture, while the food processing, services, craft and non-agricultural production sectors are poorly developed. In this context, the need of the local population for new opportunities leading to job creation is obvious. It is necessary to encourage entrepreneurial initiatives, by encouraging the rural business environment, in areas such services, crafts and value added production activities. In the same time, modern and economically efficient aquaculture activities in the Danube Delta have a significant employment potential.

##### **OBJECTIVE:**

To build on the natural capital and natural environment in the region for stimulating sustainable food processing, hospitality and food services practices by developing an innovative business model integrating aquaculture, agriculture and tourism sector with a limited environmental impact on the Black Sea's coastal waters. The Local Gastronomic Point is an action building on integrated tourist activities which include other activities than the leisure, agro-tourism or cultural tourism, in the same time providing productive activities and use as a raw material local resources provided by other members of the community;

##### **EXPECTED IMPACTS:**

- development of slow tourism
- encouraging the local rural economy and enhancing additional source of revenues from gastronomic tourism
- increased local demand for organic products
- integrating sustainable aquaculture within the region

##### **IMPLEMENTATION STAGE:**

*Table 24: MAL 5 Business Case Implementation stage*

<b>SHORT TERM actions (within a year)</b>
Traditional farms, as source of organic food and local heritage, should be supported and integrated with the touristic attractiveness of the region
<b>Stakeholders involved</b>
Farmers and farmers' associations (both vegetal, livestock and fishery sector), National Authority for Fishing and aquaculture (NAFA), FLAGs, LAGs, Tourism operators, Local authorities

<b>MEDIUM TERM action (within 2 to 5 years)</b>	
Introduce the principles of circular economy in day-by day activity by identification of unused local resources that can be the raw material for productive activities	Creating networks of promotion of local resources (cultural, natural heritage, products local crafts, etc.)
<b>Stakeholders involved</b>	
Research Institutes, Environmental Engineering companies, Farmers and Farmers’ associations (both vegetal, livestock and fishery sector)	
<b>LONG TERM actions (within 10 years)</b>	
- Conservation and promotion of local heritage	- Improving the regional infrastructure for increasing the areas’ attractivity (transportations, healthcare services, farming technologies )
<b>Stakeholders involved</b>	
National and local authorities, ITI, ARBDD	

### 3.6.7.2. SWOT analysis

Table 25: MAL 5 Business case SWOT analysis

<b>STRENGTHS</b>	<b>WEAKS</b>
<ul style="list-style-type: none"> <li>rich background of historical - cultural monuments that will attract tourists in the area;</li> <li>business model based on a significant natural capital and natural environment;</li> <li>the business model is developed in the spirit of economic integration, on the agri-food chain;</li> <li>the business idea is in line with the principles underlying the European Commission's strategy From Farm to Fork by increasing the sustainable ecological production consumption;</li> <li>the model can be an example for other economic agents, interested local producers, encouraging the local rural development;</li> <li>the business idea can be promoted through viral marketing / word-of-mouth techniques, that generate high effects with minimal effort;</li> <li>the local gastronomic point contributes to the touristic appeal of the region;</li> <li>the location of the local gastronomic point in the tourist area of the Danube Delta for which the tourist demand is constantly growing;</li> <li>the basic menu that is served inside the gastronomic point can be diversified in various ways, there are a multitude of recipes for traditional dishes, based on fish;</li> </ul>	<ul style="list-style-type: none"> <li>lack of promotion of the gastronomic products of the region</li> <li>the region's gastronomic products are not included in a standard production of the enterprises.</li> <li>insufficient professional knowledge of the personnel working in the area</li> <li>at the business beginning, low notoriety of the local gastronomic point;</li> <li>low capacity (limited number of guests at the same moment);</li> <li>reduced competitive power on the market compared to “industrial” restaurants;</li> <li>at the beginning of the activity, the need to practice a higher price, in order to reach the break-even point;</li> <li>high costs of output and limited capital to ensure co-financing</li> <li>low production of local fish and fish products</li> </ul>

<ul style="list-style-type: none"> <li>the menu is a surprise for the guests of the gastronomic point, they don't know what they will serve;</li> <li>at the employees level, the working program is more suited because the serving is done only by appointment (unlike others restaurants, which are open until late at night).</li> </ul>	
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<ul style="list-style-type: none"> <li>diversity of gastronomic products based on eco farming and local aquaculture</li> <li>local cuisine includes healthy and nutritious products</li> <li>additional source of revenues from gastronomic tourism</li> <li>growing interest in domestic tourism</li> <li>increasing consumer preferences for local agri-food products and the changes in their lifestyle;</li> <li>Tourist card issued by the government for encouraging domestic tourism;</li> <li>increasing the number of tourists, domestic and foreign, in the Danube Delta area;</li> <li>the European funds in order to finance these types of business models and the investment funds available for business development;</li> <li>the progress made at the level of technological and technical factors, which can be applied in the aquaculture sector but also in hospitality sector;</li> <li>increased local demand for organic products;</li> <li>the possible exploitation of the existing tradition in the consumption of fish (religious holidays, other habits);</li> <li>the number of users of social networking accounts increase make possible to use more the online marketing techniques, which is less expensive than the conventional marketing;</li> </ul>	<ul style="list-style-type: none"> <li>the region is dominated by seasonal tourists</li> <li>low availability of labour force;</li> <li>failure to meet demand;</li> <li>crisis situations (sanitary – Covid restrictions; military- nearby war);</li> <li>increasing costs for the acquisition and improvement of the production factors;</li> <li>high competition on the restaurants market and others profile units and the competitor actions;</li> <li>regulations in the establishment of businesses</li> <li>restrictions set by some environmental regulations applications.</li> <li>Infrastructure facilities (transportation, hospitals, etc) of the region</li> </ul>

### 3.6.8. Financial dimension

Proper funding is essential for any solution implementation in all three sectors. While own funding is sometimes not available, non-refundable funds (European/ national grants) were indicated as more suitable. However, several funding programmes are developed on the “reimbursement of costs” scheme, and it is rather difficult for beneficiaries to carry on expenses on their own funds. For this situation a public partnership between commercial banks and responsible Ministries could be a solution.

For fish farming, investments are needed for:

- Modernization, rehabilitation and endowment of landing points
- Compensation for counterbalancing the effects due to periods of prohibition and restrictions imposed by environmental authorities

- Support by accompanying measures for the reconversion of the functionality of fishing vessels, to offer new fishing conditions, optimal for temporary housing and mooring

### 3.6.9. Key resources to be mobilized and main beneficiaries

Table 26: MAL 5 BRM key resources needed

Key resources needed			
Physical/technological	Intellectual	Human	Financial
Advisory services for certification and technology to be implemented in organic system; planting material for forest belts; Capacity building activities to attract young persons toward agriculture sector; Mapping available land	knowledge on up-to-date technologies	qualified workforce	funding instruments and subsidies
Monitoring of tourism attractiveness, tourism pressure, and pollution from touristic activities	local brand name		Incentives
mapping available land	knowledge on up-to-date methods and technologies		funding for capacity building activities
	technological transfer, research and innovation facilitators and advisors		

The implementation of the Business roadmap will benefit to local population, incoming tourists as well as businesses based on natural capital.

### 3.6.10. Policy dimension

Within MAL 5, it has been recognized that ensuring a broader transition to agro-ecology practices and increasing organic production area can be achieved by proper policy measures such as **appropriate compensatory payments, funding for organic farming inputs, market strategies**, etc. In the same time, according to agriculture specialists, climate change projections sees a reduction of soil moisture leading to a reduction of agricultural crop yield. Therefore the plantation of **forest protection belts** is seen as an effective method of the climate change risks reduction. . For a sustainable agriculture, there is a serious need to maintain a balance between profitability and input cost. R&D actions should focus towards novel plant breeding techniques for crop improvement programs resulting in increased yields that would advance nitrogen efficiency use. Despite the positive effect of nitrogen on crop yields, the plants uptake of nitrogen is situated between 30–50% of the supplied amount (depending on crop species, soil category, environmental conditions). As crop production areas are limited, it is **critical to optimize fertilizer application and improve crop uptake for avoiding nitrogen loss from soils**. Therefore, the final target is to achieve high production while also reducing environmental pollution and production cost.

For developing sustainable practices in the tourism industry, monitoring the hospitality industry with indicators such as tourism attractiveness, tourism pressure, while taking into consideration the pollution from touristic activities is a key issue for future development of the Danube area. Supporting alternative forms of

tourism such as the establishment of slow tourism in the area could lead to increasing local revenues and creation of jobs. In parallel the region needs to strengthen the productivity and profitability of commercial fishing and aquaculture which can only be achieved based on both economic and environmental performances (increasing fish farm revenues, jobs creation, monitoring water quality, spatial pressure from aquaculture development and nitrogen management).

Therefore, policies should support fish farming by strengthening the productivity and profitability of aquaculture based on environmental performance (increasing the intensive aquaculture productivity and monitoring the impact of the nitrogen load from aquaculture). Diverse types of actions were mentioned in the elaborated business road map (e.g. Extending the ecological certification of fish farmed and other products from fish in conjunction with the creation of a local brand of traditional products from the Danube Delta).

The stakeholders reinforced their idea that a coherent regulatory framework and policy support is essential for the implementation of any envisaged solution. Thus, it is considered as welcomed the involvement of general public and civil society to decision making. The professional organisations representing various sectors must be as well considered. The possible actions (see table 25) are referring to improvement of funding sources (subsidies, tax reduction, preferential interest rate) and maintenance of support policies that are in this moment in initial steps of implementation.

Table 27: Policy solutions proposed (MAL5)

Actions	WHO	WHEN		
		Short term (1 year)	Medium term (5 years)	Long term (10 years)
Establishment of support policy for young farmers; eg. Land lease	MARD	X	X	X
Maintenance of support policy for ecological farming		X	X	X
Maintenance of support policy for planting forest belts		X	X	X
Establishment of Support schemes and funding for entrepreneurship / SMEs in the area	MARD, MIPE, Ministry of Economy	X	X	X
Establishment of training programmes for crafts, touristic guide, ecological farming, project management, funding, business plan	MARD, MRID	X	X	
The organization and operation of the Fishing Vessels Register	MARD, NAFA	X		
Organization and operation of the Aquaculture Company Register		X		



Setting up of the Satellite Monitoring Centre for Fishing Vessels		X		
Provide coherent regulatory framework for fish farmers by development of Aquaculture Law	MARD, MWFE	X	X	
Establishment of Knowledge transfer networks to promote good practice and reduce the risk of pollution with various substances of water and soil	MARD, MWFE, NGO's	X	X	X

The solutions proposed contribute to the Green Deal implementation and Greening the Common Agricultural Policy as follows:

- Support to the objective of at least 25% of the EU's agricultural land under organic farming by 2030 from Farm2Fork strategy by encouraging the expansion of organic area.
- Encouraging the establishment of agro-forestry practices from Farm2Fork strategy by planting forest belts.

### **3.7. MAL6: Mar Menor (Spain)**

#### **3.7.1. Business solutions proposed**

Our stakeholders envisioned a Business Roadmap that builds on four milestones: (I) Rural ecotourism; (II) Coastal ecotourism; (III) Sustainable agriculture, and (IV) Integrated sustainable management. A total of 14 solutions have been proposed by stakeholders during sectoral and multi actor workshops to contribute to each of the milestones, which can be achieved by means of large number of different specific initiatives mentioned by stakeholders over the course of the project. In total 56 of those specific initiatives were suggested by stakeholders during the workshops. The 14 main solutions proposed to achieve each milestone and that are directly linked to input variables in the SD model are:

##### **RURAL ECOTOURISM:**

- 1) The promotion of rural ecotourism activities.

##### **COASTAL ECOTOURISM:**

- 2) The promotion of coastal ecotourism activities.

