



## Implementation of the System Innovation Approach in all the Case Studies

### Intermediate Report

### Deliverable 6.5

### WP6: Case studies: Coordination and implementation activities

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Date: 29/03/2023



This project has received funding from the European Union's Horizon H2020 innovation action programme under grant agreement 101037424.

Deliverable Number and Name	D6.5 – Implementation of System Innovation Approach in all case studies. Intermediate report.
Work Package	WP6 – Case studies: coordination and implementation activities
Dissemination Level	Not Public before the complete implementation of the SIA of ARSINOE at month 45
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Date Due	31/03/2023
Date Submitted	31/03/2023
File Name	ARSINOE_D6.5
Status	Final
Reviewed by (if applicable)	Joep van den BROEKE (KWR)
Suggested citation	La Jeunesse I., Moujan C., Akinsete E., Guittard A., Spiropoulou A. (2023). Implementation of System Innovation Approach in all case studies. Intermediate report. ARSINOE Deliverable 6.5, H2020 grant no. 101037424

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This document has been prepared in the framework of the European project ARSINOE. This project has received funding from the European Union's Horizon 2020 innovation action programme under grant agreement no. 101037424.

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## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	6
INTRODUCTION .....	8
Scope of this deliverable .....	8
Structure of this document .....	10
<b>1.0 SYSTEMS INNOVATION APPROACH .....</b>	<b>11</b>
1.1 Introduction to SIA .....	11
1.2 Systems Innovation Approach and Living Labs .....	12
<b>2.0 STAKEHOLDER IDENTIFICATION AND MAPPING .....</b>	<b>15</b>
2.1 Case study elaboration .....	15
2.2 Stakeholder identification .....	15
2.4 Stakeholder mapping and analysis .....	16
2.5 Feedback on stakeholder selection .....	18
2.6 Discussion and Conclusions .....	19
<b>3.0 CONVENING THE LIVING LABS .....</b>	<b>19</b>
3.1. Training sessions .....	20
3.2 Pre- and post-workshop 1 meetings with CS teams .....	24
3.3 Guidelines for Workshop 1 .....	25
3.4 Standard agenda for the first round of Living Lab workshops .....	27
3.5 Reporting template for workshop 1 .....	28
3.6 Mental mapping outputs .....	29
3.7 Observations after the first round of workshops .....	30
3.8 In between WS1 and WS2 .....	30
3.9 Guidelines for Workshop 2 .....	30
3.10 Defining guiding principles .....	31
3.11 Standard agenda for the second round of Living Lab workshops .....	31
3.12 Reporting template for workshop 2 .....	32
3.13 Pre-workshop 2 meetings with CS teams .....	37
3.14 Next steps .....	37
<b>4.0 IMPLEMENTATION OF FIRST ROUND OF LIVING LAB WORKSHOPS PER CASE STUDY .....</b>	<b>39</b>
4.1 Case Study 1 – Greening Athens .....	39
4.1.1 Introduction to the Living Lab focus .....	39
4.1.2 First Living Lab workshop .....	39
4.1.3 Main activities directed to stakeholders between workshops .....	42
4.2 Case Study 2 – Mediterranean Ports .....	42
4.2.1 Introduction to the Living Lab focus .....	42
4.2.2 First Living Lab workshop .....	43
4.2.3 Main activities directed to stakeholders between workshops .....	52
4.3 Case Study 3 – Main River .....	54
4.3.1 Introduction to the Living Lab focus .....	54

4.3.2	First Living Lab workshop .....	54
4.1.3	Activities carried out between workshops 1 and 2.....	57
4.4	Case Study 4 – Orhid and Prespa Lakes .....	58
4.4.1	Introduction to the Living Lab focus .....	58
4.4.2.	First National workshop of the LL in North Macedonia .....	58
4.4.3	List the main activities directed to stakeholders between workshops.....	62
4.4.4	First National workshop of the LL in Greece .....	62
4.4.5	List the main actions directed to stakeholders between workshops ..	65
4.4.6	First National workshop of the LL in Albania.....	65
4.4.7	List the main actions directed to stakeholders between workshops ..	68
4.4.8	First Transboundary workshop of the LL .....	68
4.4.9	Main actions directed to stakeholders between workshops .....	70
4.5	Case Study 5 – Canary Islands.....	70
4.5.1	Introduction to the Living Lab focus .....	70
4.5.2	First Living Lab workshop .....	71
4.5.3	Activities carried out between workshops 1 and 2.....	76
4.6	Case Study 6 – Black Sea.....	76
4.6.1	First workshop of the LL.....	76
4.7	Case Study 7 – Southern Denmark .....	86
4.7.1	Introduction to the Living Lab focus .....	86
4.7.2	First Living Lab workshop.....	87
4.7.3	Activities carried out between workshops 1 and 2.....	90
4.8	Case Study 8 – Torbay & Devon County.....	91
4.8.1	Introduction to the Living Lab focus .....	91
4.8.2	First Living Lab workshop .....	91
4.8.3	Activities carried out between workshops 1 and 2.....	93
4.9	Case Study 9 – Sardinia .....	96
4.9.1	Introduction to the Living Lab focus .....	96
4.9.2	First Living Lab workshop .....	97
4.9.3	Activities carried out between workshops 1 and 2.....	99
	<b>INTERMEDIATE CONCLUSIONS AND NEXT STEPS .....</b>	<b>99</b>
	<b>GLOSSARY OF KEY TERMS .....</b>	<b>102</b>
	<b>BIBLIOGRAPHY .....</b>	<b>103</b>

## EXECUTIVE SUMMARY

ARSINOE develops the methodological framework for the combination of Systems Innovation Approach (SIA) with the Climate Innovation Window (CIW) to create an ecosystem for climate change adaptation solutions. The work in ARSINOE resolves around nine Case Studies (CSs), where the implementation of the SIA takes place. The case studies represent a range of environments and collections of (local and regional) stakeholders that are the target for the implementation of the innovation packages for resilience and climate change developed in ARSINOE.

This deliverable D6.5 presents a detailed account of the methodology and implementation process of the Systems Innovation Approach within ARSINOE from Months 1-18. Since the implementation of SIA is led by WP2, this deliverable completes the information presented in Deliverable 2.1, which reported on the initial activities in WP2 during the first twelve months of the project. Later in the project, newer (updated) versions of this document will be submitted (D6.6 due M45). The deliverable is a living document, reporting (a) the stakeholder engagement activities (meetings, actions, etc... within the CSs; (b) the organisation of actions for the implementation of stakeholder participation; (c) the organisation of a monitoring mechanism and plan for all these activities.

During this period of 18 months, the focus has been on the execution of the SIA (Task 6.2). The main achievements from task 6.2 were the successful organisation of the living labs (LLs) for each case study. The LLs are instrumental in the implementation of the SIA and are the place where the projects interact with the stakeholders from the case studies, and the direction of the case studies is determined by co-creation with the stakeholders. Living Labs are a series of three participatory workshops implemented over an 18-month period. For this deliverable, all case studies have successfully organised their first LL workshops, and the second round of living lab workshops is well under way.

In the actions under Task 6.2, stakeholders from diverse backgrounds and disciplines within each individual CS are brought together to co-design an accepted vision of the future. The main goals of this task are to identify stakeholders through an iterative stakeholder mapping process and engage them in local co-creation activities to self-assess, envision, and co-design adaptation pathways toward climate resilience that respond to the strengths and needs of each local system.

The main objective of SIA within the context of ARSINOE is to enable project partners from diverse disciplines to converge on a unified view, before implementing resilience modelling. Outputs from the SIA process also feed the work of WP5, responsible for implementing Open Calls for Tenders as a way to identify promising or mature innovations to be included in ARSINOE's Portfolio of Innovations. The process is undertaken in three phases: i) stocktaking for the identification of relevant solutions well adapted to each local context, ii) preparation and publication of the Open Calls for Tenders, and iii) the evaluation and selection of the solutions to be supported. Problems and innovation gaps identified within LLs are the base of phase i and ii, and inform the relevance of proposed solutions in phase iii. [Figure 3](#) gives a general overview of the interactions between Living Labs and Open Calls for Tenders.

**Section 1** of this document outlines the general methodology of the SIA, giving an overview of its main stages (Defining the Scope, Mapping, Problem Definition, Envisioning, Backcasting, and Building). The process is implemented at case study level within LLs, led by the case study leaders and with the support of the WP2 team.

**Section 2** describes the methodology for stakeholder identification and mapping across the 9 case studies. To select appropriate participants to take part in LLs, CSs perform Stakeholder Mapping activities, which consist on i) long lists, which are broad inventories of relevant actors within the area, and ii) influence/interest matrices, where stakeholders are plotted within a two-axis matrix according to their perceived influence in the area, and their potential interest in taking part in ARSINOE living labs. A detailed description of the implementation of Stakeholder Mapping activities for each CS has been reported on Deliverable 2.1.

**Section 3** develops a step-by-step description of the work carried out by WP2 to prepare CS teams to convene local Living Labs, from initial in-person training in Tours, to final reports and post-workshop meetings. WP2 team members developed a series of tools, including in-person and online training sessions, written guidelines detailing the preparatory work, main activities and expected outputs for each workshop, a standard agenda for each workshop, reporting templates to guide CS teams in their analysis and processing of workshop outputs, individual preparatory meetings to assist CSs with the different aspects involved in convening the workshops, and post-workshop meetings to reflect on the outcomes and prepare the following steps.

A summary of the dates of the first round of LL workshops as well as all pre- and post-workshop 1 meetings can be found in [Table 10](#). Expected dates for the second round of workshops and related pre- and post-workshop meetings can be found in [Table 14](#).

**Section 4** describes in detail the implementation of the first round of LL workshops in all case studies, including main takeaways and outputs, such as problem statements and mental maps, and pictures of the workshops, as well as activities carried-out between workshops 1 and 2. All CSs have succeeded in implementing the methodology and benefited from its specific strengths. Mental maps, in particular, have proved to be powerful tools to stir discussions and shift mindsets from an initial, problem-solving, analytical approach where each challenge is filtered through a specialist mindset, to a holistic view where all challenges appear interconnected. Perceptions of what the main challenges are, and how to tackle them, are shifting from initial approaches focused mainly on technical aspects, to new ones that consider social dimensions as central elements of the system.

Finally, as preliminary conclusions presented in Section 5, we assess the first phase of SIA implementation in regard to ARSINOE's main objectives, as well as to WP2's key performance indicators, such as respect of methodology and deadlines, consistency with WP6's roadmap, knowledge sharing across CSs, and effective support of other WP activities (WP5 in particular). We also provide a glossary of key terms, and a bibliography.

In the coming period will continue the work started in the reporting period, in particular the reporting of workshop2 and the preparations for the 3<sup>rd</sup> living lab workshops. We present an overview of the next steps – Envisioning (workshop 2) and Backcasting (workshop 3) – which will take place within the next 6 months.

Related Deliverable: D2.1

## INTRODUCTION

### Scope of this deliverable

The work in ARSINOE revolves around nine Case Studies (CSs). The case studies represent a range of environments and collections of (local and regional) stakeholders that are the target for the implementation of the innovation package for resilience and climate change developed in ARSINOE. This package may be designed for implementation in specific regions, but its building blocks are transferable and re-usable. In each case study a number of activities and actions need to take place connected to the development and implementation of the innovation package. Furthermore, there are activities horizontally across the case studies. To ensure concerted and coordinated action, and sharing of experience and knowledge between the case studies, all case studies are coordinated in Work Package (WP) 6. The overall objectives of WP6 are to:

- (i) develop a roadmap of actions for all the CSs;
- (ii) coordinate the activities and actions in all the Case Studies;
- (iii) guide and monitor the implementation of the stakeholder engagement, the resilience assessment and the innovation packages at the CSs throughout the project;
- (iv) develop and monitor Key Performance Indicators (KPI)s;
- (v) develop and coordinate the validation procedures for the innovation packages in all the CSs;
- (vi) provide evidence-based knowledge and recommendations at EU level.

**Figure 1** shows schematically the methodological approach and the research areas to be followed in ARSINOE at a higher and comprehensive level, demonstrating the main methodological approach for the project overall.



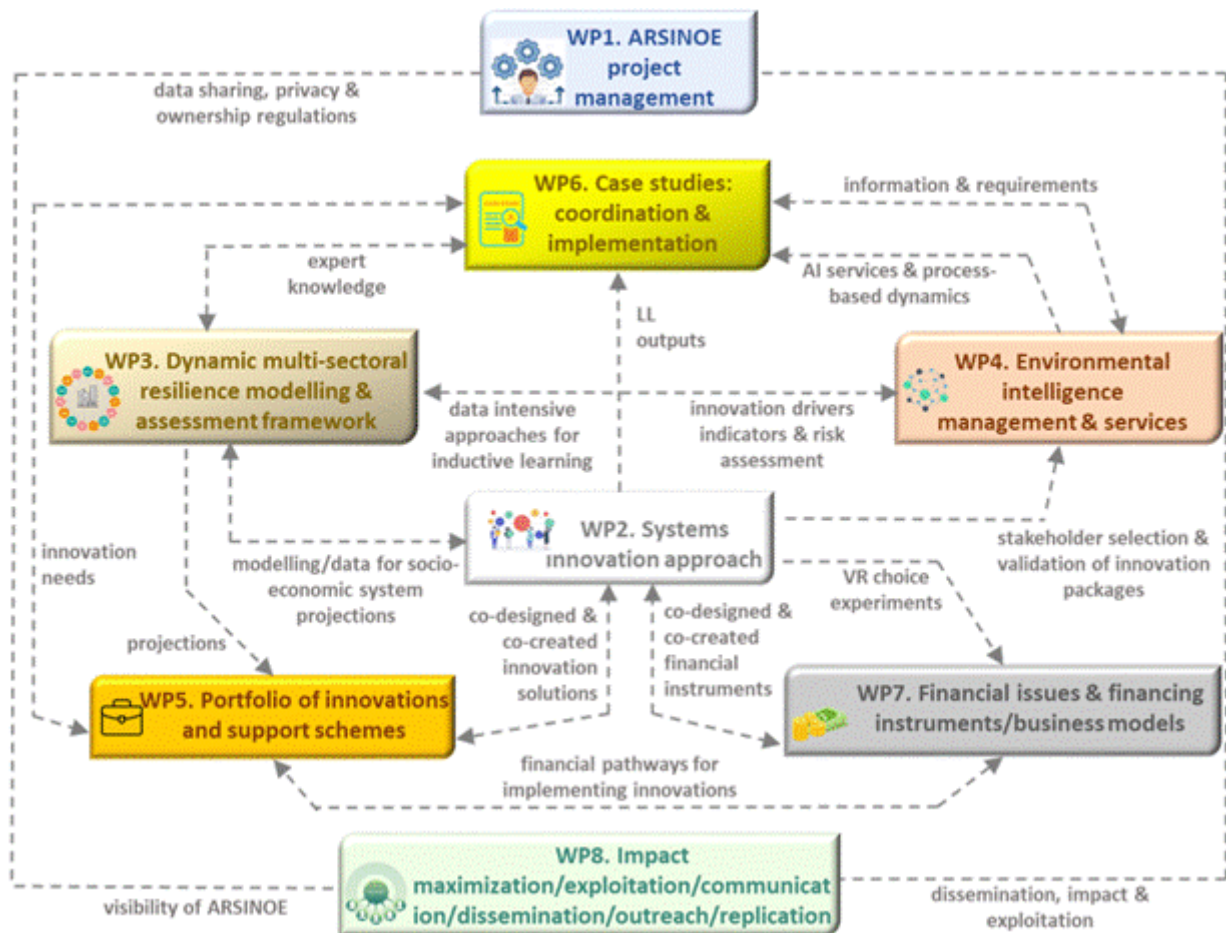


Figure 1: Schematic representation of the interlinkages between WP6 and the other WPs.

ARSINOE’s Work Package 2 develops methods for implementing the Systems Innovation Approach and proposes guidelines and training sessions to case study teams. Context and solutions to face climate change are self-assessed and co-designed with stakeholders in living lab settings and qualitative analysis through interviews and workshops, where the targeted stakeholders and citizens create together a future vision and define possible pathways to reach their goals. Following WP2 methodology, WP6 is dedicated to coordinating, planning, assisting and monitoring the implementation of this approach for the CSs. WP6 is structured in several Tasks, Task 6.2 encompassing the objectives of the **Implementation of the System Innovation Approach in each case study**. In particular this task identifies stakeholders through a dynamic stakeholder mapping and implements the stakeholder engagement activities for co-creation developed in WP2 at each CS. This task develops also specific KPIs for monitoring the progress of each CS, in collaboration with the stakeholders. The outcome of this Task are two deliverables detailing the implementation of the SIA in each CS (D6.5 and an updated version thereof in D6.6).

The monitoring performed as part of Task 6.2 is reported in the two deliverables D6.5 (M18) and D6.6. (M45). The current document (D6.5), is produced as part of the ongoing monitoring of the progress of SIA implementation activities in the 9 case studies. This intermediate report focuses mostly on actions performed between M1 and M18 (stakeholder mapping, invitation of LLs participants, implementation of the first round of workshops) and, to a lesser extent, on activities related to WP5 (Portfolio of innovations and support schemes).

The content of this deliverable is based on reports of activities provided by case studies. The role of the WP2 and the WP6 in the task 6.2 is not to supervise scientific outputs provided by CSs in those reports, but only to assist, train and support them in adapting the methodology provided by WP2 to their specific case study needs, as to ensure that progress respects the WP6 agreed roadmap.

## Structure of this document

The deliverable is organised as follows. **Section 1** of this document outlines the general methodology of the SIA, giving an overview of its main stages (Defining the Scope, Mapping, Problem Definition, Envisioning, Backcasting, and Building). The process is implemented at case study level within LLs, led by the case study leaders and with the support of the WP2 team. **Section 2** describes the methodology for stakeholder identification and mapping across the 9 case studies. A detailed description of the implementation of Stakeholder Mapping activities for each CS has been reported on Deliverable 2.1 (M12). **Section 3** develops a step-by-step description of the work carried out by WP2 to prepare CS teams to convene local Living Labs, from initial in-person training in Tours, to final reports and post-workshop meetings. **Section 4** describes in detail the implementation of the first round of LL workshops in all case studies, including main takeaways and outputs, such as problem statements and mental maps, and pictures of the workshops, as well as activities carried-out between workshops 1 and 2. Finally, as preliminary conclusions presented in **the last section**, we assess the first phase of SIA implementation in regard to ARSINOE's main objectives, as well as to WP2's key performance indicators, such as respect of methodology and deadlines, consistency with WP6's roadmap, knowledge sharing across CSs, and effective support of other WP activities (WP5 in particular). We then explain the next steps as this deliverable is an intermediate report of the SIA implementation in the 9 case studies. We also provide a glossary of key terms, and a bibliography.