##### **SUSTAINABLE AGRICULTURE:**

- 3) Implementation of nutrients, soil, and water retention measures
- 4) Reduction in fertilizer use
- 5) Denitrification of brine wastes from groundwater treated for irrigation
- 6) Decrease in agricultural water demand per hectare (i.e. 10% of decrease by default in the model)

##### **INTEGRATED SUSTAINABLE MANAGEMENT:**

- 7) Control of the extension of irrigated areas
- 8) Promotion of environmental education
- 9) Control of the number of groundwater wells (i.e. maximum 500 wells by default in the model)
- 10) Promotion of photovoltaic facilities
- 11) Surface water pumping from the Albuji3n ephemeral stream
- 12) Control of other point sources of pollution to the lagoon
- 13) Groundwater pumping and treatment
- 14) Increase in sea water desalination amount (twice the BAU value by default in the model)

#### **3.7.2. Expected impacts and benefits for coastal-rural areas**

The promotion of coastal and rural ecotourism is expected to create a direct synergy in which each benefit from each other. Most of the tourists currently only visit the coastal areas, while there is a high potential to attract them to the rural areas if the inland rural infrastructures and tourist facilities are created and promoted. However, tourism, and especially international tourism, can be negatively affected by the degradation of the Mar Menor lagoon, which makes it a limiting factor to promote coastal and rural ecotourism. . Therefore, to facilitate ecotourism development, nutrient export from agricultural areas to the

Mar Menor lagoon needs to be reduced by means of the several solutions proposed in milestones III and IV, which are fundamental to improve the ecological status of the lagoon, and thereby its touristic attractiveness.

By expanding the ecotourism and photovoltaic sectors more jobs are expected to be created and more economic benefit will be obtained, which will certainly improve the quality of life of the local populations. Moreover, promoting coastal and rural ecotourism will also increase the recreation potential for the local populations, enhancing their well-being and territorial bonding

Finally, solutions aiming at increasing water availability through renewable resources or by decreasing water demand, will ensure the sustainable development of the agricultural sector, but only if combined with the set of solutions to **decrease nutrients export**, highlighting another synergy.

### 3.7.3. Synergies dimension

We used several Key Performance Indicators (KPI) (See COASTAL D19 and D20) to assess the synergies that each of the proposed set of solutions could trigger, such as recreation potential, employment, economic growth, available water resources, ecological status of the Mar Menor, and environmental awareness. Based on the opinion of most stakeholders we highlight the following synergies:

**Promotion of coastal and rural ecotourism** would significantly affect recreation potential, employment, economic growth, and environmental awareness.

**Promotion of environmental education** would significantly affect recreation potential and environmental awareness.

**Surface water pumping** from the Albuji3n ephemeral stream, pumping and treating water from the aquifer (part of the original "Vertido Cero" Plan that was proposed by the previous central administration), the reduction in agricultural water demand, the implementation of nutrients, soil, and water retention measures, the control of irrigated arable land without water rights, the control of illegal wells, and the denitrification and management of brines, would significantly affect available water resources and the ecological status of the Mar Menor.

**Promotion of small and medium installations** (less than 10 megawatts) **of (agro)photovoltaic renewable energy facilities** would significantly enhance employment, economic growth and environmental awareness.

According to the feedback received from stakeholders, the **reduction of fertilization intensity** would only significantly affect the ecological status of the Mar Menor, and the **increased desalination of seawater for irrigation** would only significantly affect available water resources, and although they may still be useful measures to implement, stakeholders do not perceive them to provide relevant synergies between coastal and rural sectors. Only indirectly the reduction of fertilization intensity can promote tourism development by increasing the recreation potential due to the increase in lagoon water quality. The increased desalination of seawater for irrigation is primarily intended to secure water sources for the agricultural sector in the future.

### 3.7.4. Values proposition

Progress on the four milestones and related individual solutions contributes directly to reaching the Future Vision that was developed for the Mar Menor and Campo de Cartagena area in collaboration between stakeholders during the first multi-actor workshop. The stakeholders envision well-developed sustainable rural and coastal tourism in combination with sustainable intensification of agriculture that produces high quality products for local and international markets, and is spatially integrated with (agro)photovoltaic facilities. Collaboration between sectors is strengthened by implementation of a coordinating body for the Mar Menor with constructive representation of all sectors involved.

We identified the main paradigms behind the main sets of solutions based on expert knowledge gathered through the sectorial and multi-sectoral workshops, the MAL6 blog and expert interviews. The promotion of

environmental education activities and the promotion of rural and coastal ecotourism activities support a transition pathway based on **cooperation and partnerships between rural-coastal-sea actors**. The denitrification of brine wastes from groundwater treated for irrigation, surface water pumping from the Albuñón ephemeral river, control of other point sources of pollution to the lagoon, groundwater pumping and treatment (“Vertido Cero Plan”), control of number of groundwater wells and control of extension of irrigated areas, support a transition pathway based on **environmental control and regulation**. The implementation of nutrients, soil and water retention measures, the decrease in agricultural water demand per hectare, the increase in sea water desalination amount and the reduction in fertilizer use, support a transition pathway based on principles of **building with nature** (Nature-based- solutions), circular economy, sustainable intensification, and environmental control and regulation, and relate directly with the objectives of the EU Green Deal (Biodiversity and Farm to Fork strategies). The promotion of (agro)photovoltaic facilities supports a transition pathway based on circular economy and sustainable intensification.

### 3.7.5. Key sectors-actors

In relation to the integrated management of the Campo de Cartagena and Mar Menor lagoon territory, the majority of stakeholders considered that all sectors and actors should be highly engaged, being the Regional Government of Murcia (CARM) and the Segura River Basin Authority (CHS) the most relevant actors that should lead the development. However, stakeholders indicated that sustainable and effective management requires genuine participation of all stakeholders in decision making. Regarding the development of a more sustainable agriculture, most participants considered that the agricultural companies and associations, such as FECOAM, ASAJA or COAG, together with the Regional Government of Murcia should lead the implementation of this transition with support from universities and research centers to transfer innovations. With respect to the promotion of coastal ecotourism, the companies and associations of the tourism and sports sector together with the Regional Government of Murcia were considered the actors responsible to lead and initiate the solutions linked to this milestone, with support from the municipalities around the Mar Menor and the General Directorate of Coasts of the national Ministry. In relation to the promotion of rural ecotourism, the Regional government of Murcia together with the municipalities of the Campo de Cartagena should lead this transition in close collaboration with the companies and associations of the tourism and sports sector (e.g. restoration of traditional windmills, old mine companies, salt pans, Monasteries etc.) and with support from representatives from agricultural companies and farmers organizations regarding development of agro-tourism.

### 3.7.6. Key steps for solutions' implementation

All four Milestones described in the BRM (see table 26 below) require coordinated activities between all stakeholders involved (see section 3). Nevertheless, each Milestone and the solutions therein, have a first responsible sector to initiate the milestone supporting the transition. The tourism sector should lead the development and implementation of Milestone 1 and 2 (i.e. promotion of rural and coastal ecotourism activities). The agricultural sector should lead the activities related to Milestone 3 (i.e. implementation of nutrients, soil and water retention measures, the reduction in fertilizer use, the denitrification of brine wastes from groundwater treated for irrigation, and the decrease in agricultural water demand per hectare). The public administrations sector should lead or promote the solutions related to the Milestone 4 (i.e. control of extension of irrigated areas, the promotion of environmental education activities, the control of number of groundwater wells, the promotion of photovoltaic facilities, the surface water pumping from the Albuñón ephemeral river, the control of other lagoon point source pollution sources, the groundwater pumping and treatment (“Vertido Cero Plan”) and the increase in sea water desalination amount).

For each of the 4 Milestones and related 14 solutions, a large number of specific initiatives were identified together with stakeholders along the project, which were then prioritized by stakeholders. A proposed period of implementation is also indicated in parenthesis for each of the initiatives (short term: 2021-2026; medium term: 2026-2030; long term: 2030-2040).

Table 28: Business roadmap MAL 6

AIM	Short term	Lead actors	Mid term	Lead actors	Long Term	Lead actors
Promotion of rural ecotourism,	Training and capacity building of workers in the tourist sector	Higher education centers, universities, and the Regional Institute of Tourism, together with companies and associations of the tourism and sports sector	Restoration and promotion of the cultural heritage (e.g. windmills in Campo de Cartagena, Monastery of San Ginés de la Jara, Victoria Cave and the Sima de Las Palomas, etc.)	Municipalities of Mar Menor and Campo de Cartagena and the Regional Territorial Planning Unit (CARM);	Restoration and further promotion of old mines for touristic purposes	Regional Government of Murcia;
	Creation of green corridors for recreational purposes for tourism and local populations connecting places of interest (e.g.	Regional Territorial Planning Unit, the Segura Watershed	Promotion of agro-tourism	Tourism and agricultural companies and associations together with	Promotion of music festival tourism	Campo de Cartagena municipalities



	protected areas, towns, livestock routes, cultural monuments, etc.)	Authority and the Municipalities of Mar Menor and Campo de Cartagena		local development groups	Promotion of inland sports activities (soccer fields, golf courses, horse riding, etc.)	Campo de Cartagena municipalities together with companies and associations of the tourism and sports sector
Promotion of coastal ecotourism	Ccreation of a circular bike and walking path around the Mar Menor	Regional Department of development and infrastructures together with the Mar Menor municipalities	Recreational activities related to fishing (restoration of traditional fishing methods like ‘encañizadas’)	Regional Department of water, agriculture, livestock, fisheries and the environment together with companies and associations of the tourism sector	Promotion of educational and congress tourism	Mar Menor municipalities
	Training and capacity building of workers in the tourist sector	Higher education, universities and the Regional Institute of Tourism, together with companies and associations of the tourism and sports sector	Restoration of traditional bathing cabins	Regional Department of water, agriculture, livestock, fisheries and the environment and the Mar Menor municipalities	Restoration of buildings and infrastructure in urban centers in coastal municipalities	
	<b>Promotion of activities in protected areas by means of land stewardship and restoration projects in Mar Menor wetlands and salt</b>	Environmental NGOs and the Regional Government of Murcia			Promotion of music festival tourism and the promotion of activities on the Barón island	Mar Menor municipalities in collaboration with the private owners (Barón)



	<p><b>flats to improve habitats, biodiversity and tourism (e.g. Salinas de Marchamalo)</b></p>	<p>Promotion of non-motorized water sports (e.g. adapted sailing, latin sailing, rowing, kitesurfing, diving)</p> <p>Increased control of illegal anchorages in the Mar Menor</p>	<p>Companies and associations of the tourism sector</p> <p>Regional Department of development and infrastructures</p>	<p>island) and festival organizers</p>	
<p>Transition to a more sustainable agriculture</p>	<p>Promotion of organic farming and the linked to that the establishment of a quality and sustainability brand in Campo de Cartagena</p> <p>Reduction in the use of fertilizers</p> <p>Provide and promote training on the use of fertilizers for workers in the agricultural sector</p>	<p>Regional Department of water, agriculture, livestock, fisheries and the environment, together with the agricultural companies and associations (e.g. FECOAM, ASAJA, COAG, etc) and independent certification schemes</p> <p>Regional Department of water, agriculture, livestock, fisheries and the environment, together with the agricultural companies and associations</p>	<p>Implementation of cover crops, crop rotation, and crop diversification techniques for more sustainable production with less inputs</p> <p>Hydrological-forest restoration in the Mar Menor basin (Campo de Cartagena) including restoration of the natural drainage network</p>	<p>Regional Department of water, agriculture, livestock, fisheries and the environment, together with the agricultural companies and associations</p> <p>Segura Watershed Authority (CHS) and the Regional Territorial Planning Unit</p> <p>Implement wetlands as green filters by creating a green belt around the Mar Menor</p> <p>Implement multifunctional hedges around cultivated fields and limit the number of harvests or rotations per year</p>	<p>Regional Department of water, agriculture, livestock, fisheries and the environment and the Regional Territorial Planning Unit</p> <p>Regional Department of water, agriculture, livestock, fisheries and the environment, together with the agricultural companies and associations</p>



	Denitrification and management of brines	Segura Watershed Authority (CHS) together with the agricultural companies and associations			
	Plowing parallel to contour lines	Individual farmers and farmers associations			
Transition to integrated territorial management	Control and compliance of the extension of irrigated areas to those with actual rights for water use for irrigation	Segura Watershed Authority (CHS) and the Regional Government of Murcia Department of water, agriculture, livestock, fisheries and the environment	Set-up a territorial management body for the Mar Menor and Campo de Cartagena with genuine participation and representation from all sectors and actual decision making power	Regional Government of Murcia and the Segura Watershed Authority (CHS) and should include the participation of all sectors	Implement and maintain groundwater pumping and management (part of "Vertido Cero" plan)
	Control and guarantee compliance with closure of illegal groundwater wells	Segura Watershed Authority	Promote implementation of small and medium sized installations (<10 MW) of (agro)photovoltaic energy facilities in suitable places in Campo de Cartagena, including integration with cropland areas	Regional Department of development and infrastructures together with photovoltaic energy companies and associations	
	Improve wastewater management in tourist areas	Regional Entity for Sanitation and Wastewater Treatment (ESAMUR);	Increase the capacity and distribution of desalinated seawater for irrigation	Regional Department of water, agriculture, livestock, fisheries and the environment together with	Segura Watershed Authority





	<p>Develop and implement environmental education and awareness activities for the population</p> <p>Implement surface water pumping of the Albuñón ephemeral stream</p>	<p>Regional Government of Murcia together with Environmental companies and NGOs, primary and higher education centers</p> <p>Segura Watershed Authority</p>	<p>the Regional Entity for Sanitation and Wastewater Treatment (ESAMUR)</p>
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### 3.7.7. Business Case focus

#### 3.7.7.1. Overview

##### **TITLE BUSINESS CASE:**

Recovery of the 'Marchamalo' Salt-pan

##### **PURPOSE**

Restoration of a unique socio-ecosystem and cultural heritage to protect the environment and promote coastal and rural ecotourism: The development and implementation is coordinated by the environmental NGO 'Asociación de Naturalistas del Sureste' (ANSE) and needs collaboration from the sustainable tourism sector and from public administration

##### **LOCAL CONTEXT:**

This restoration and development project is about the recovery of the traditional salt production process, which is an ecologically sustainable activity that only requires natural resources: the water from the Mar Menor accumulates in the ponds and then the journey begins through which the salt is obtained from the interactions between the sun, air and time. To this end, in addition to the high environmental values provided by the typical flora and fauna of salt pans (e.g. flamencos), the restoration of salt pans also benefits invaluable historical and cultural values, such as the ponds, the production of salt, the ancient buildings, the salt storage facilities, the windmill, etc.

##### **OBJECTIVE:**

This sustainable business project promotes the cultural and natural values of the area based on economic, environmental, social and cultural sustainability. It is designed to promote medicinal and educational tourism all year around and would generate synergies with the different sectors of the area with the creation of stable and qualified jobs, supported by already established or newly created tourism companies such as sailing schools, bird watching, diving, sport fishing, nautical cultural and hiking service companies. The restoration of the traditional salt pans also has a clear educational objective.

##### **EXPECTED IMPACTS:**

Production of high value local salts and opportunity to visit a unique ecosystem providing habitat for fish and birds and the cultural heritage facilities, thereby creating a synergy between coastal and inland recreation opportunities. After restoration, anyone, local or tourist, could go to the restored salt pans based on a particular interest, from traditional guided tours to experimentation in the extraction of salt, bird watching, photography, the heritage of the mills, mud treatment or just sports and walks. The facilities will contribute to education related to the natural and cultural heritage values.

##### **IMPLEMENTATION STAGE:**

The restoration and rehabilitation project comprehends the production and marketing of high quality salt, as well as the recovery of existing buildings to host different sustainable tourism and educational projects, such as the following:

- Eco-medicinal services: water baths with a high degree of magnesium, mud baths, massages, medicinal treatments, etc.
- Cultural and environmental educational activities in relation to the production of salt, the elaboration of characteristic products, the different habitats, including their terrestrial and marine fauna and flora, etc.
- Education and dissemination activities of the ancestral cultural heritage represented by the



‘Marchamalo’ salt pans: the existing Phoenician mines in the area; the Phoenician and Arab fishing systems, etc.

Currently ANSE is looking for additional funding to initiate the restoration activities and allow the start of the salt production and restoration of cultural heritage.

*Table 29: MAL 6 Business Case Implementation stage<sup>22</sup>*

<b>SHORT TERM actions</b>		
Project led by the environmental NGO ‘Asociación de Naturalistas del Sureste’ (ANSE) through its foundation – Find additional funding to implement the project including private funding (donations) – EU funding (e.g. Life project) – fund raising – collaboration with other small scale salt pans or rice production companies.	-Acquire the land to proceed with the recovery -Get the administration approval to exploit the public domain and implement the project	Implement the Natura 2000 Network Management Plan (LIC and ZEPA), and promote the definitive approval of the Natural Resources Management Plan of the protected area, together with the rest of the environment of the Mar Menor. Agreements and collaboration with neighbouring owners, the government of the autonomous community of the Region of Murcia, State Coast Demarcation, etc.
<b>MEDIUM TERM actions</b>		
Recover the aquatic biodiversity of the area through the resumption of salt production by repairing the water transfer channel and dikes, partially dredge the flats, install a new water supply pump, restore separation of pools of salt ponds and the conditioning of heating and crystallizing ponds.	production and marketing of high quality local produced salt  - promote agreements with other salt companies in the Mar Menor area and seek synergies for the recovery of other small salt mines in the environment, such as Rasall.	closure of access to the salt mines, restoration and conditioning of warehouses and environmental and salt production visitors centre, environmental signage, restoration of the vegetation cover, biological monitoring and investigation of populations of birds, fish and other flora and fauna of interest -recovery of existing buildings to host different sustainable tourism projec
<b>LONG TERM actions</b>		
Organize guided tours regarding natural values and salt production Develop a bike road around the salt pans and connected to the villages around the Mar Menor.	Develop eco-medicinal services and cultural and environmental educational activities in relation to the production of salt	Education and dissemination activities of the ancestral cultural heritage

<sup>22</sup> <https://www.fundacionanse.org/reservas-de-anse/salinas-de-marchamalo/>

**3.7.7.2. SWOT analysis**

Table 30: MAL 6 Business Case SWOT analysis

<b>STRENGTHS</b> (Internal positive factors)	<b>WEAKNESSES</b> (internal negative factors)
<ul style="list-style-type: none"> <li>- Contribution to the regeneration of the Mar Menor lagoon by improving the conservation management of the area and the wetland biodiversity and its hydrological function.</li> <li>- Restoration, protection and valorization of the cultural heritage of the area, thereby increasing the potential and attractiveness as sustainable tourism destination.</li> <li>- Creation of synergies between coastal and rural areas by offering alternative tourist activities and linking tourism with food production, education, and other inland activities.</li> <li>- Creation of jobs.</li> <li>- Development of educational and environmental activities that will help raising environmental awareness of the value of the particular ecosystem of the Mar Menor.</li> <li>- The ANSE Foundation already obtained the concession for the use of the salt pans covering an area of just over 8 hectares for a period of approximately 50 years and on 7000 m<sup>2</sup> with two old (ruined) warehouses with a license from the Cartagena City Council for the construction of a salt warehouse.</li> <li>- ANSE Foundation already counts on important financial and human resources.</li> <li>- ANSE Foundation and their partners have extensive technical knowledge and experience in the management and exploitation of natural areas of high environmental value and for the development of an environmental visitor center.</li> </ul>	<ul style="list-style-type: none"> <li>- Additional funding is required to fund the restoration activities of the salt pans and of cultural heritage and to develop a visiting center to support sustainable tourism and education activities.</li> <li>- The ‘Salinas Marchamalo’ cover an area of about 200 hectares of which ANSE Foundation obtained concession rights for 8 hectares only, thereby possibly reducing impact and production potential.</li> <li>- Political support and collaboration is needed but requires further development and specification.</li> <li>- The area is located in the public domain and protected by various environmental regulations (i.e. Protected Natural Area of Community interest; Special Protection Area for Birds, Specially Protected Area of Mediterranean Interest, and Ramsar Wetland of International Importance) that require additional authorizations to operate.</li> </ul>

<b>OPPORTUNITIES</b> (External positive factors)	<b>THREATS</b> (external negative factors)
<ul style="list-style-type: none"> <li>- There is high public awareness and interest at local and national level regarding the urgency to restore the Mar Menor and its surroundings due to the severe environmental crises of last years.</li> <li>- There is strong momentum for the restoration of the Mar Menor lagoon through support from local, regional and national governments to all kinds of initiatives to revitalize the environmental values and protection of biodiversity around the lagoon.</li> <li>- The regional government has developed the 'Strategy for the integrated management of the Mar Menor' (<i>'Estrategia de gestión integrada de zonas costeras en el Mar Menor y su entorno'</i>) that includes initiatives to support diversification of tourism and environmental awareness through education activities.</li> <li>- The national government is developing a Framework of Priority Actions for the recovery of the Mar Menor (<i>'Marco de Actuaciones Prioritarias para recuperar el Mar Menor'</i>) that includes restauration and re-naturalization and the creation of wetlands and buffer zones and public education and awareness building amongst its objectives.</li> <li>- The tourism sector is very interested to diversify the tourism activities in the area and thereby become less dependent on only the summer season for beach tourism.</li> <li>- A detailed description and proposal for restoration of the Salt pans and its cultural heritage was developed by Paloma de Andrés Ródenas as part of her degree in architecture at the Polytechnic University of Cartagena.</li> </ul>	<p><i>Economic, Environmental, Technological, Policy, Societal, Political trends (local to supra-national) that can hamper the implementation of the solution</i></p> <ul style="list-style-type: none"> <li>- Insufficient economic resources become available to perform the restoration project.</li> <li>- Environmental regulation impedes the development of salt production and tourist activities in the area.</li> <li>- Development of other activities (e.g hotel buildings) near to the salt pans are prioritized and reduce the environmental value of the lagoon.</li> <li>- Insufficient complementary ecotourism activities are developed and promoted in the area, leading to little interest from visitors.</li> <li>- The ongoing environmental degradation of the Mar Menor lagoon makes restoration of the salt production impossible due to contamination.</li> <li>- The ongoing environmental degradation of the Mar Menor lagoon negatively affects tourism attractiveness affecting the economic feasibility of its exploitation for ecotourism activities.</li> <li>- Climate change induced sea level rise affects the feasibility of the salt production in the salt pans.</li> </ul>

### 3.7.8. Financial dimension

Private funding was considered a relevant financial resource to achieve all milestones, except for the integrated management. On the other hand, public funding and subsidies were considered very relevant to achieve all 4 milestones as well. The difficulty to start a new business and complexity of regulations of different administrations was mentioned as a relevant barrier in relation to the promotion of coastal and rural ecotourism activities. Some of the proposed solutions (e.g. pumping aquifer and surface water, denitrification of brine waste) require costly infrastructure, while other solutions may affect the economic return of certain sectors (e.g. control of extension of irrigated areas). While there remains discussion about how these financial costs should be covered, some ideas were discussed of how synergies can be created to overcome them at least partly (e.g. additional income through diversification including photovoltaics, agro-tourism and certified agricultural produce with higher added values).

### 3.7.9. Key resources to be mobilized and main beneficiaries

In relation to Milestone 1 (promotion of rural ecotourism), according to the stakeholder consultation, private and public funding and subsidies were the most relevant resources needed, followed by training and capacity building for the tourist sector. In relation to Milestone 2 (promotion of coastal ecotourism), the most relevant resource needed is training and capacity building for the tourist sector, followed by private and public funding and subsidies. In relation Milestone 3 (sustainable agriculture), the most important resource needed as identified by stakeholders, concerns research and development of innovative management, closely followed by training and capacity building of the agricultural sector regarding more efficient use of inputs (fertilizers), regarding crop diversification and agro-tourism. In relation to Milestone 4, the integrated management of the Campo de Cartagena and Mar Menor territory, the key resources needed are related to new legislation, more means to support control and compliance, and the promotion of land stewardship initiatives.