## 1.0 SYSTEMS INNOVATION APPROACH

Systems Innovation Approach (SIA) addresses the growing complexity, interdependencies and interconnectedness of modern societies and economies, focusing on the functions of cross-sectoral systems as a whole and on the variety of actors. The Climate Innovation Window (CIW) is the EU reference innovations marketplace for climate adaptation technologies. ARSINOE shapes the pathways to resilience by bringing together SIA and CIW, to build an ecosystem for climate change adaptation solutions. Within the ARSINOE ecosystem, pathways to solutions are co-created and co-designed by stakeholders, who can then select either existing CIW technologies, or technologies by new providers (or a combination) to form an innovation package. This package may be designed for implementation to a specific region, but its building blocks are transferable and re-usable; they can be re-adapted and updated. In this way, the user (region) gets an innovation package consisting of validated technologies (expanding the market for CIW); new technologies implemented in the specific local innovation package get the opportunity to be validated and become CIW members, while the society (citizens, stakeholders) benefits as a whole. ARSINOE applies a three-tier, approach: (a) using SIA it integrates multi-faceted technological, digital, business, governance and environmental aspects with social innovation for the development of adaptation pathways to climate change for specific regions; (b) it links with CIW to form innovation packages by matching innovators with end-users/regions; (c) it fosters the ecosystem sustainability and growth with cross-fertilization and replication across regions and scales, at European level and beyond, using specific business models, exploitation and outreach actions. The ARSINOE approach is show-cased in nine widely varied demonstrators, as a proof-of-concept with regards to its applicability, replicability, potential and efficacy.

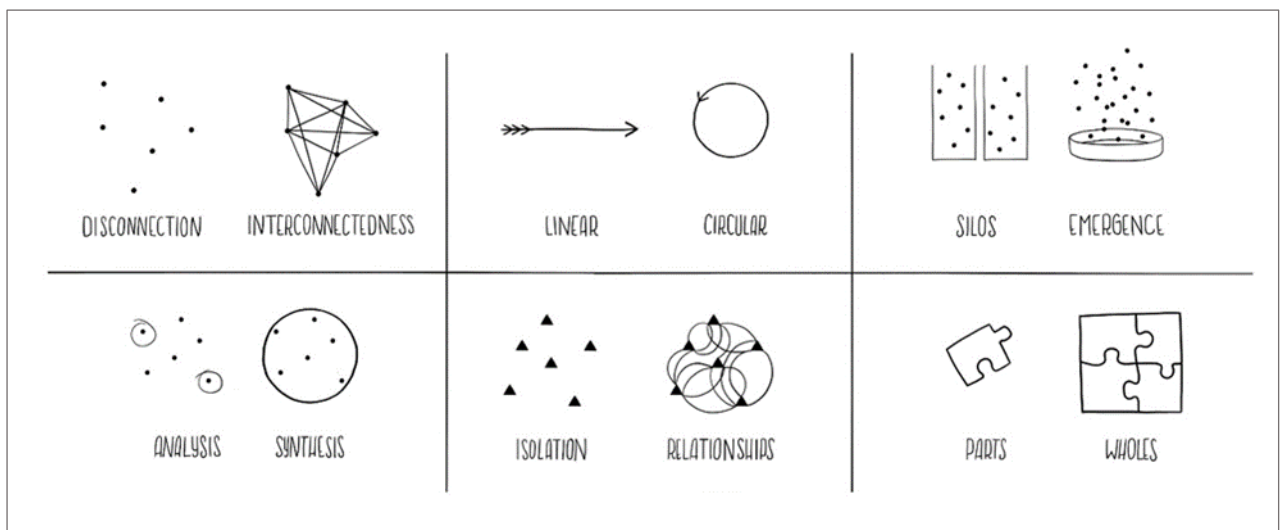
### 1.1 Introduction to SIA

System innovation approach (SIA) is defined as an interconnected set of innovations, where each influences the other, with innovation both in the parts of the system and in the ways in which they interconnect. By system, we refer to the interplay of sectors, activities and local actors impacted by climate change effects and consequences within given areas (i.e. the nine Case Studies) and specific focuses. For instance, if the focus is on the water-food-energy nexus, the system is comprised of food producers, energy providers, water management companies, policy makers, final consumers, as well as a myriad of other actors contingent to the local situation. The SIA is applied in ARSINOE for solving complex, multi-parameter problems. The emphasis is given on the functions of the cross-sectoral system “as a whole” and on the **variety of actors**, instead of just focusing on specific functions or individual/sectoral benefits.

SIA refers to an innovation process that uses systems thinking as both a philosophical and analytical tool to address complex systemic challenges, by examining the underlying structure of a system and viewing systems from a broad perspective that includes seeing overall structures, patterns and cycles within the system, rather than seeing only specific events in the system. This broad view can help to quickly identify the real causes of issues within the system and know just where to work to address them.

Through SIA, we understand and evaluate the interconnectedness within and among the System components (Figure 2) manifested through shared/common states of its agents-actors. These essential components signify decisions, decision makers, and stakeholders; resources; organizational setups; emergent behaviour; cultural identity; and time frame. In this course of action, visions of the future

describing the functions, order and means that are communicated and shared among stakeholders, aligning interests and framing problems as the process unfolds. Then, trajectories to face climate change challenges will be identified in collaborative living labs, and will enable experts, decision makers and stakeholders to a priori identify current or planned integrated systems that may be on the critical path and the best solutions to prevent the worst-case scenarios. Thus, the stakeholder and policy work feed the integration of climate adaptation with the biophysical and socio-economic modelling. The aim of engaging stakeholders throughout is maximizing knowledge transfer and engagement, facilitating uptake and enhanced decision-making.



**Figure 2** Visualizing Systems Thinking. Source: Acaroglu 2017.

Stakeholders are considered as part of the 3 tiers in ARSINOE. The primary long list of stakeholders circulated by case study leaders will permit to identify the tier 1 during the stakeholder mapping activity.

In Tier 1, CS stakeholders will be engaged in living labs, to facilitate participatory modelling development, analysis and validation of policy suggestions and climate-change innovation pathways.

In Tier 2, a wider constellation of interested stakeholders (local government, EC DGs, stakeholders in different regions) who wish to utilize the ARSINOE tools will be engaged as well as innovation companies that want their innovations to be incorporated in the marketplace / climate innovation window or that want to benefit from the ARSINOE Innovation bazaar funding scheme.

In Tier 3, a wide group of stakeholders will be identified for dissemination of outcomes, and could include neighbouring region / country authorities, business / private enterprises, and regional / national planning agencies.

## 1.2 Systems Innovation Approach and Living Labs

The SIA will be implemented within the context of Living Labs (LLs). LLs refer to user-centred, open innovation ecosystems based on systematic user cocreation approach, integrating research and innovation processes in real life communities and settings. The approach adopts an experiential learning

model, which brings together a core group of stakeholders to co-develop ideas, scenarios, and socio-technical solutions. This systemic co-creation approach integrates research and innovation processes in real life communities and settings, building on the stakeholders' experience to work through a cycle of observation, reflection, and innovation.

The LLs will be made up of approximately **12-15 stakeholders**, the final composition of which will vary depending on the focus of the various case studies and the outcome of the stakeholder mapping activity. The LLs are intended to provide the freedom and a “safe” place for the representatives to co-identify challenges, risks, and opportunities, explore innovative ideas, co-develop pathway(s) towards a common desirable future. **Thus, the LLs will form the focal point for the implementation of the System Innovations Approach (SIA).**

The main stages in the process of SIA during ARSINOE include:

1. **Defining the scope:** systems boundaries (spatial, temporal or conceptual), setting focus/objectives
2. **Mapping:** Mapping of the system including stakeholders, issues, and challenges
3. **Problem Definition:** Isolation and challenge statement
4. **Envisioning:** Outlining the desired future state/goal
5. **Backcasting:** Identification of Innovation Pathways working backwards from the Future Vision
6. **Building:** Elaboration of the Innovation pathways and identification of concrete actions

The process will be implemented at case study level within LLs, led by the case study leaders and with the support of the WP2 team. In complex/multi-site Case Studies, working groups involving local stakeholders will be implemented, to understand the local challenges that need to be tackled and gather input from all relevant perspectives.

### 1.3 ARSINOE SIA methodology implementation and timeline

The first step (Defining the scope) of the SIA takes place through stakeholder mapping activities and analysis. The stakeholder mapping is a collective activity, performed by the case study team, led by the CS leader and supported by the WP2 team. This activity was defined in detail in Deliverable 2.1. Details of this process can be found in section 2 of this document and have been reported thoroughly on deliverable D2.1.

Steps 2 through 5 (*Mapping, Problem definition, Envisioning, and Backcasting*) are carried out within the Living Lab framework. Within ARSINOE, Living Labs take the general form of a minimum of three mandatory workshops, scheduled every 6 months. Each workshop is meant to address a specific goal and produce precise outcomes. Living Labs act as open innovation spaces which foster co-creation with participants. Rather than a physical space, a Living Lab consists of a set of tools, a group of participants, and a temporal structure. Within ARSINOE, the Living Labs take the general form of three workshops, each one meant to address a specific goal. The main output of the first workshop is *mapping*. Drawing a mental map of the system, including stakeholders, issues and challenges, and formulating a first approach to problem definition in the form of a problem statement. This will serve as the basis for envisioning a future narrative for the region, the main activity to be carried out during the second workshop.