The implementation of the Business Roadmap will be beneficial for local populations and the tourism sector thanks to the improvement of the environmental status of the Mar Menor lagoon and new opportunities within the tourism sectors

### 3.7.1. Policy dimension

#### 3.7.1.1. Policy context

Policy support was considered a crucial element for the successful implementation of each of the 4 Milestones. Policy support is sometimes needed in the form of **facilitation** (e.g. providing the required permissions for new sustainable touristic developments), **subsidies, incentives and investments** (e.g. support for implementation of nature based solutions in agriculture, groundwater pumping infrastructure), **training and awareness raising** (e.g. develop environmental education and capacity building on fertilizer use), or better control of compliance (e.g. fines for illegal irrigated areas, groundwater wells, or incorrect use of fertilizers). The regional Rural Development Programme and the upcoming **eco schemes** of the new CAP could provide a good instrument to support implementation of measures related to Milestone 3 (transition to sustainable agriculture). For effective governance, it was considered crucial to develop a **coordinating body for management** of the Mar Menor with actual decision making power and **active participation of all sectors**. This requires coordination of different administrations and a transition towards more participatory governance.

The **lack of coordination among public administrations and the lack of involvement of all sectors in decision-making** were considered very relevant barriers to achieve all 4 milestones, especially in regard to integrated management. The **lack of social awareness in environmental** aspects was considered to play a major role in relation to the development of a more sustainable agriculture and the development of coastal ecotourism. The lack of legislation and its compliance was considered a key issue mostly in relation to integrated management and sustainable agriculture.

#### 3.7.1.2. Policy recommendations

Based on the co-designed BRM and the evaluations of the expected impacts of the BRM on KPI, the **main policy recommendations** and policy relevant conclusions are:

- ❖ **Support and promote implementation** of all **14 solutions** proposed in the BRM through facilitation, financial support, training and education, control and enforcement of regulation and consideration of all specific initiatives described in detail in the BRM.
- ❖ Facilitate **informed decision making** based on integrated, holistic, evaluations of the



expected impacts of solutions on all different sectors, considering coastal-rural interactions, synergies or trade-offs, building on the SD model developed in COASTAL.

- ❖ In case of **limited available resources**, start with the minimum combination of solutions required to reach sustainable development based on economic, environmental and social Key Performance Indicators. Selection of these priority solutions can be supported by modelling impacts with the model developed in COASTAL.
- ❖ The **restoration and sustainable development** of the Mar Menor and surrounding 'Campo de Cartagena' requires **time, investment** and **public-private collaboration** between sectors.
- ❖ **Promote and facilitate** participatory forms of decision making through establishment of a dedicated **territorial management body** for the Mar Menor and Campo de Cartagena with genuine participation and representation from all sectors and with actual decision making power.
- ❖ Start developing policy and implementing solutions building on **common grounds** and interests between stakeholders.

## 3.8. Synthesis

### 3.8.1. Key synergies for coastal-rural regions

In the COASTAL project, the sustainable management of the water resource is the key element driving the key coastal-rural territories with the agriculture and tourism sectors the dominant sectors impacting and or impacted by a resource becoming more and more scarce and polluted.

Increasing synergies around the sharing and management of the water resource through territorial dialogue, collaboration and partnerships from source-to-sea (including stakeholders from rural and coastal areas as far inland in the river basin as activities impacts the resource at the coast) is of crucial importance for the sustainable development of coastal-rural regions. As seen in the different COASTAL region, it can be an opportunity for change, fostering business opportunities and innovation.

As highlighted in all COASTAL case studies farming practices have a major impact on the water resource, thus when it comes to environmental and water management, synergies with the agricultural sector, benefiting both side must be investigate. Multiple solutions have been proposed across the MAL, from enhancing agro-environmental practices to reusing sludge-based fertilizers from wastewater treatment plants.

Developing synergies between the agriculture and tourism sectors can create new market opportunities while reducing their impact on the water resource. For instance the development of local quality products from a sustainable agriculture (bio and eco farming supported by local branding and labelling) in partnership with the local tourism industry, the development of alternative tourism offers towards rural landscape, based on the natural and cultural capital providing qualitative offers with higher economic value. As the tourism sector is dependent on the good status of the water resource (quantitatively and qualitatively), part of the attractiveness of coastal areas (e.g. Mar Menor lagoon, South-West Messinia), developing dialogue and partnership with the agricultural sectors will be beneficial for the sustainability of the sector.

Within the tourism sector itself, developing synergies between coastal tourism and rural tourism can benefit both areas, by on one side releasing pressure of mass tourism on the coastal zone and on the other side creating business opportunities in inland rural area often less economically attractive

Finally,

developing cross-



sectoral dialogue and partnerships between agriculture and aquaculture sectors is another axe to develop in the context of as harmonized development of a coastal-rural territory. In the context of climate change, drought episodes will be more frequent with potential dramatic impact on crop production, aquaculture will certainly contribute to food security, a sector dependent on good coastal water quality status.

### 3.8.2. Key Performance Indicators for coastal-rural synergies

Key Performance indicators (KPIs) have been developed by each MAL to quantify the local environmental, social and economic impacts of business and policy solutions proposed within the BRMs. Those KPIs are reported in the WP5 deliverables D19 (downscaling of scenarios) and D20 (robustness analysis)

Complementary, WP3 has identified additional KPIs as a proposition for measuring land-sea / coastal-rural synergies more specifically, summarized in table 29 below.

*Table 31: Proposed KPIs for coastal-rural synergies*

Domain	Indicators	Measurement
Governance	Existence of cross-sectoral agency / an agency with mandate over land and sea jurisdictions	Yes/No; Number of meeting per year; Sector represented
	Existence of cross-sectoral networks and collaboration across land-sea continuum	Number of network; Influence; Sector represented
	Policy coherence (vertical/horizontal) over the land-sea continuum: existence of coordination mechanism to ensure consistency and coherence of policy instrument	Yes/No
	Mechanisms to ensure participation and public dialogue (including private sector and civil society)	Yes/No; Decisional power; Stakeholder participation; Types and numbers of actors involved in the policy process at different stages
Policy	Horizontal policy coherence	Assessment of synergies and trade-offs between the key policies of the coastal-rural continuum
		Mention of expected impact of the policy on other sectors



		Presence of an inter-sectoral planning body for key sector of the coastal-rural area
Tourism	Balance development of tourism across coastal-rural region	rural tourism direct GDP a proportion of total tourism GDP and in growth rate compare to coastal tourism direct GDP
water	Cross-sectoral management of water resource	nutrient use in accordance with water quality needs of downstream activities; sector representatives from source-to-sea in the decision-making process

### 3.8.3. Key policy recommendations for coastal-rural sustainability

#### **CALL FOR A NEW GOVERNANCE MODEL INTEGRATING LAND-SEA CONTINUITY**

As the interdependencies between upstream and downstream are multiple, there is a need for the integration of all stakeholders representing sectors from source-to-sea in territorial decision making processes, carefully monitoring the different degree of influence of the various stakeholders' groups. There is also a need to facilitate knowledge exchange through science-policy-industry dialogue.

#### **FACILITATE COLLABORATION AND PARTNERSHIPS ACROSS RURAL AND COASTAL SECTORS AND ADMINISTRATIONS**

With coastal-rural natural capital under increased anthropogenic pressures, collaboration across sectors but also within sectors and administrations around biodiversity protection and management is of utmost importance. It will support a better coordination in policy decision-making (ensuring vertical and horizontal policy coherence), develop environmental and sustainability awareness, ease access to technological innovations, foster business opportunities, thus facilitating the sustainable management of shared natural resources.

In parallel, there is a need for more integrative territorial policies (by opposition to sectoral policies) at the scale of rural and coastal areas to break silo thinking.

#### **LAW ENFORCEMENT AND FLEXIBILITY**

As mentioned in many COASTAL case studies, lack of law enforcement but also inconsistencies in state's legislation are major issues in environmental management with dramatic consequence for the natural resources, thus a coherent, enforced regulatory framework is a pre-requisite for a sustainable and harmonized development in coastal-rural regions

There is also a need for more flexibility in local implementation of EU and national policy frameworks, to adapt to local context in terms, for instance, of targets and indicators (e.g. spatial differentiation).

#### **AN AMBITIOUS CAP SUPPORTING SUSTAINABLE AGRICULTURAL PRACTICES**

As already mentioned, the agriculture sector is a key player in coastal-rural regions with a major role to play in the sustainable management of natural resources and water before all. Therefore the agriculture policy and the CAP 2023 will be of great importance for the sustainable management of the water resource thus a sustainable development of coastal-rural regions. Strengthening the agro-environmental

architecture of the CAP to fit in the framework of the “green deal” European policy is much needed to tackle the current environmental threats of coastal-rural regions. The future “integrated development” FEDER programs could also allow a global approach within the coastal and agricultural world. These combined new approaches could help to improve the quantity and quality of waters, which affect the coastal zone as well as biodiversity and provide a better and healthy environment for coastal areas and activities.

Support to sustainable and organic practices, and local productions by ensuring the effective implementation of the Farm-to-Fork strategy is also a priority.

### **INTEGRATED WATER MANAGEMENT FROM SOURCE-TO-SEA**

Today water resource management is the key challenge for coastal rural regions; it is often source of tension and conflicts but can be source of collaboration and partnerships for the benefits of socio-ecological systems.

Achieving a good environmental status of the water resource (fresh water and marine water) require an integrated management from source-to-sea with a territorial vision, involving all sectors, the use of technological innovation (e.g. water saving device, nutrient retrieving technologies) and nature-base-solutions, as well as a differentiate spatial management.

A Combinations of different types of water management measures are needed that include, as presented in the Swedish case study, more efficient fertilizer use and enhanced removal and reuse of nutrients from wastewater, wetland restoration and construction of different types of reactive barriers. Implementing mussel and seaweed coastal farming, placed so that they can significantly capture legacy source releases of nutrients on land and at the coast, can also play a significant role in improving coastal water quality.

## **4. BLUE ECONOMY INDICATORS FOR SUSTAINABILITY**

The COASTAL business and policy roadmaps were developed in order to support the sustainable development of rural and coastal areas in an harmonized way while preserving the environment. In this context we took a closer look at the blue economy activities playing an important role in the project case studies, which are benefiting but also are impacted by land-sea interactions. With the European Commission shifting its focus in recent years from “blue growth” to the sustainable blue economy<sup>23</sup> concept, we analysed how the blue activities that are present or have a potential in the project regions (port and offshore wind energy, aquaculture, coastal tourism) are in line with the European Union’s vision on sustainable Blue economy. For this, a desk study was performed in which we looked deeper into the different strategies, directives and communications of the European Union concerning the sustainable blue economy and the indicators used to measure the performance of the maritime sectors. The report on Sustainability Criteria for the Blue Economy (SCBE – EC, 2021c) was tested in the context of the COASTAL blue activities and used to recommend additional key performance indicators for the COASTAL land-sea models, for future post-project analysis, in the lens of sustainability and guarantee the alignment of the blue economy activities with EU vision developed in the EU Green Deal.

### **4.1. The Blue economy and the European Green Deal**

With the EU Green Deal as a transformative strategy setting up ambitious goals for the sustainable future of the Union with the EGD, the contribution of the Blue Economy sectors will be of utmost importance; Hereby quoting EU Commissioner for Environment, Oceans and Fisheries, Virginijus Sinkevičius, “*Blue Economy will play a major role in this transformation and I dare to say that we will not meet the European Green Deal ambitions without the Blue Economy*”. It implies that the Blue economy sectors including their whole value chains turn into more sustainable practices (e.g. reduce emissions; and other type of pollutions, apply circular economy principles to be less resource- and waste users’ intensive

The EU Blue Economy report 2021(EC, 2021e) points to the following established key sectors of the Blue economy: Marine living resources, Marine non-living resources, Coastal tourism, Port activities, Shipbuilding and repair, Maritime transport and Marine Renewable energy. The latter sector is also included in the Blue Economy Strategy as other emerging and innovative sectors such as Blue bioeconomy and biotechnology, Marine minerals, Desalination, Maritime defence, security and surveillance, Research and Education and Infrastructure and maritime works. For all Blue economy sectors, quantifying the costs and impacts of depletion of blue natural capital and ecosystem services, as well as the benefits of their preservation, restoration and adaptation are essential. This latest EU Blue Economy report also mentioned the need to preserve and increase the natural capital of the seas and oceans as critical to ensure a continued delivery of valuable ecosystem services of which the

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<sup>23</sup> a new approach for a sustainable blue economy in the EU Transforming the EU's Blue Economy for a Sustainable Future; COM(2019) 640 final

EU Blue economy depend on, a condition to achieve the EGD objectives as well as the UN 2030 Agenda Sustainable Development Goals and in particular SDG14 related life below water)

One of the most transformational changes needed in Europe to comply with the European Green Deal is preserving and restoring ecosystems and biodiversity. This should be done on land as well as in the sea, taking into consideration their close interdependencies.

More than 80% of greenhouse gasses (GHG) are produced by human land-based activities. However, it is our ocean that is being impacted disproportionately as the increase in carbon dioxide (CO<sub>2</sub>) and other greenhouse gas emissions causes changes in water temperature, ocean acidification and deoxygenation, leading to changes in oceanic circulation and chemistry, rising sea levels, increased storm intensity, as well as changes in the diversity and abundance of marine species. With the EGD the European Union aims to transform Europe into a fair and prosperous society, with a modern, resource-efficient and competitive economy, with the goal of zero-net emissions of greenhouse gases by 2050. Here the marine environment has a crucial role to play, for instance marine carbon sequestration is expected to greatly contribute to reduce the excess carbon in our atmosphere and by so mitigating climate change, benefitting land as sea.

The development of marine renewable energy sources will support the EU transition to a carbon free society. With the REPowerEU Plan (EC, 2022), the EU expect to have a massive speed-up and scale-up in renewable energy for power generation. Offshore wind energy has been developed at a fast pace in European waters while other renewable energy production systems (e.g. wave energy) are been explored.

The sea has already been a source of feed and components for medicines. But there is still a lot to be discovered in the waters, upon and under the seabed. However, past, current and future human activities can harm the benefits of what the sea can offer. Discharges from land-based activities are having a negative impact on the biodiversity of the sea. Having identified many of those anthropogenic pressures, the European Commission has developed a set of policy strategies and regulations to tackle land-based source pollution and support the EGD, policy frameworks which have been identified as relevant for coastal-rural regions by COASTAL case study, depending on the local context (see chap. 1). The next section summarized below those key policies to mitigate anthropogenic pressures on the marine environment.

#### **4.1.1. EU policies supporting a sustainable blue economy**

The EU “A farm to fork strategy” (EC, 2020c) will put more regulations on pesticide use and the excess of nutrients. These measures will not only improve the soil and land biodiversity, but should also reduce the negative impacts of agricultural runoffs on rivers and the sea. With the Biodiversity strategy 2030 (BS2030 - EC, 2020b) measures are set not only to protect our natural capital, but also to increase the natural protected area. One of the recommendations in the framework of the Common Agricultural Policy (EC, 2020d) is that every farm has a least 3% of the arable land to be

dedicated to biodiversity. However, these regulative actions in European agriculture could lead to lower agro-food production, but for this the EU is looking towards aquaculture, in specific low trophic, to increase their share in the EU food production. Through digitalization, another target of the EU Green Deal and widespread over most of EU different strategies, more control can be obtained in the production of food, on land as in waters, resulting in less food waste, less use of chemicals products and more yield per effort. For this, the EU stimulates the technology development in these area, where an overlap can be seen between digitalization processes for agriculture (land) and those for aquaculture (sea). Other actions mentioned in the BS2030 are the large-scale river and floodplain restoration investments that can provide a major economic boost for local socioeconomic activities such as tourism and recreation. This increase in attractiveness for tourism in inland regions could lead to a lower tourism pressure on the coast and its natural environment for the benefits of coastal and marine biodiversity.

Plastic pollution in the ocean is also of great concern, taking into consideration the impact it can cause on marine ecosystems and their related ecosystem services from which Blue Economy sectors such as fishery or tourism depend on greatly.. The use of plastics is an important and ubiquitous material in society's daily lives, but the environmental problems caused by this material when released in the environment cast a long shadow over the production, use and consumption of plastics (EC, 2018). This pollution is not only affecting life under and above water, more and more concerns are rising on the effect of microplastics on human health transmitted through the food chain. With the European Strategy for Plastics in a Circular Economy (EC, 2018), the Single-Use-Plastic (SUP) Directive (EC, 2019), and the Circular Economy Action Plan (CEAP) (EC, 2020a), the Commission seeks to tackle marine litter by reduce land-based source of plastic and other solid waste pollution on land as at sea with a packages of measures to limit plastic packaging in retail, improve selection and sorting of plastic waste, design the products with lesser plastics and easier recycling, eliminate certain SUP items.. With the use of bio-based feedstock as raw material for plastic production (e.g. seaweed, waste from fish transformation and aquaculture), marine area can play an important role in reducing plastic pollution by the production of bio-plastic. Additionally, with the CEAP, the EU seeks to eliminate exportation of waste to third countries, thus boost the recycling industry within European soil, however European seaports could encounter economic drawbacks due to the possible reduction in transport over sea. On the other side it can be an opportunity for port industrial areas (sea ports and river ports) to develop waste management activities (recycling, and transforming for the production of recycled raw materials).

### 4.1.2. Blue Economy in COASTAL

Blue sectors are directly targeted by strategic business roadmaps actions for coastal-rural synergies Coastal tourism in 4 out of 6 MALs (coastal tourism in MAL 2, MALL 5, MAL 6, fishery and aquaculture sector in MAL 4 and MAL 5), while coastal tourism is expected to benefit from the BRM implementation in MAL 1 (opportunities for agro-tourism and eco-tourism), MAL 3 (reduce water pollution from urban tourism development), MAL 4 (water availability for tourism sector). Additionally, MAL 4 gives a good example of synergies between rural inland activity and coastal blue activity, where a change in farming practices, as proposed in the BRM, is likely to impact port activities with a potential reduction of crop exportation as a result of a diversification of farming production redirected to a local. Figure 5 gives an overview of blue economy activities within the MALs, identifying as direct (meaning to have a primary role in the MAL) or indirect (other primary activities are depending on or influencing blue activities or resources). In MAL 1, a system dynamic model for the decommissioning activity of offshore wind farms has been developed which enable us to include this sector in our analysis of the sustainability of the blue economy sectors in the context of the EGD and coastal-rural synergies.

		MAL1- Oudlandpolder (BE)	MAL1- Decommissioning (BE)	MAL2- Lagoon (GR)	MAL2- Agriculture (GR)	MAL2- Tourism (GR)	MAL03 (SE)	MAL04- Shellfish (FR)	MAL04- Agriculture (FR)	MAL04- Water (FR)	MAL04- Infrastructure (FR)	MAL05- Tourism (RO)	MAL05- Fish Farming (RO)	MAL05- Ecofarming (RO)	MAL06 (ES)
Marine Living resources	Primary production -> Fishery														
	Primary production -> Aquaculture														
	Processing of fish products														
	Distribution of fish products														
Marine non-living	Oil and gas														
	other minerals														
Marine Renewable energy	Offshore renewable energy														
Port activities	Cargo and Warehousing														
	Port and Water projects														
Shipbuilding and repair	Shipbuilding														
	Equipment and Machinery														
Maritime Transport	Passenger transport														
	Freight Transport														
	Services for Transport														
Coastal Tourism	Accommodation														
	Transport														
	Other expenditure														
Emerging or non specified	Blue bio economy														
	Desalination														
	maritime defence														
	Submarine cables														
	ecosystem services														

Figure 5: Overview of the Blue activities in the COASTAL-project (dark blue: direct; light blue: indirect)

## 4.2. Blue sectors sustainability

### 4.2.1. How to evaluate sustainability of a Blue Economy activities

It is clear that the growth in the Blue Economy has to be of a sustainable nature to fit in the EGD. To ensure this, a typology with a set of criteria to assess the sustainability of blue economy activities is needed. With the report “Sustainability criteria for the Blue economy” (EC, 2021d), the EU aims to develop a Blue Economy Sustainable Framework, based on sustainability criteria and indicators, which can be applied to blue economy activities and illustrates how environmental, social, economic and governance dimensions of sustainability can be measured within the blue economy sectors. This could then be a tool to support public and private investments in the selection of their blue economy projects. The study inherent to the development of the “Sustainable criteria for the Blue economy” (SCBE), analysed and compared 30 sustainability frameworks concerning the blue economy sectors and activities. However, according to the study, most of the existing frameworks do not provide the combination of elements required for the SCBE, namely the four dimensions of sustainability (environmental, economic and social sustainability and sustainable governance), a cross-sectoral approach to the blue economy and the flexibility for an application at different scales, levels and geographic zones. In this report ,a selection of criteria and indicators were identified, building on an extensive database of tested and established criteria and indicators that measure the sustainability of activities.

The SCBE established for each of the four dimensions, a number of criteria with different indicators (Table 32 shows an example per dimension). There is a distinction between common indicators and sector-specific indicators as well as the selection of ‘key indicators’ shortlisted from these common criteria. The latter can be considered essential for reviewing the sustainability of any given activity. In total, the SCBE contains 148 indicators (44 common and 104 sector-specific) organised in an indicator database. In Figure 7 an overview is given of the sustainability criteria grouped per dimension for the renewable energy sector according to the SCBE.

*Table 32: Examples of criteria for each of the dimension of the SCBE*

Dimension	Criteria	Indicator	Unit
<b>Environmental</b>	LEVEL OF ENERGY CONSUMPTION	Energy consumption	Tonnes of oil equivalent (TOE) /year
<b>Economical</b>	ECONOMIC VIABILITY	Turnover	m EUR/year
<b>Social</b>	INCLUSIVENESS	Employees with no post-school diploma	%
<b>Governmental</b>	CERTIFICATION AND LABELLING	Existence of a sustainability label or	Score (1-3)

certificate

Environmental Dimension	KI	CI	SI	Social Dimension	KI	CI	SI
Emissions to air	x			Employment conditions	x		
Energy efficient		x		Health and safety management		x	
Impact on ecosystem	x			Inclusiveness	x		
LOEC	x						
Mitigation	x			<b>Governmental Dimension</b>			
Waste/ Wwater management	x			Level of acceptance by Stakeholders	x		
				Social balance			
<b>Economic Dimension</b>				Fairness in remuneration	x		
Concentration of business		x		Certification and labeling	x		
costs		x		climate change		x	
eco benefits		x		Education in sust		x	
Eco viability	x			Impact assesment	x		
Employment	x			Innovation		x	
Fin viability	x			Level of Stakeholders engagement	x		
Funding		x		Nature based solutions		x	
Infrastructure capacity			x	Permits		x	
KI: Key indicator; CI: common indicator				Risk Management		x	
SI: Sector-specific indicator				Strategy and vision		x	
				Supply chain		x	

Figure 6: Sustainability criteria for Renewable energy according to the SCBE report (source: SCBE report).

The SCBE report itself underlines that the proposed criteria and indicators are a first attempt to provide a multi-sectoral framework and, although expert judgement of the study team and feedback from industry was used to develop them, new input from stakeholders is encouraged to further develop the framework. As the COASTAL project is dealing with certain Blue Economy activities, as mentioned previously, it was of interest to cross-check the sustainable criteria listed by the SCBE with the inputs and outputs generated by the COASTAL case studies through local stakeholders interactions, system dynamic models and their indicators, and policy recommendations. The objective here is to strengthen the sustainability components of the Blue sectors within the COASTAL land-sea models. Additionally the COASTAL project can provide feedback on certain SCBE to fine tune proposed Blue Economy sustainable indicators. For this a closer look was taken on the Blue economy activities in the MAL1 (Offshore wind energy), MAL4 (Oyster farming) and MAL5 (Fisheries and aquaculture), as well as an overlook at the coastal tourism through MAL 2 and MAL 6.

#### 4.2.2. Blue policy indicators for offshore marine energy

With the European Green Deal aiming at reaching net-zero greenhouse gas emissions in Europe by 2050, renewable energy will play an important role to decarbonize our energy systems. In Belgium, offshore wind



energy (OWE) will play an important role<sup>24</sup> in supporting the energy transition. In 2021 Belgium was positioned at the fifth place worldwide in terms of installed offshore wind capacity and after Denmark at the second place worldwide in terms of offshore wind production per inhabitant<sup>25</sup>. And although new offshore windmills will be built in new designated zones, the current operating windmills have an expiry date and will have to be replaced to not only assure the clean energy production, but even increase this production by replacing them with new and more performing wind mills. In the COASTAL project, although the Belgian MAL focused its work on the Outlandpolder where local stakeholders were invited to co-identify policy recommendation the reserach team also looked at the further development of the Belgian offshore wind energy as this activity at sea has an impact on different activities in the hinterland ( providing energy to households and industry, assuring job employment) as well as an impact on the local port development, affecting tourism appeal as well as biodiversity.