- **Workshop 1: *Mapping*.** Drawing a mental map of the system, including stakeholders, issues and challenges. Formulating a first approach to problem definition (problem statement). These outcomes serve as the basis for *envisioning* a future narrative for the region during the second workshop.
- **Workshop 2: *Envisioning*.** Refining the problem statement from Workshop 1. Outlining the desired future state/goal. Defining a timeframe for transformation. The future vision and timeframe are the basis for *backcasting* the necessary steps and milestones to achieve the desired goal.
- **Workshop 3: *Backcasting*.** Identification of pathways for resilience, adaptation and sustainability, working backward from the Future Vision produced in Workshop 2.

Beyond these goals, Living Lab workshops are also a platform for fostering discussion around ARSINOE’s open calls for tenders carried out by WP5. The objective is to shape the content of the calls from each LLs expressed needs and desires. Workshop participants are invited to get involved in the Open Call process within an Open Innovation strategy: co-writing the text of the call with CS and WP5 leaders, participating in the call with their own innovations, spreading the word, etc.

Innovations selected through WP5’s Open Calls for Tenders are the basis for step 6, *Building*. Whilst building comprises many dimensions, a part of what is necessary will take the form of social or technical innovations partially or totally funded through ARSINOE’S budget. Case Studies will have 2.5 years to implement selected innovations.

The following figure illustrates interactions between LL workshops and Open Calls for tenders. Other WP2 tasks carried-out in parallel are also represented.

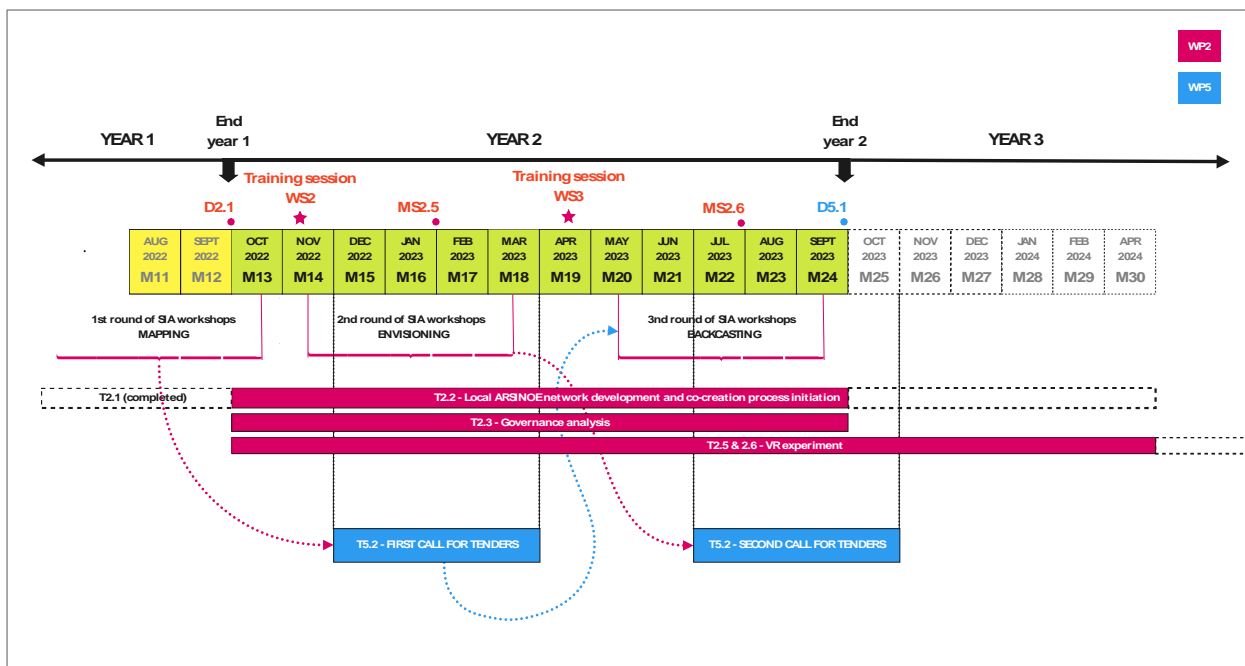


Figure 3 Overview of interactions between Living Labs and Open Calls for Tenders.

## 2.0 STAKEHOLDER IDENTIFICATION AND MAPPING

This chapter presents a summary of the individual actions in the stakeholder mapping at the overarching WP level. The process is led by the case study leader, in collaboration with the case study team and supported by the WP2 team.

### 2.1 Case study elaboration

The first step in the stakeholder identification and mapping process is the definition of the context. In the case of ARSINOE, the context setting is already mostly done as the main challenges to be tackled in each case study have been defined in the preparation phase of the project. These main objectives will form the basis of the systems innovation work going forward. The main objectives were confirmed when starting the preparations for each of the living labs.

### 2.2 Stakeholder identification

The second step is to identify the main sectors relevant to the case study, based on the focus of each case study. Within these sectors, key stakeholders need to be identified. The stakeholder identification outcomes will be compiled in the long list of stakeholders for each case study. The long list identifies key stakeholders within each relevant sector and organises them in different categories from the Quintuple Helix: Business/Industry, Government/Policy Makers, Research/Academia, Citizens, NGOs. The initial long-list drawn up by the case study team may be further extended based on input from stakeholders during the LL workshops (Table 1). The methodology for stakeholder identification comprises a desk study and a literature review, followed by a critical dialogue based on CS leader knowledge of local context.

- i) The starting point is **the identification of sectors and sub-sectors** (e.g. looking at the whole value chain of the water sector, from suppliers, users to managers). [See Table 1 for indicative examples]
- ii) The second step will be to identify the relevant categories of stakeholders representing those sectors. [See Table below for indicative examples]
- iii) The third step will be to identify key stakeholders representing those categories.

To help case study leaders to establish the initial long list of stakeholders, the following instructions were prepared:

- First of all, synthesize the main challenges and objectives of the case study in few sentences.
- Then provide an exhaustive list of sectors concerned by these challenges and objectives.
- For each sector, provide a stakeholder identification list (Template in Table 2.1). This is the “long list of stakeholders” (submitted as MS2 Month 4). It is an extensive pre-selective list of stakeholders that maps all potential stakeholders implicated in the issues the case study wants to tackle within ARSINOE.

NB: Contact details do not need to be included at this stage and can be added after the short list has been drawn up.

**Table 1** Stakeholder Identification Template

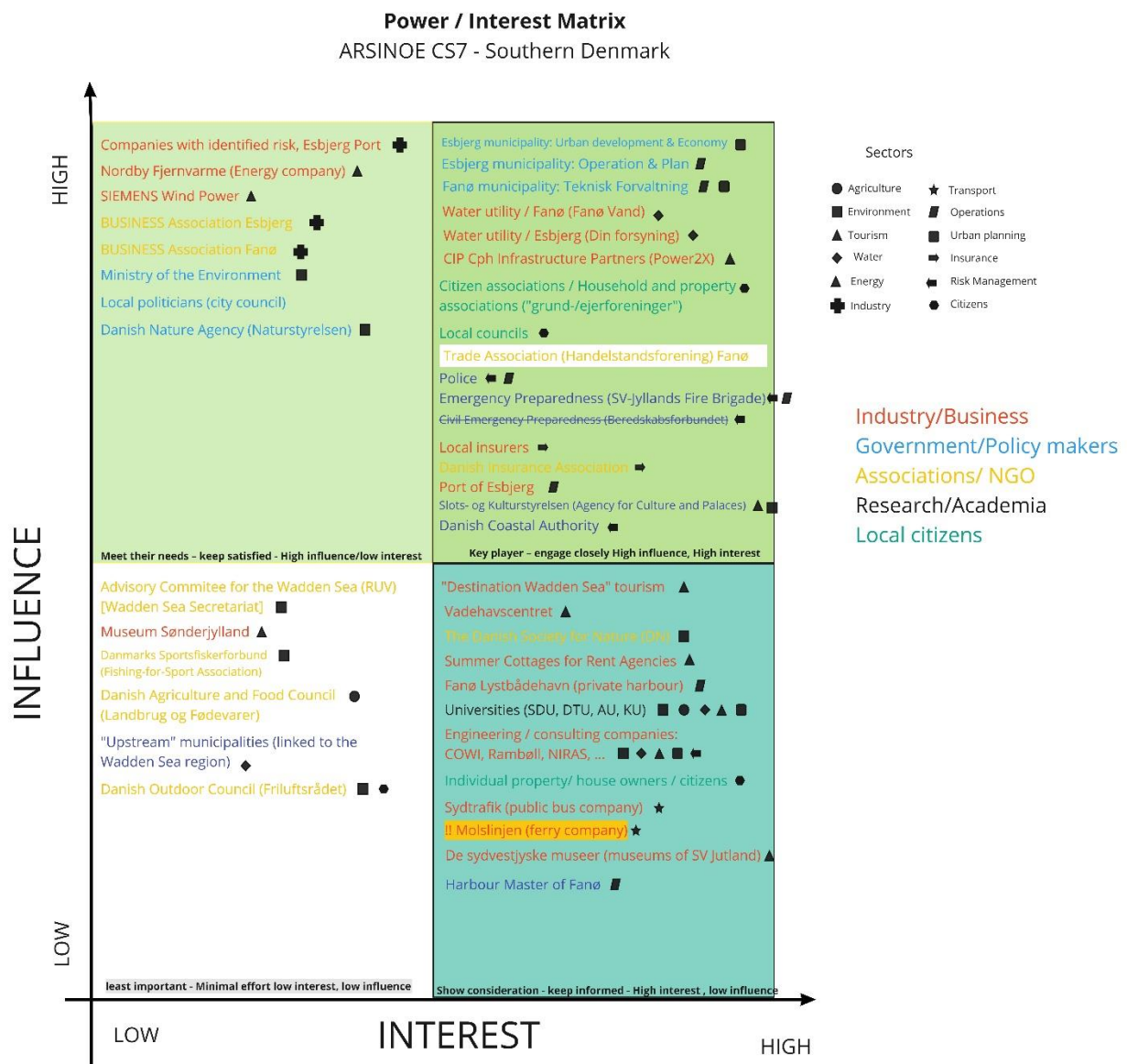
Case Study		<i>[Number and Title of the Case study]</i>		
<b>Background:</b> <i>[Paragraph providing an overview of the case study describing the context, location, focus and main issues/challenges]</i>				
<i>[Map of case study area]</i> <i>[Illustrative/representative image of the case study]</i>				
<b>Objectives:</b> <i>[List main objectives of the case study]</i>				
<b>Current activities:</b> <i>[Existing or ongoing projects/activities related to the case study focus that ARSINOE can build on]</i>				
Stakeholders				
Sector	Category	Name of Stakeholder or Organisation	Scale	Existing Contact
<i>[e.g. Water sector, Energy sector, Construction sector, Tourism sector, Agriculture sector, Maritime sector etc.]</i>	<i>[Business/Industry, Government/Policy Makers, Research/Academia, Local Citizen, NGO/Association]</i>	<i>[ e.g. National Ministry of Water Resources]</i>	<i>[Local, National, Regional/International]</i>	<i>[Yes/ No]</i>

## 2.4 Stakeholder mapping and analysis

The third step in the process is the mapping of the stakeholders. The aim of stakeholder mapping is to determine a certain level of interactions between stakeholders on the **long list of stakeholders**. Following the development of the long list of stakeholders at case study level (MS2), case study leaders were asked



to use a mapping process to create a short-list, prioritising stakeholders to be engaged in the project. For the mapping process an “**influence/interest matrix**” (Figure 2.3) is used, where Influence vs. Interest is plotted for the identified stakeholders. In this context influence is defined as “**how much power and capacity the stakeholder has to effect change**” and interest is defined as “**how likely the stakeholder is to engage in activities or initiatives relevant to the case study focus; this may be due to resultant benefit or adverse impact**” (Eden and Ackermann, 1998).



**Figure 4** Example of Influence/Interest mapping in the matrix for one ARSINOE case study (CS7, Southern Denmark)

There is a validation process for this influence/interest matrix. For this, the initial plotting based on input from project scientists and local partners is further revised by an external observer selected by the CS team (e.g. project advisory board members, or other local experts), who provides feedback on the initial selection and suggests improvements.

On the basis of these results, the **short-list of stakeholders** can be determined: The stakeholders within the **upper right quadrant (high influence/high interest) constitute the core group of stakeholders within the context of the case study and will serve as the basis for recruiting LL participants**. In addition to these core stakeholders, consideration is also given to the inclusion of stakeholders at the upper limits of the top left and the bottom right quadrants.

The analysis of stakeholders based on this matrix allows for the identification of stakeholders to whom the work is most relevant and who are most likely to be engaged in the research process. While it is advantageous to utilize the LLs as an opportunity to engage influential decision-makers, the examination of ‘Interest’ also allows for the identification of those stakeholders who will invest time and effort into supporting the research process (Brugha and Varvasovszky, 2000; Mendelow, 1981).

**The outputs of this phase are described in detail for each case study in Deliverable 2.1.**

## 2.5 Feedback on stakeholder selection

As a fourth step in the process of stakeholder identification and mapping, the WP2 team gave feedback on the long list aimed at ensuring all relevant types of actors from the sectors relevant for the ARSINOE Living labs are represented and to verify the actual relevance of all listed sectors for the case study. This check was focussing also on inclusion of the representatives of pre-identified key sectors in the mapping and plotting (pre-identified key sectors are reported detailed in MS3).

The WP2 team reviewed the whole methodology of plotting each stakeholder from the initial Long List, on the influence/power matrix and started the actual plotting with the CS leaders to get them familiar with the process. Stakeholders are plotted in the matrix in a pre-defined color code corresponding to the category of stakeholders (Industry/business; Government/Polymakers; Research/Academia; NGO/Association; Civil Society) and assigned a symbol representing the sector they belong to. Categories and sectors can be added depending on the case study requirement.

CS leaders were given a month to complete the. As soon as the mapping was completed, an external reviewer with knowledge of the case study area/issues reviewed it as part of the validation process. The goal of such reviewers is to bring an outside perspective and confirm that the general mapping reflects the main actor’s interplay within the system. Case study leaders were free to select the relevant person for this validation phase. WP2 team members then reconvened with each CS leader, first to validate the mapping, and then to proceed with the final selection of the 15 stakeholders to be invited to take part in the Living Lab’s workshops.

**Table 2** Dates of first WP2 feedback sessions with Case Study leaders

ARSINOE Case study	Case study name	Date
CS1	Athens	15/02/2022
CS2	Mediterranean Ports	08/02/2022
CS3	Main River	22/02/2022
CS4	Orhid/Prespa Lakes	24/02/2022
CS5	Canary Islands	23/02/2022
CS6	Black Sea	24/02/2022
CS7	Southern Denmark	24/02/2022
CS8	Torbay&Devon County	22/02/2022
CS9	Sardinia	17/02/2022

Table 3 Dates of second WP2 feedback sessions with Case Study leaders

ARSINOE Case study	Case study name	Date
CS1	Athens	17/03/2022
CS2	Mediterranean Ports	17/03/2022
CS3	Main River	03/03/2022
CS4	Orhid/Prespa Lakes	17/03/2022
CS5	Canary Islands	11/03/2022
CS6	Black Sea	10/03/2022
CS7	Southern Denmark	17/03/2022
CS8	Torbay&Devon County	10/03/2022
CS9	Sardinia	11/03/2022

A detailed account of the work done during these two sessions can be found in Milestone MS20.

## 2.6 Discussion and Conclusions

Mapping all stakeholders from the long list of stakeholders is a necessary process to ensure the stakeholder engagement throughout the whole project. Furthermore, in the case of unavailability or lack of interest of stakeholders initially selected, it facilitates the identification of a replacement. Other stakeholders will most likely be involved through other forms of engagement (survey, interviews).

This mapping is an iterative process and might evolve following the first interactions within the workshops of the living labs, where new elements are likely to come up, affecting the perception of CS leaders regarding the degree of interest and power/influence of certain stakeholders. In that case, new stakeholders will be added to the long list and based on updated mapping might be asked to join the workshops.

All case studies timely and successfully completed this task following the methodology proposed by WP2. The process helped with clarifying the main issues at stake and narrowing the challenge(s) to focus on and with preparing for the next steps of the SIA implementation. It allowed the case study teams to identify stakeholders beyond their usual network of collaborators. While this can be sometimes challenging, the involvement of an external validator helped to broaden the mapping of stakeholders.

The process of defining the focus of the different living labs shifted perceptions of individual stakeholders' influence and interest, challenging conventional assumptions on leverage points for implementing transition strategies. **This is an important step towards developing a systemic approach to climate change adaptation through guiding principles based on SDGs.**

## 3.0 CONVENING THE LIVING LABS

Living Labs are a participatory research tool which bring together a collective of key stakeholders to explore a focal issue. Each case study organises its own living lab. Transboundary case studies (CS2, CS4 and CS6) involving more than one location (and often several languages) face more complex challenges involving the interplay between local goals and conditions and regional challenges. Therefore, CS2 (Mediterranean ports), CS4 (Orhid and Prespa Lakes) and CS6 (Black Sea) have organized national working groups to carry out preparatory activities ahead of transnational Living Lab workshops. Working groups take place in local languages and have a more flexible structure depending on specific opportunities and constraints.

Before the actual workshops can take place, WP2 proposed a series of preparatory activities and materials. Details on this process are provided in the following sub-sections. A detailed account of each workshop can be found on section 4 of this document.

### 3.1. Training sessions

Three training sessions were organized to prepare case study teams for the following steps. A fourth and last one dedicated to the third workshop (backcasting). is scheduled after this reporting period (on May 3<sup>rd</sup>, 2023).

A training workshop on SIA for case study leaders took place in Tours, France, at the Maison des Sciences de l'Homme, CNRS CITERES laboratory headquarters, on March 22<sup>nd</sup> and 23<sup>rd</sup>, 2022. Representatives of 8 out of 9 case studies were able to attend, amounting to a total of 19 participants.