MAL 1 developed an offshore wind farm system dynamic model (Figure 8: MAL 1 Port and Energy sub-model) taking into account the different processes and variables related to the Offshore wind Energy development (installation of new wind turbines, decommissioning of the old wind turbines, , use of offshore space, operational costs,...). In addition to a business-as-usual scenario for the decommissioning rate, the central policy indicator referring to the number of turbines decommissioned per year, and derived indicators, the model can be used to examine the impact of other planning scenarios or sensitivity for model-specific parameters, such as the decommissioning rate. The model can be used for long-term planning related to the logistic, infrastructure and economic aspects of installing and decommissioning offshore wind turbines. The model generates a dashboard (Table 33) where the Key Performance Indicators from the port and decommissioning model are displayed.

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<sup>24</sup> General Policy Note: Energy; Belgian Chamber of Representatives DOC 55 1580/007 (2020)

<sup>25</sup> The socio-economic impact of 6 GW offshore wind development in Belgium, Belgian Offshore Platform (2021)

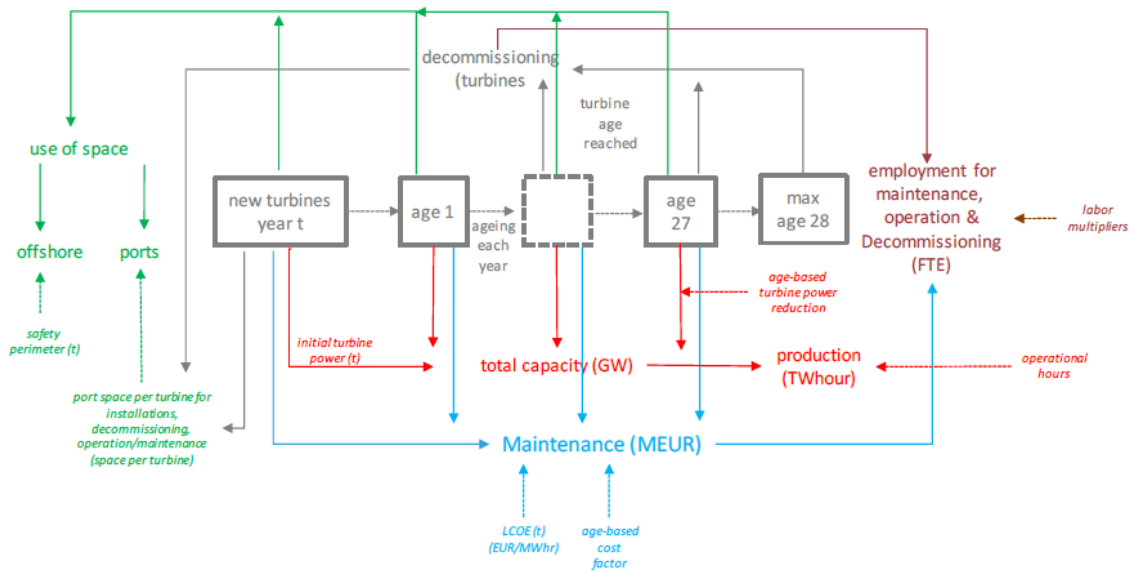


Figure 7: General model structure for the port and decommissioning model (COASTAL D14)

Table 33: KPI of the Port and Energy model (In yellow are highlighted the indicators that have a similar indicator present in the SCBE)

Number of turbines (nr)	Employment generated (FTE/decommissioned turbine)
Average turbin age (year)	Total Power (GW)
Maximum turbin age (year)	Electricity production (TWh/Y)
Minimum turbin age (year)	Production as % demand
New Turbines (nr)	Use of Space offshore(%)
Decommissioning rate (%)	Use of port space (%)
Maintenance Cost (M€/y)	

To predict if the further development of the offshore wind energy is of sustainable nature, a comparison can be made of the MAL's output with the criteria developed by the SCBE. For this task we interacted with the Belgian Offshore Platform, which is an industrial consortium of investors and owners of wind farms in the Belgian part of the North Sea, and other commercial and governmental organizations (VLIZ, POM, Royal Belgian Institute of Natural Sciences, ...).

The model itself is only focussing on the long-term logistics of the decommissioning of the turbines and direct social-environmental impacts (employment, use of space, carbon saving, ...), while the scope of the SCBE takes the whole OWE into account. This partially explains why not all SCBE indicators are found in the model.

Belgium is engaging to reach 4GW of energy produced by OWE in 2030<sup>26</sup>, for which indicators as “Electricity production” and “Total power” in the dashboard are important and are also listed in the SCBE sector-specific indicators for renewable energy. In the common indicators of the SCBE “Energy demand met by renewable energy” reflects well how a region or sector is powering its activity in a sustainable way. But considering that the EU has proposed to adopt targets to achieve a 45% share of renewable energy in final energy consumption by 2030 (EC, 2022), an extra indicator that reflects how much the OWE is covering a countries electricity need could be more appropriated to clarify the role of this sector in achieving the goals of EGD. Therefore, the indicator “Production as % of countries demand”, elaborated in COASTAL decommissioning model, should be taken up in the list of SCBE for renewable energy to follow up on the development and contribution of that sector to the energy transition for a sustainable EU.

There are some indicators found in the model that are present in the economic dimension of the SCBE, but the model lacks certain detail and indicators from the environmental dimension, complicating the evaluation on the sustainability of the Belgian OWE and therefore also its contribution to a Sustainable Blue economy.

The EU is committed to halt biodiversity loss (EC, 2020b) for which the creation of protected nature areas are an efficient and effective means to address this. There seems to be negative as well as positive effects of the OWE on the biodiversity, but if the positive impacts are of a greater magnitude, the offshore windmill zones could be potentially used as a protected area, applying the concept of multi-use of space in a region characterized by a concentration of activities with potential spatial conflicts. Although the MAL’s model provides the indicator “Use of space offshore”, it is not linked towards a positive or negative effect on the environment. As Europe aims to have 30% of marine area to be protected as part of the EU Biodiversity Strategy (EC, 2020a), an extra indicator in the MAL SD model coupled to the indicator “Use of space offshore” could reveal if OWE can help ensure these protected areas and safeguard the biodiversity. The SCBE does try to reflect the impact value on biodiversity with the common indicator ‘Extent of coastal and marine habitat positively/negatively impacted’. However, OWE influences wildlife on different levels (birds in the air, mammals in the sea, benthic organism on the sea bottom,...) and not only close to the windmill parks, but also far inland (change in bird migration routes). This makes it difficult to answer the criteria on habitat as not all impacts are of the same scale and a summation of the area affected will possibly not reflect the true amplitude. The SCBE did identify a sector-specific environmental indicator for the OWE with “Species fatalities due to collisions”. However, feedback from researchers indicates that at this moment there is no reliable way to determine the number of collisions, as current models are based on too many sensitive assumptions.

Another relevant criteria from the SCBE environmental dimension is “Waste management”. The primary policy relevant action included in the MAL 1 model is the decommissioning of turbines, which results in waste that is landed in the port. A further elaboration of the waste cycle and data in the model could also give a better representation of the sector evolution in terms of sustainability. Especially as stakeholders believe that innovation could rapidly enhance the further technological development of recycling in the

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<sup>26</sup> Nationaal Energie- en Klimaatplan 2021-2030

OWE. One of the indicators for the SCBE “Waste management” criteria is “Tonnes of waste generated and recycled/year”. As landing of offshore windmill waste will probably occur irregularly, given that commissioning and decommissioning of offshore windmills is not a constant activity, this “absolute” number is probably not useful when evaluating the trends in consecutive years or comparing different regions. For latter reason the use of a percentage (% waste recycled/year) could be a better indicator for the degree of sustainability of the activity.

Additional indicators to be taken into consideration in the SCBE:

- Specific indicator on coverage of a nation electricity needs by its own offshore renewable energy production : Production as % of countries demand
- Waste management criteria could be assessed in percentage in complement to an absolute number due to the variability in the decommissioning activities: “% waste recycled/year as a complement to “Tonnes of waste generated and recycled/year” within the waste management criteria
- More flexible and specific indicators on impact of offshore renewable energy on biodiversity and environment as the impacts are spread spatially as well as throughout different animal realms (sea bed, within the water column and in the air)

### 4.2.3. Blue policy indicators for Shellfish production

The coastal zone of the Charente region (France) is well known for its oyster culture. This blue economy activity has been performed for more than a century and has not only contributed in food production, but also in adding an extra value to the touristic appeal of the region (culinary, excursions, landscape,...) and its economy. Baby seed (spat) are obtained from adult oyster, which are then raised in the shoreline of the coast for almost three years. Most oysters are then sold to consumers and retailers, although a small part is first transferred to shallow clay ponds where they acquire a superior quality. We can distinguish in the local production two kind of spat obtainment, being the wild collection and the controlled spat production in land based hatchery. In those hatchery most of the spats are produced triploid. This disabled the sexual maturation, and inhibits sexual reproduction of these oysters for which they can grow faster. The other advantage is that triploid oysters offer consumers a non-milky product during the summer. However it seems that triploid oysters are also more affected during mortality episodes.

Following the EGD and F2F Strategy, the Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030 (EC, 2021a) underline the role of aquaculture in building a sustainable food system as being *a source of protein for food and feed with a low-carbon footprint*. Although

the regional oyster culture of Charente coastal region is already an old and traditional activity, it fits well in the aquaculture needed for the future. The oyster culture activities have a minimal waste production with almost no stress on the ecosystem. In contrary, it helps by absorbing excess nutrients of agriculture wash off and offers also climate change mitigation services like carbon sequestration, while the structures used for oyster culture can also play a role in coastal protection (against storm surge and erosion). However, it will probably not be possible to increase total local production, and by this, contribute to a higher European aquaculture production, which is now only covering 10% of the European seafood consumption (COASTAL D14). It is even so that current production is under pressure as there is a lot of mortality due to a herpesvirus, which proliferation is also facilitated by the global warming. The latter also has a negative influence on the natural reproduction (wild seed collection) of the oyster as well as the growth (dysmorphism of the shell resulting in a lower flesh index and price). As a result, there is some concern on the resilience of oyster culture in the region for the coming years relating to climate change which already has driven to some relocation of the oyster culture outside the region. The growth of near shore oyster aquaculture is increasingly constrained by space, economics, human health, and environmental concerns. To date most of the oysters sold under the regional label are grown abroad during part of their life. However, stakeholders have been looking for different strategies to allow the continuation of local oyster activities. Offshore oyster farming in open ocean waters offer a tremendous potential for expansion of the shellfish farming but with a number of technical, operational, economic, and social challenges that need to be addressed. Important in the current and future oyster culture is the role of trophic capacity to be able to support not only the shellfish farms, but also the natural biodiversity. A reduction in density of near shore cultured oyster through technical solutions (rearing oysters in floating bags instead of on tables or reducing the number of oysters in bags) or an enlargement of cultivation area could ensure the needed nutrients per oyster. This would also be in alignment with a possible local strategy to produce a specific regional oyster brand with increased flesh index and quality. The COASTAL project developed a model on the shellfish farming in the Charente region (MAL 4, cf. COASTAL D14) to test possible scenarios. The dashboard of this model (Table 34) displays different key performance indicators which allow assessing the different scenarios and could be used to complement the SCBE regarding shellfish culture.

*Table 34: Dashboard of MAL 4 shellfish farming model*

<b>Concentration in trophic resources</b>	<b>Spat purchase</b>
<b>Occurrence of viruses</b>	Local coastal oyster production
<b>Quality index</b>	Produced oyster weight
<b>Spat capture</b>	Oyster gross margin

Within the SCBE framework, three different subsectors are of interest for the oyster culture, namely “fish and shellfish harvesting”, “fish and shellfish processing” and “aquaculture”. Analysing the indicators for “fish

and shellfish harvesting” and “aquaculture” we noticed that these indicators handle much more fish than shellfish. By setting COASTAL oyster culture assessment against the SCBE, we propose to complement the SCBE to improve the sustainability assessment of the shellfish production sector. As described above the oyster culture could be impacted on the long-term by climate change and this is an aspect that is not taken into consideration within the SCBE framework. Although it could serve as a good evaluation tool on different sustainability aspects, it does not evaluate the **long term resilience of a sector**. Aside the impacts, positive or negative, on different aspects of economic, environmental and social dimensions, for an activity to be considered sustainable, it has to be able to be practiced in a long term and be resilient against future changes and pressures.