**Table 4** 1<sup>st</sup> (in person) training session list of participants

Case study number and name	Participating members
CS1 - ATHENS	Giannis Adamos, Alexandra Spyropoulou
CS2 - MEDITERRANEAN PORTS	Laura Morcillo, Conrad Landis, Alexandros Charalambides
CS3 - MAIN RIVER	Gunnar Braun, Marion Zilker
CS4 - PRESPA/OHRID LAKES	Suzana Kasovska Georgieva, Orfeas Rousos, Slavica Trajkovska
CS5 - CANARY ISLANDS	Noelia Cruz, Juan Carlos Santamarta
CS6 - BLACK SEA	Nicolaos Theodossiou
CS7 - SOUTHERN DENMARK	Bodil Ankjaer Nielsen, Martin Drews
CS8 - TORBAY & DEVON COUNTY	–
CS9 - SARDINIA	Marco Dettori
OTHER PARTICIPANTS	Isabelle La Jeunesse, Carola Moujan, Alice Guittard, Ebun Akinsete

**Table 5** Workshop agenda

DAY 1 – TUESDAY 22 <sup>nd</sup> MARCH	
8:30 – 9:00	Arrival and registration
9:00 – 9:30	Welcome and Intro Round (All)
9:30 – 9:45	Training Overview and Agenda (Isabelle)
9:45 – 10:00	Presentation on SIA (Ebun)
10:00 – 10:15	Outline of the Workshops and connections to WPs (Alice)
10:15 – 10:30	WP5 Presentation (Isabelle)
10:30 – 10:45	GDRP and Ethical considerations (Ebun)
10:45 – 11:15	First Thoughts: Q&A
11:15 – 11:30	Coffee Break
11:30 – 11:45	Presentation of Workshop 1 + Q&A (Ebun)
11:45 – 12:00	Presentation of Workshop 2 + Q&A (Alice)
12:00 – 12:15	Presentation of Workshop 3 + Q&A (Ebun)
12:15 – 13:45	Lunch
13:45 – 14:45	Presentation of the CSs

14:45 – 15:15	Present the Mock CS & Assign Roles
15:15 – 15:30	Coffee Break
15:30 – 16:30	Mock Workshop 1: Scoping, Objective Setting and Mapping
16:30 – 17:00	Feedback session
<b>DAY 2 – WEDNESDAY 23<sup>rd</sup> MARCH</b>	
8:30 – 9:30	Mock WS 2: Problem Definition and Envisioning (8.30 START)
9:30 – 10:00	Feedback session
10:00 – 10:15	Coffee Break
10:15 – 11:15	Mock WS 3: Innovation and Backcasting
11:15 – 11:45	Feedback session
11:45 – 12:45	Open session 1
12:45 – 13:00	Training Wrap up session
13:00 – 14:30	Lunch
14:30 – 15:30	Open session 2

To train case study team members who could not attend in person, an online session summarizing key points from the Tours workshop was organized on May 3<sup>rd</sup>, 2022 13:45 – 17:00 CET. A total of 27 participants representing the 9 case studies participated in this online workshop.

Table 6 2<sup>nd</sup> (online) training session list of participants

<b>Name</b>	<b>Case Study/ Work package number</b>
Olympia Nisiforou	CS2
Sarah Ward	CS8
Maria Paraschiv	CS1
Glen Lumani	CS4
Isabelle La Jeunesse	WP2
Teresa Pérez Ciria	CS3
Pinar Uygurer	WP5
Albert Chen	CS8
Kate Baker	CS8
Carola Moujan	WP2
Gloria Salmoral	WP5
Nensi Lalaj	CS4
Ebun Akinsete	WP2
Yordan Zdravkov	CS6
Alice Guittard	WP2
Alexandra Spyropoulou	CS1
Nikolaos Mellios	CS1
Sophia Papageorgiou	CS1
Charis Stavridis	CS6
Conrad Landis	CS2
Dimitris Kofinas	CS1
Chrysi Laspidou	CS1
Valentina Mereu	CS9
Isabel Gamallo Paz	CS5
Veliana Zlateva	CS4

Bukem Belen	CS6
Dimitra Frysalis	CS6

**Table 7** 2<sup>nd</sup> (online) workshop agenda

8:30 – 9:00	Arrival and registration
9:00 – 9:30	Welcome and Intro Round (All)
9:30 – 9:45	Training Overview and Agenda (Isabelle)
9:45 – 10:00	Presentation on SIA (Eburn)
10:00 – 10:15	Outline of the Workshops and connections to WPs (Alice)
10:15 – 10:30	WP5 Presentation (Isabelle)
10:30 – 10:45	GDRP and Ethical considerations (Eburn)
10:45 – 11:15	First Thoughts: Q&A
11:15 – 11:30	Coffee Break
11:30 – 11:45	Presentation of Workshop 1 + Q&A (Eburn)
11:45 – 12:00	Presentation of Workshop 2 + Q&A (Alice)
12:00 – 12:15	Presentation of Workshop 3 + Q&A (Eburn)
12:15 – 13:45	Lunch
13:45 – 14:45	Presentation of the CSs
14:45 – 15:15	Present the Mock CS & Assign Roles
15:15 – 15:30	Coffee Break
15:30 – 16:30	Mock WS 1: Scoping, Objective Setting and Mapping
16:30 – 17:00	Feedback session
<b>DAY 2 – WEDNESDAY 23<sup>rd</sup> MARCH</b>	
8:30 – 9:30	Mock WS 2: Problem Definition and Envisioning (8.30 START)
9:30 – 10:00	Feedback session
10:00 – 10:15	Coffee Break
10:15 – 11:15	Mock WS 3: Innovation and Backcasting
11:15 – 11:45	Feedback session
11:45 – 12:45	Open session 1
12:45 – 13:00	Training Wrap up session
13:00 – 14:30	Lunch
14:30 – 15:30	Open session 2

To refresh LL facilitators' memories of the previous training sessions, and develop more in-detail activities to be carried out during Workshop 2, a third online training session was held on November 7<sup>th</sup>, 10-12 CET. A total 29 participants from 9 case studies attended this session.

**Table 8** 3<sup>rd</sup> (Online) workshop agenda

10.00 – 10.15	Welcome and intro
10.15 – 10.30	Recap on SIA and steps taken so far
10.30 – 10.40	Q&A
9:45 – 10:00	Break
10:00 – 10:15	Review of Workshop 2 Activities and Guidelines
10:15 – 10:30	Discussion and questions
10:30 – 10:45	Feedback and closing

**Table 9** 3<sup>rd</sup> (online) training session list of participants

Name	CS/WP
Alice Guittard	WP2
Isabelle La Jeunesse	WP2
Carola Moujan	WP2
Ebun Akinsete	WP2
Gerardo Anzaldúa	WP5
Suzana Kasovska Georgieva	WP5
Miraç Gül	CS6
Bodil Ankjær Nielsen	CS7
Dijana Likar	CS4
Petar Petrov	CS6
Orfeas Rousos	CS4
Mike Wood	CS8
Dave Stewart	CS8
Pavlos Filippidis	CS6
Mercedes De Juan Muñozerro	CS2
Marion Zilker	CS3
Sophia Papageorgiou	CS1
Alexandra Spyropoulou	CS1
Olympia Nisiforou	CS2
Gunnar Braun	CS3
Joselin Sarai Rodríguez Alcántara	CS5
Noelia Cruz Pérez	CS5
Ioannis Adamos	CS1
Gloria Salmoral	WP5
Vanessa Chala	CS2
Haris Biskos	CS6
Chrysi Laspidou	CS1
Dimitris Kofinas	CS1
Kate Baker	CS8
Nikolaos Mellios	CS6
Giulia Urracci	CS9
Valentina Mereu	CS9
Conrad Landis	CS2
Nikolaos Theodosiou	CS6
Martin Drews	CS3

Charis Starvid	CS6
Marco Dettori	CS9
Sarah Ward	CS8
Raul Wood	CS3

### 3.2 Pre- and post-workshop 1 meetings with CS teams

To adapt the methodology to each CS's specific needs and resources, several one-to-one work sessions took place between May and September 2022.

During pre-workshop sessions, WP2 assisted each team in designing and planning the different activities, whereas post-workshop sessions were dedicated to reviewing and analysing the workshop outcomes and to providing support for the preparation of the WP2 workshop report.



**Table 10** Dates of each CSs' work sessions with WP2 and of 1<sup>st</sup> LL workshops

	Case study name	Date of 1 <sup>st</sup> workshop in 2022	Final review w/WP2	Post-workshop meeting
CS1	Athens	May 27th	24th May	June 28th
CS2	Medit Ports 1 - Piraeus LL	September 6th	29th Aug	30/09/2022
	Medit Ports 2 - Valencia LL	July 6th	27th June	August 1st
	Medit Ports 3 - Cyprus LL	July 4th	27th June	August 1st
CS3	Main River	July 15th	July 7th	July 22nd
CS4	Prespa / Ohrid Lakes - North Macedonia	July 8th	July 4th	July 18th
	Prespa / Ohrid Lakes - Albania	August 10th	July 22nd	September 7th
	Prespa / Ohrid Lakes - Greece	July 8th	July 1st	July 18th
	Prespa / Ohrid Lakes - International	September 23rd	September 7th	September 30th
CS5	Canary Islands	June 21st	June 13th	July 8th, 13th, September 6th
CS6	Black Sea - Bulgaria	September 9th	August 30th	October 10th
	Black Sea - Romania	September 14th	August 30th	September 26th
	Black Sea 3 - Turkey combined with Istanbul BRIDGE LL	September 15th	August 30th	September 23rd
	Black Sea - International (lead by Greek team)	October 17th	October 7th	November 2nd
CS7	Southern Denmark	October 11th	September 15th & 20th	September 29th
CS8	Torbay&Devon county	September 22nd	September 7th	September 28th
CS9	Sardinia	September 27th	September 20th	September 29th

### 3.3 Guidelines for Workshop 1

WP2 team circulated a 27-page illustrated document entitled 'a step-by-step comprehensive description of the different steps of the process and how to prepare for the next steps' to project partners on May 13<sup>th</sup> 2022. The document provides guidelines for organising the first workshops, including useful tips for handling situations that might arise during workshops, as well as a glossary of key terms and a bibliography. Furthermore, it includes a set of appendices to further assist teams with preparation tasks, such as invitation and reporting templates, and a list of Frequently Asked Questions collected during the training sessions. The table of contents of the document is provided in Figure 3.1.

**Table 11** Guidelines for Workshop 1’s Table of Contents

<b>TABLE OF CONTENTS</b>	
EXECUTIVE SUMMARY .....	4
1. INTRODUCTION.....	5
1.1 What is the System Innovation Approach?.....	5
1.2 What are Living Labs?.....	6
1.3 Working groups.....	6
2. BEFORE THE FIRST WORKSHOP .....	7
2.1 Initiating Contact with the Stakeholders.....	7
2.2 Organise the facilitation team .....	7
2.3 Decide on workshop details .....	7
2.1 Key Themes.....	8
2.2 Workshop Invitations and Informed Consent Forms .....	8
2.3 WP2 Pre-workshop meeting .....	8
2.4 Optional Activities.....	8
3. DURING THE WORKSHOP .....	10
3.1 Workshop 1 – Mapping, Scoping and Objective Setting .....	10
3.2 Workshop Objectives .....	10
3.3 Activities .....	11
3.4 Manage conflicts.....	12
4. AFTER THE WORKSHOP.....	13
4.1 WP2 Post-workshop meeting.....	13
4.2 Refine Mental Maps.....	13
4.3 In-between workshops.....	13
4.4 Before the next workshop.....	14
GLOSSARY OF KEY TERMS .....	15
REFERENCES AND FURTHER READING.....	16
APPENDICES .....	18

### 3.4 Standard agenda for the first round of Living Lab workshops

Below is the draft agenda showing the standard elements that should be part of all 1<sup>st</sup> LL workshops. It was used by CS teams as a guide for developing their own workshop agendas. Since each CS has its own objectives and history in engaging with stakeholders, additional sessions, and activities can be added to this framework.

**Table 12** Standard agenda for first round of LL workshops

30 min	Welcome and Introductions of participants
10 min	Agenda and Objective of the Workshop
10 min	Introduction to ARSINOE
20 min	Introduction to the Case Study
10 min	Living Lab concept and objectives
10 min	Break
60-90 min	<b>Mental mapping</b>
30 min	Conclusion: setting the LL objectives

### 3.5 Reporting template for workshop 1

To assist LL facilitators with notetaking, reporting on activities between workshops, and the preparation of the post-workshop sessions with WP2, a reporting template was provided.



#### SIA Workshop 1 Reporting Template

Deadline for workshops held in June & July: September 9<sup>th</sup>


Deadline for workshops held in September: October 14<sup>th</sup>.

**Table 1: To be completed by CS teams who carry out a separate event before workshop 1**

PRE-WORKSHOP EVENT <i>*If applicable</i>	
1. Case Study	[Athens]
2. Format	[Type of event. E.g. coffee morning, focus group, working lunch etc.]
3. Date and Time	[dd/mm/yyyy, HH:MM – HH:MM]
4. Location	[Venue, City]
5. Notes	[General Notes, main discussion points]
6. Action Points	[Main conclusions]
ATTENDEES	
Role	Organisation
1. ...	
2. ...	

**Table 2: To be used as a guide for the note taker during the workshop**

WORKSHOP NOTES	
1. Case Study	[Athens]
2. Date and Time	[dd/mm/yyyy, HH:MM – HH:MM]
3. Location	[Venue, City]
4. Living Lab Focus	[What is the central focus of the LL?]
5. Key Themes	[Pre-selected key themes to start the mapping]
6. Mental Mapping	
Main Sectors	[e.g. water, energy, agriculture, education]
Key Challenges	[main problems within the system]
Key Actors	[individuals or organisations that are mentioned during discussion]
Positive Relationships	[positive impacts, synergies, collaborations]
Negative Relationships	[negative impacts, trade-offs, competition]
Innovations or solutions	[existing innovations that may be mentioned during discussion]



<b>7. Living Lab Objectives</b>	1. ... 2. ... ...	
<b>8. Stakeholder Gaps</b>	1. <i>[additional LL participants to be invited to Workshop 2]</i> 2. ... ...	
<b>9. Additional Documentation</b>	1. <i>Living Lab Mental Map (Miro board)</i> 2. <i>Agenda</i> 3. <i>Pictures of the Mental Mapping process (at least one good image of the finished map) and Facilitators in action [NOT participants' faces]</i>	
<b>ATTENDEES</b>		
<b>Role</b>	<b>Organisation</b>	<b>Notes</b>
1.		<i>[interested in taking part in other ARSINOE activities, resistant to the process, motivated, neutral, quiet etc]</i>
2.		
3.		
...		

**Table 3: To be completed jointly with the WP2 team during the post-workshop meeting**

<b>POST WORKSHOP ANALYSIS</b>	
<b>1. System Map Analysis</b> <i>*following the digitisation of the mental map</i>	
Central Themes	<i>[e.g. water, energy, agriculture, education]</i>
Main Sectors	<i>[e.g. water, energy, agriculture, education]</i>
Key Challenges	<i>[main problems within the system]</i>
Key Actors	<i>[individuals or organisations that are mentioned during discussion]</i>
Key Relationships (Positive)	<i>[positive impacts, synergies, collaborations]</i>
Key Relationships (Negative)	<i>[negative impacts, trade-offs, competition]</i>
Innovations or solutions	<i>[existing innovations that may be mentioned during discussion]</i>
<b>2. Core Themes</b>	
<b>3. Problem Statement</b>	
<b>WORKSHOP 2 PREPARATION</b>	
<b>1. Time horizon for Future Narrative</b>	
<b>2. Relevant SDG Targets</b>	

Figure 5 Reporting template for workshop 1

### 3.6 Mental mapping outputs

After the first round of workshops had been carried out in each case study, detailed reports, problem statements, and maps of the systems were provided by CS teams. All Case Study teams produced a refined mental map based on the drafts produced during workshops; individual maps and detailed comments per Case Study are presented in Section 4 of this document.

Based on the outcomes and needs of each group, tailor-made activities were designed and carried out by CSs before the second round of SIA workshops, scheduled to take place between November 2022 and March 2023.

### 3.7 Observations after the first round of workshops

A comparison of the process and outcomes of this first round of workshops in the 9 ARSINOE case studies leads to the following main conclusions.

First of all, the learning methodology adopted in ARSINOE has helped to better focus the issues of each case study. The case studies were satisfied with this first round and are on track for the next stage. In particular, it was noted that facilitators who attended the face-to-face training felt more confident in conducting WS. Therefore, this training was really necessary and encourages face-to-face training meetings as much as possible.

With regard to the workshop itself, although the impact of the number of stakeholders may be very case-specific, it was observed that too few stakeholders for the first workshop means that gaps have to be filled for the next one, especially when not all sectors have been represented. Conversely, too many stakeholders generally increase the difficulty of the mapping exercise. In addition, at least two facilitators are needed to lead the workshop and take notes for the report. And indeed, the workshop report seems to be important not only for the follow-up by WP2 but also very much for the teams themselves, as the synthesis allows a clear vision of the next steps. In particular, it was found by the WP2 team that for each workshop it is necessary to organise at least 2 individual meetings between the case studies and WP2 before (workshop preparation phase) and 2 additional individual meetings after the workshop (workshop debriefing phase and definition of next steps).


### 3.8 In between WS1 and WS2

After the first round of workshops, detailed reports and maps of the systems were provided by CS teams. Based on the outcomes and needs of each group, tailor-made activities specific to each situation were designed and carried out before the second round of SIA workshops (required to take place, following the amended Grant Agreement, between December 2022 and February 2023).

In addition, to prepare the second workshop, a new online training session was held between October and November 2022, and implementation guidelines were circulated in mid-November. One-on-one meetings were also be conducted between each CS and the WP2 team to prepare the second WS.

### 3.9 Guidelines for Workshop 2

Following what had been done to prior to WS1, WP2 team circulated a 21-page illustrated document entitled 'a step-by-step comprehensive description of the different steps of the process and how to prepare for the next steps' to the project partners on October 28<sup>th</sup>, 2022. This guideline include useful tips for handling situations that might arise during workshops, as well as a glossary of key terms and a bibliography. It also includes a set of appendices to further assist teams with preparation tasks, such as invitation and reporting templates, and an updated list of Frequently Asked Questions collected during the training sessions.


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### TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY .....	4
2.0 INTRODUCTION .....	4
3.0 BETWEEN WORKSHOPS 1 AND 2 .....	5
4.0 PREPARING FOR WORKSHOP 2 .....	7
5.0 DURING THE WORKSHOP .....	9
6.0 AFTER THE WORKSHOP .....	12
7.0 GLOSSARY OF KEY TERMS .....	14
8.0 REFERENCES AND FURTHER READING .....	16
9.0 APPENDICES .....	18

Figure 6 Guidelines for Workshop 2 - Table of Contents

### 3.10 Defining guiding principles

A list of ‘Guiding Principles’ (words or short phrases) serves as inspirational building blocks with which to develop the Future Narratives within second LL workshops. These Guiding Principles were extracted from relevant SDG targets.