The oyster culture has different characteristics as the uptake of waste nutrients from inland rural activities transported in coastal waters through water and sediment flows, the waste of oyster shells used in different industry (Pet food, construction, cosmetics,..), the latter can be assessed using the indicator: “*waste generated/recycling*”, however neither the service of carbon sequestration nor the nutrient-recycling capacity inherent to this sector is taken into account. Those ecosystem services could be important indicators for this sector, especially in the case of the Charente oyster culture, as the possible strategy to lower oyster density could also lead in a reduction of the capacity to provide those services to the society. Being a more traditional activity, it is also performed by a large number of producers, which have grouped themselves in different producer organisations. These existing clusters are investigating the use of less pollutant plastics in the oyster production as well as in the packaging, both being mentioned as SCBE-indicators. As in most sectors, “*level of energy consumption*” is an important criterion to follow up. Oyster culture is not a big user of fossil fuel but it is shown in a lifecycle analyse<sup>27</sup> that possible amelioration could be obtained with adaptations of the barges used for transport of oyster in the near shore. These could be adapted with electrical motors and the installation of shore energy, actions that will even have more impacts if oyster culture will be more offshore.

Listed in the COASTAL models dashboard, “*concentration in trophic resources*” will not only give an indication on the carrying capacity for the possible amount of oyster production, but also on the balance with the natural consumption of trophic resources. “*Quality index*” is a kind of flesh index which can be an indication of a broken balance between oyster density and trophic resources and ring an alarm bells, advocating further research on the problems leading to this. An interesting indicator to add could be “*mortality*” as it has become more frequent and indicate a disturbance in the system. The indicator of “*occurrence of viruses*” and “*mortality*” could then be interpreted together to detect a link between them or with other variables. The dashboard also includes the indicator “*spat capture*” for which low values can indicate a problem in the natural production of oyster spat, which on its turn will lead to decreased oyster production. Another issue that the sector is confronted with, is the impact that contaminated oysters can have on the health of the consumer. It is known that severe illness and even mortality can occur in humans due to consumption of raw oyster infected with a virus. With Europe asking to improve the management of

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<sup>27</sup> Life Cycle Assessment of Oyster Farming in the Po Delta, Northern Italy. (Tamburini et al. 2019)

risks related to animal and human health, with specific notification towards the mollusc industry (EC, 2021a), some indicators could be developed to reflect this relationship and its evolution. In the sector-specific Aquaculture indicators of the SCBE, the indicator “*mortalities reduction program exists and implemented*” could mirror health issues in the oyster culture. However, the specific virus (Norovirus) oysters can transmit to humans is not affecting the oyster itself for which the indicator is only monitoring the cultured species. And although the SCBE takes into consideration the occupational diseases as an indicator, nothing is mentioned on the health of the end consumer. To be able to foresee the sustainability of this activity or other Blue economy activities where there is a close and repetitive connection between the activity and the health of the end consumers, a more specific indicator could be developed

Considering the general criteria for social dimension, it could be challenging regarding social equitability that there would also be indicators listed that can reflect how diverse the end consumers are, especially income-related. This could show how an activity benefits or is accessible to the different population groups. In the current SCBE there are different indicators (e.g. gender or income related) listed concerning the workers in that activity, but nothing on the end-users. Linking these indicators together could then also show, and be used as an index to avoid, imbalance between the ones that contribute to the activity and the ones that benefits from the activity.

Additional indicators specific to the shellfish production sector to be taken into consideration in the SCBE:

- “concentration in trophic resources” and quality index indicators can be interesting indicators to assess the carrying capacity of the coastal ecosystem for shellfish production as well as the pressures that the activity can have on the habitat
- Indicators monitoring the product quality for the consumers would be an added value for the sustainability of the sector in a specific area
- Monitoring the social equitability of the sector towards consumers (e.g. social class of consumers)

#### 4.2.4. Blue policy indicators in aquaculture

In the Romanian case study (MAL 5) we observe two strong blue economy activities, fisheries and aquaculture, which should play an important role in the improvement of the quality of life and sustainability within Danube Delta Biosphere reserve and its marine waters (Black Sea). Both activities should help increase the domestic production to provide in their own national consumption, as this is currently less than 20%. It is also notable that both industries are currently on a point where new strategies have to be developed for further development; Fisheries have declined, traditional inland aquaculture struggles to increase production and marine aquaculture has is not developed yet. As both industries will be setting new or different pathways, it makes it also an ideal moment to make decisions that ensures sustainable pathways.

Although the production ways of these activities differs, they have a common step towards the consumer: the food processing and retail. The EU Farm to fork strategy wants to stimulate sustainable food processing, wholesale, retail, hospitality and food services practices. And these activities seems to be left behind in the Romanian fishery and aquaculture sector, calling for a further development and modernization<sup>28</sup> which would lead to job creation, but probably also will be reflected in an elevated cost for these products. However, the last years, wages have increased in Romania, especially in the urban regions, and the consumer preferences have changed towards more sophisticated type of products<sup>22</sup>. This increased purchasing power can compensate for the increasing prices of the aquaculture products, and aquaculture producers can diversify their products with the add-on value that processed seafood has to offer, matching the more sophisticated or elaborated “local” demand. In this way the increased urban wealth could also be stretched to the less developed inland Danube rural region. A national marketing campaign will be needed to raise awareness on local seafood production to support the development of a local seafood production and consumption market, ensuring a more sustainable food consumption, in line with the Farm to Fork strategy.

For the increase in the national production of seafood, Romania will have to depend more on its aquaculture development than on its fisheries as the fishing sector is characterised by unsustainable practices: overfishing (in the Black sea), and concern on water availability, illegal fishing and pollution for inland fisheries (COASTAL D14). It seems that increase in fishing effort will not lead to higher landings and would be counterproductive in terms of sustainable fisheries. However, this does not mean no investments should be done in the fisheries in the Danube delta. To assure a sustainable future for fisheries different actions have to be implemented. More control on illegal, unreported, and unregulated fishing should be able to give natural stock the ability to recover, not only for fishermen, but also for the natural balance of ecosystems. Sustainable fisheries also covers the use of materials (boat fuel, net material,...) or fishing methods (trawling) with lesser impacts on the environment. Supporting sustainable fisheries can also give new opportunity for the sectors by developing synergies with tourism activities based on the natural assets of the region (e.g. eco-tourism, pesca-tourism...).

The current aquaculture activities in the Danube delta are traditionally based on inland ponds or pen farming and these are or could, with some small adaptations, be considered as organic aquaculture, for which the Danube delta region could contribute to the significant increase in organic aquaculture pursued by the EU Farm to Fork strategy. Traditional farms should therefore be kept as they are, not only as source of specific regional quality food, but also as source of organic food. The role of the traditional aquaculture in the Danube Delta is also one of a local heritage which can be an addition for the touristic appeal of the region. Farmers could also play a role in ecological monitoring of the Delta to help in protecting this Natural Capital, an action underlined by the EU Biodiversity strategy.

To obtain a more drastic increase in aquaculture production, more focus should be placed on aquaculture in sea cages and/or on land in RAS (Recirculating Aquaculture System). However, in both cases measurements

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<sup>28</sup> Food processing and retail in Romania (2019) Flanders Investment and Trade



should be taken from the start to ensure its sustainability. Farming in sea cages in the Black Sea will scale up Romanian aquaculture production, but will also have a big pressure on the natural surroundings. Therefore fish farming at sea should be combined with extractive seaweed farming (IMTA) from the start and be optimized to avoid negative effects. For RAS-farming, the new installations should not interfere with the EU goal to secure 30% in protected nature land area and specific measure should control water usage and disposal. Various development actions have been proposed in MAL 5 Business Roadmap in line with the “Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030”. The Romanian MAL developed a system dynamic sub-model “Fish farming in the Danube Delta” (COASTAL D14) which can run different scenarios leading to policy decisions for the sustainable development of the aquaculture sector in the Delta. The dashboard of the model (Table 35) groups the selected key performance indicators used to evaluate the different scenarios.

*Table 35: MAL 5 Key Performance Indicators of the model “Fish farming in the Danube Delta”*

<b>Fish Farming Area</b>	<b>Fish Farming Employment</b>
<b>Fish production</b>	Fish Farming Revenue
<b>Spatial pressure Aquaculture</b>	Fish Production Ratio

The dashboard sums up economic and productive indicators, having a production oriented focus, putting aside the environmental aspect of the activity, thus no environmental indicators are present. When looking more into the variables of the model, the indicator “total aquaculture Nitrogen load” could have a more prominent role on the dashboard as it is an important pressure-indicator on the environment. When analysing the SCBE, “Phosphorous (P) and nitrogen (N) concentrations” are indicators that are mentioned as sector-specific sustainability indicators for Aquaculture. As future improvement, in a post-project activity, a more elaborated model could make more distinguishment between the different aquaculture systems (conventional vs sustainable) and their differentiating characteristics taking into account their strength and weakness (mitigation service by oyster or seaweed farming; water pollution by cage-farming or discharge in inland RAS farms; eco-tourism;...). This will also clarify their positive or negative role in the further development of the MAL 5 region.

There are indicators for normal and intensive aquaculture relating to the area they occupy and the production they deliver, but not for the interaction of these two indicators: the “production per area”. This indicator could evaluate the efficiency of a normal and intensive aquaculture and could advocate for shifting some aquaculture space from one system to another. Increase in production by intensive farming could be reached with lower use of area than it would by extensive farming. However, the question is: “is there space for intensive farming in the Danube Delta?” as it could be a problem to fit land based RAS farms in the natural environment. A question that is not easy to answer as there is a gap in policy on allocated zones for aquaculture, inland as well as at sea in the country. To date there is still no national legally binding Maritime Spatial Plan in Romania. This also leads to a lack of infrastructure planning, which in turns lead to low

interest for investment in aquaculture projects. This problem has also been mentioned as one of the highest priority in the Romanian Business RoadMap to support Aquaculture development.

Additionally, within a post-project activity, the further development of the Romanian marine aquaculture model could also benefit from the incorporation of indicators on animal welfare. The EU Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030 is emphasizing that more attention has to be paid to animal welfare in Aquaculture. The “Mortality” indicator could be added in the COASTAL MAL 5 aquaculture sub-model, like in the MAL 4 oyster shellfish Model. The SCBE does include the indicator “Mortalities reduction program exists and implemented” as an Aquaculture sector-specific indicator. However, it seems that this indicator does not take into account that stress or malpractice will not always lead to mortality of the fish and that fish can suffer a lot during their whole life in captivity, before and during slaughter. A review (Toni et al. 2019) does stipulate that the control of fish welfare on aquaculture farms is a complex issue due to the high number of environmental factors to be considered, the shortage of welfare indicators and the high number of teleost species<sup>29</sup>. Nevertheless, the SCBE could add an indicator like “Stress reduction program exists and implemented”. A look on the SCBE sector-specific indicators for fisheries shows that also in that list there is no indicator concerning the welfare of fish. Fish that are getting caught undergo stress and a lot of them die suffering before slaughter. Although the European Regulation<sup>30</sup> underlines that animals must spare any avoidable pain, distress or suffering during their killing, it is set for animals kept for production. But there should be no distinguishment between the suffering of farmed and that of wild fish at harvest and slaughter time. Therefore the SCBE should also consider taking up an animal health indicator in their sustainable indicators for Fisheries. The project “Towards sustainable Fisheries<sup>31</sup>” has elaborated an animal welfare indicator for the Belgian Fisheries where the animal welfare is scored at the vessel level using some parameters (such as towing time, duration and method of processing on board,...) that collectively describe the welfare of the fish brought on board. These parameters and the main concerns submitted by the Aquatic Animal alliance regarding animal welfare in the wild-capture fisheries industry<sup>32</sup> could help the implementation of such welfare indicator in the SCBE.

Additional indicators to be taken into consideration in the SCBE:

- Stress-indicators of the produced organism during their production cycle
- The use of an indicator “production/area” to evaluate production on the land- and sea space they are taking in

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<sup>29</sup> Review: Assessing fish welfare in research and aquaculture, with a focus on European directives, Toni et al, *Animal* (2019), 13:1, pp 161–170

<sup>30</sup> COUNCIL REGULATION (EC) No 1099/2009 on the protection of animals at the time of killing

<sup>31</sup> VALDUVIS Factsheet Indicator DIERENWELZIJN (2014)

<sup>32</sup> Animal Welfare Considerations for Marine Stewardship Council’s 2020-2021 Standards Review

#### 4.2.5. Blue policy indicators for coastal tourism

The EU is a world leading tourism destination, with four of its Member States among the world's top ten destinations for holidaymakers<sup>24</sup>. Coastal tourism represents 45% of the GVA and 64% of the employment of the EU Blue economy (EC, 2021e). However, it is a sector where activities are more susceptible to adversities, leading to fluctuations in the revenues. The covid 19 pandemic had a severe impact on the travelling and tourism activities. The recovery of this sector should be taken as an opportunity to address changing consumer needs and steer the tourism ecosystem towards more resilient, digital, and greener practices (EC, 2021f). In the Blue Economy report (EC, 2021e) coastal tourism covers beach-based tourism and recreational activities, (e.g. swimming, sunbathing, coastal walks, wildlife watching) but also includes maritime tourism which covers water-based activities and nautical sports (sailing, scuba diving and cruising). For economic evaluation the reports divides coastal tourism in accommodation, travel and other expenditures. The same economic dimensions can also be used for rural tourism, which is defined by the European Environment Agency as the activities of a person travelling and staying in rural areas (without mass tourism) other than those of their usual environment for less than one consecutive year, for leisure, business and other purposes (excluding the exercise of an activity remunerated from within the placed visited).

Five of the COASTAL case studies include tourism activities, with a predominance of sea-side tourism. The COASTAL project explored diverse options (cf. MALs' BRM) to trigger coastal –rural synergies in the tourism sector to release the tourism pressure on the coast as well as boosting economic activities in rural areas. The question remains on how to ensure that the shift of tourists from coastal to rural has a positive effect in the different sustainability dimensions on both territories.

Looking at the tourism models developed within the project, the economic dimension is assessed using the "employment" indicator, reflecting the importance of this sector in most regions. The environmental dimension is also assessed in all COASTAL tourism sub-models. In Greece (MAL 2), the status of the lagoon ecosystem is connected the "landscape and seascape quality" which are then connected to the indicator "Tourism development". In Romania (MAL 5), pollution in the Danube delta is linked to the impacts it has on the attractiveness for tourism while in Spain (MAL 6) the degradation of the saltwater lagoon Mar Menor is connected to the indicator "Tourism loss" (loss of tourism activity due to the degradation of coastal natural environment). The models and indicators used reflect the touristic appeals of coastal regions which rely on the presence of certain ecosystems, attractive natural spaces (e.g. beautiful scenery, quality of bathing waters, clean beach) and the preservation of it is of high importance to maintain this regional touristic attractiveness. To reflect the link between the sustainability of tourism activities and the good status of the environment, the use of indicators to assess the "Landscape and seascape quality" could be included in the SCBE framework, to monitor tourism attractiveness.

Another key environmental criteria highlighted by COASTAL, which must be taken into consideration when assessing the sustainability of the tourism sector in coastal regions, is the sector's water consumption. In the COASTAL models, indicators such as "Water demand" or "Waste water" are used. The SCBE framework include criteria for waste water production and water consumption however the latter is only assessed using "Water consumption per guest night" which does not take into consideration the overall water resource availability of a given territory which varies greatly from one region to another, depending on the climate but also on the presence of competing sectors (e.g. agriculture), as well as the seasonality of the sector and the resource (in summer coastal region face higher water demand in a context of lower resource availability). Antonona et al. (2022) have proposed interesting indicators which could be relevant to complement the SCBE criteria for the sustainability of the tourism sector. In relation to the water consumption criteria, the indicator "**water withdraw**" by the sector in comparison to other sectors (agriculture, industry, household consumption) seems pertinent, as well as the presence of "**water saving** measure", and more generally the presence of "environmental certification" to monitor the sustainability of tourism practices..

The third component of sustainability, the social dimension, is however absent from the COASTAL tourism models, mainly due to initial choices made at the start of the modelling process in terms of scope and models boundaries, for the sake of simplicity. Nevertheless, in the future, the COASTAL tourism models should also be able to monitor the social impact of the sector in coastal-rural regions. Tourism relies on seasonal and temporary workers (23%), many of them young (37% of tourism workers are under 35), women (59%), and from other countries (15% EU or non-EU) (EC, 2020e). For this, looking at the just transition towards a sustainable future ideology, stipulated in the European Green Deal, indicators concerning social inclusion could give more insight on the implications for vulnerable employees of the tourism sector. The COASTAL models could include social SCBE indicators ("Employees with no post-school diploma" and "Employment rate of vulnerable groups", "seasonal jobs") to characterise the employment market

Finally it is worth mentioning that neither the COASTAL models nor the SCBE framework take into consideration the **transport dimension** (transportation needed to reach the destination and transport use within the touristic area) in tourism activities, a component highly CO2 emitting, thus it must be taken into consideration when assessing its future sustainable development in coastal-rural regions

Additional indicators to be taken into consideration in the SCBE:

- "Landscape and seascape quality" indicator to monitor the tourism attractiveness of a region
- Additional indicators to measure the sustainability of the sector in relation to the water resource availability (e.g. water saving measure", "water withdraw"),
- Indicator to measure sustainable tourism practices (e.g. "presence of environmental certification")

### 4.3. Assessing the sustainability of Blue Economy sectors: summary

With the assessment of the different Blue Economy activities in the MALs and comparing it with the SCBE, certain remarks on the sustainable indicators of that framework can be made. As the SCBE report already tried its framework on some case studies, the report itself includes some remarks and recommendations matching up with COASTAL stakeholders' feedback. Their first reaction was that the SCBE could be a very interesting framework however, a thoroughly study will need a lot of time. As also mentioned by the SCBE itself, reliable and recent data could be problematic, as for some indicators companies will have to share economic information (wages, revenue, ...) which they might object to.

. When using "Emissions" as a criteria for a sector, a good standardized description of all activities that could contribute to emissions is needed, especially when comparing different regions and/or sectors. As the stakeholders pointed out some activities (e.g. origin of energy used for steel production) can be quickly overlooked and so also their corresponding part in the total emission. A meticulously Value Chain Analysis, which is also advised by the SCBE, should be able to list all the different activities of a sector. Comparison between different sectors on their Sustainability compliance using the SCBE will also be challenging. The SCBE does not apply a scoring mechanism, as this should allow more flexibility with the chosen units. However, trying to find the appropriate answer for some indicators, it seems the indicator unit is sometimes more sector-specific, which means we cannot compare directly between sectors or activities. An intermediate step may be necessary to process the evaluation, for example with radial graphs.

As a general conclusion we can outline that the SCBE seems to be a promising tool to assess the sustainability of Blue economy activity. Table 36 summarize indicators that are suggested to be taken into consideration by the SCBE framework. Most of the suggested indicators are related to the environmental dimension, which could be explained that the European Union wants an economy that is giving more importance to biodiversity conservation.

*Table 36: "Suggested indicators for the SCBE framework (In the column "case study" the COASTAL MAL from which the input came from is stipulated and in the last column is stipulated under which SCBE dimension it should be located)*

Sector	Proposed indicators	Dimension
<b>Port and Energy</b>	"Production as % of countries demand"	Environmental
	% waste recycled/year	Environmental
<b>Shellfish industry</b>	"Impact on human health"	Social
	"Availability for consumers with diverse income"	Social
	"Carbon sequestration inherent to this sector"	Environmental

	“Nutrient-recycling capacity inherent to this sector”	Environmental
	Concentration in trophic structure	Environmental
<b>Aquaculture</b>		
	“Phosphorous (P) and nitrogen (N) concentrations”	Environmental
	“production per area”.	
	“Animal stress reduction program exists and implemented”	Environmental
<b>Coastal Tourism</b>		
	“water withdraw in comparison to other sectors”	Environmental
	“Accessibility for visitors with diverse income”	Social
	Landscape and seascape quality (status of ecosystems in the region)	Environmental
	Existence of water saving measure	Environmental
	Existence of environmental certification in tourism structures compare to all tourism structures	Environmental

#### 4.4. Future sustainable Blue indicators for COASTAL land-sea models: summary

In the context of post-project exploitation of the COASTAL system dynamic models for land-sea synergies, we suggest to take into consideration additional indicators to strengthen the capacity of the models to assess the sustainability of certain blue economy sectors (Offshore wind energy; aquaculture and shellfish farming, coastal tourism).

Table 37 summarize those indicators.

Table 37: “Suggested indicators for the COASTAL models”

Case study	Suggested indicators
<b>MAL 1: Port and Energy sub-model</b>	
	“Use of space offshore considered as protected nature area”
	“Waste management”
<b>MAL 4 : Shellfish Model</b>	

	"Level of energy consumption"
	"Mortality"
	"Impact on human health"
	"Availability for consumers with diverse income"
	"Carbon sequestration inherent to this sector"
	"Nutrient-recycling capacity inherent to this sector"
<b>MAL 5: Fish farming in the Danube Delta</b>	
	"Use of space offshore considered as protected nature area"
	"Waste management"
	"Production per area".
<b>Different MALs: Tourism</b>	
	"Level of energy consumption"
	"Waste management"
	"Nature area not accessible for tourism"
	"Availability for consumers with diverse income"

## 5. CONCLUSION

This deliverable presented the outputs of the tasks conducted as part of WP3 (“Business and policy support”), starting in chapter two with a mapping of the key policy frameworks for coastal-rural regions which revealed the importance of regional cooperation frameworks at sea basin level when it comes to cross-sectoral and cross-territorial synergies. The existing policy framework, reinforced by the European Green Deal is perceived as very relevant for establishing sustainable coastal-rural systems with the capacity to foster synergies across coastal-rural territories, if policies are effectively implemented and enforced. Structural barriers exist in most European countries in terms of governance when it comes to land-sea synergies, with marine and land administrations working in silos, rarely in collaboration.

Within this policy context, the 6 COASTAL Multi-Actor-Labs, representative of the diversity of European coastal-rural regions, provided a space for the research teams to work closely with local stakeholders from coastal and rural activities in order to co-develop a portfolio of business and policy actions leading to increased synergies between coastal and rural actors with the aim to tackle key local coastal-rural challenges, (one of the key issue was the sustainable management of fresh water resources). Those actions have been translated into business roadmaps and policy recommendations presented in Chapter three. Agriculture, tourism, aquacultures and water managers are key actors and sectors of the land-sea continuum, fostering synergies and collaborations among them will support a sustainable and harmonized territorial development from source-to-sea for the benefit of all. Each case study (MAL) identified specific actions for those sectors (e.g. development of organic farming and alternative forms of tourism; creation of cross-sectoral governance bodies for the management of natural resources...).

The overall policy recommendations for coastal-rural synergies and the sustainable development of coastal-rural territories are summarized in this way:

- ❖ The need of a new governance model integrating land-sea continuity
- ❖ Facilitate collaboration and partnerships across rural and coastal sectors and administrations
- ❖ Ensure the enforcement of existing laws while giving more flexibility and adaptiveness to local context when it comes to European directives
- ❖ Design an ambitious CAP which will support sustainable agricultural practices, environmental protection and quality products
- ❖ Implement an Integrated water management framework from source-to-sea

Chapter four elaborates the analysis to the sea side of coastal-rural territories, taking a closer look at the sustainability dimension of the blue economy sectors present in the project case studies, using the EU Sustainable Criteria for the Blue Economy framework. It provides a valuable complement to coastal-rural analysis as well as the land-sea interactions system dynamic models (WP4), by identifying additional key performance indicators for a sustainability analysis of all sectors of the land-sea continuum. It was also an opportunity to test the SCBE framework and provide feedback, contributing to a potential updated version of criteria (summarized in table 36 and 37).



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