In the 1<sup>st</sup> workshop report, CSs included a list of relevant SDGs and targets connected to the main topics discussed with stakeholders during workshop 1. **SDG targets are used as a way to provide a consistent framing for envisioning and backcasting** (the core activities to be performed during WS2 and 3), the “golden thread” that will keep discussions aligned with ARSINOE’s general goals. **Selecting appropriate SDG targets also helps CSs prioritize specific topic areas where impact can be maximized.**

Prior to pre-workshop meetings with WP2, CS teams extracted key words and phrases from their chosen SDG targets which represent the goals and values upon which the LL can construct its Future Narrative. The list was further refined with the help of WP2 during preparatory meetings.

### 3.11 Standard agenda for the second round of Living Lab workshops

As it had been done for the first round of workshops, a standard agenda including the core activities that should be a part of all 2<sup>nd</sup> LL workshops was provided by WP2 to all CSs. It was used by CS teams as a guide for developing their own workshop agendas.

**Table 13** Standard agenda for second round of LL workshops

15 min	Welcome and Introductions of participants (especially new ones). Reminder of Living Lab concept, objectives, and process; brief summary of activities carried out between first and second workshops
5 min	Agenda and Objective of the Workshop
20 min	Present and validate the refined mental map
10 min	Consensus on problem statement
15 min	<b>Envisioning Part 1: Validating guiding principles</b>
15 min	Break
45 min	<b>Envisioning Part 2: Future Narrative</b>
15 min	<b>Feedback to the group</b>
10 min	Break
45 min	Merging and discussion of future narratives
20 min	Conclusion and next steps

### 3.12 Reporting template for workshop 2

Following the same approach developed for WS1, WP2 provided a reporting template to assist LL facilitators with notetaking, reporting on activities between workshops, as well as to prepare the post-workshop sessions with WP2. The template also included an appendix with examples of future narratives produced in previous projects to serve as guidance for LL facilitators.





### SIA Workshop 2 Reporting Template

Deadline for 2<sup>nd</sup> workshops held in 2022: January 15<sup>th</sup>.

Deadline for 2<sup>nd</sup> workshops held between January and March 2023: April 15<sup>th</sup>.

**Table 1: To be completed by CS teams who carry out activities between workshops 1 and 2**

EVENT <i>*If applicable</i>	
1. Case Study	<i>[Athens]</i>
2. Format	<i>[Type of event. E.g. coffee morning, focus group, working lunch, online meeting etc.]</i>
3. Date and Time	<i>[dd/mm/yyyy, HH:MM – HH:MM]</i>
4. Location	<i>[Venue, City]</i>
5. Notes	<i>[General Notes, main discussion points]</i>
6. Action Points	<i>[Main conclusions]</i>
ATTENDEES	
Role	Organisation
1. ...	
2. ...	

**Table 2: Other collective initiatives/activities carried out between workshops 1 and 2**

ACTIVITY	
Format	<i>[Type of initiative: newsletter, blog, collaborative mapping..., small working groups, conferences]</i>
Date and Time *	<i>[dd/mm/yyyy, HH:MM – HH:MM]</i>
Location*	<i>[Venue, City]</i>
Frequency*	
Presenters/guest speakers*	
Content	<i>[Brief description of topics addressed, abstract of the session...]</i>

*\*If applicable*



<b>First name</b>	
<b>Role within organization</b>	
<b>Sector</b>	
<b>Date and Time</b>	<i>[dd/mm/yyyy, HH:MM – HH:MM]</i>
<b>Location</b>	<i>[Venue, City]</i>
<b>Frequency*</b>	
<b>Main outcomes</b>	<i>[Brief description of topics addressed, key takeaways...]</i>

\*If applicable

**Table 4: To be used as a guide for the note taker during the workshop**

WORKSHOP NOTES	
<b>1. Case Study</b>	<i>[Athens]</i>
<b>2. Date and Time</b>	<i>[dd/mm/yyyy, HH:MM – HH:MM]</i>
<b>3. Location</b>	<i>[Venue, City]</i>
<b>4. Problem statement at the beginning of the workshop</b>	<i>[As stated on previous report]</i>
<b>5. Key Drivers</b>	<i>[main variables/dominant sectors/central processes, as they appear in the map]</i>
<b>6. New Drivers (if any)</b>	<i>[any significant new variable added to the map during the validation process]</i>
<b>7. Problem statement after consensus</b>	<i>[Final version of the problem statement]</i>
<b>8. Relevant SDG targets</b>	<i>[Selected by the CS team]</i>
<b>9. Envisioning part 1</b>	
Guiding principles	<i>Work done on SDGs targets (please refer to the <a href="#">SIA guidelines for WS2</a>, page 7 for details)</i>
Key Actors	<i>[individuals or organisations that are mentioned during discussion]</i>
<b>10. Envisioning part 2</b>	
Future narrative group 1	
Future narrative group 2	
Future narrative group 3	



Diverging viewpoints (if any)	
...	
Merged narrative (See appendix below for examples)	
Positive Relationships	<i>[positive impacts, synergies, collaborations to agree on the narrative]</i>
Negative Relationships	<i>[negative impacts, trade-offs, competition during the narrative setting]</i>
<b>11. Stakeholder Gaps</b>	<ol style="list-style-type: none"> <li>1. <i>[additional LL participants to be invited to Workshop 3]</i></li> <li>2. <i>[participants who could not attend and should be invited again for WS3]</i></li> <li>3. <i>[participants to WS1 and WS2 expected to stay involved in WP3]</i></li> </ol>
...	
<b>12. Additional Documentation</b>	<ol style="list-style-type: none"> <li>1. <i>Updated Living Lab Mental Map (Miro board) showing changes (if any)</i></li> <li>2. <i>Agenda</i></li> <li>3. <b><i>Pictures of the Brainstorming process</i></b> (at least one good image of the envisioning session) and Facilitators in action [NOT participants' faces in order to respect ARSINOE ethic rules]</li> </ol>
<b>ATTENDEES</b>	
<b>Role</b>	<b>Organisation</b>
1.	
	<i>[interested in taking part in other ARSINOE activities, resistant to the process, motivated, neutral, quiet etc]</i>
2.	
3.	
...	

**Table 5: To be completed during post-workshop meetings (meeting with WP2 can help in completing this section)**

<b>POST WORKSHOP ANALYSIS</b>	
<b>1. Future narrative analysis</b>	
Central Themes	<i>[e.g. water, energy, agriculture, education]</i>
Main Sectors	<i>[e.g. water, energy, agriculture, education]</i>
Key Actors	<i>[individuals or organisations that are mentioned during discussion]</i>



Innovations or solutions	<i>[link to a compiled list of existing innovations that could potentially contribute to achieving the future narrative. Innovations may be suggested by stakeholders and/or identified by the CS team after the workshops. We have provided <a href="#">a template on Teams</a> to help you with this task]</i>
<b>WORKSHOP 3 PREPARATION</b>	
<b>1. Potential blockers</b>	<i>[Mentioned during workshop or detected by the CS Team]</i>
<b>2. Innovation gaps</b>	<i>[Mentioned during workshop or detected by the CS Team]</i>

## APPENDIX

### Examples of Future Narratives co-develop with local stakeholders in Multi-Actor Labs

The COASTAL project

<https://h2020-coastal.eu/>

#### The Mar Menor Coastal Lagoon in 2050

“The Campo de Cartagena and Mar Menor lagoon are internationally recognized as well-developed coastal and rural ecotourism destinations. The tourism, agriculture, and fishery sectors are now interdependent and collaborating for sustainable development. The strong presence of sustainable tourism activities creates the incentives for developing and preserving healthy rural areas, sea, and coasts, combined with good quality infrastructures and a level of general well-being for people living in the area. All sectors work together following a problem-based approach and promoting economic benefit transfer from coastal to rural areas and vice versa. New regulations from local to national level are developed, incorporating and considering the environmental, social, and economic aspects of sustainable development. All economic sectors have internalized environmental costs and benefits in their business models. The agricultural sector is aware of its role and impact on the Mar Menor lagoon driven by a change in attitude from local and international consumers, who now consciously buy vegetables and fruits produced by means of sustainable land management practices. Thus, agriculture in the area has made a transition to high-quality products with a high added value, applying the latest technology for water and nutrient efficiency and concepts of sustainable intensification. Production is increasingly oriented to local markets and tourism and solar energy has become an attractive alternative for agricultural land use. There is an expansion of tourism activities linked to agriculture (agro tourism) and to alternative activities in rural and coastal areas that attract international (water and land) sport events taking advantage of the soft winters. The blue growth sectors expand, leading to high self-sufficiency in energy and a more circular production of local goods. There is a coordinating body for the Mar Menor and its catchment area formed by public administrations and representatives from all socio-economic sectors that co-manage the area

Figure 7 Reporting template for Workshop 2

### 3.13 Pre-workshop 2 meetings with CS teams

Similar to what was done for the first round of LL workshops, to adapt the methodology to each CS's specific needs and resources, several one-on-one work sessions took place between November 2022 and March 2023. During pre-workshop sessions, WP2 assisted each CS team in designing and planning the different activities, whereas post-workshop sessions were dedicated to reviewing and analysing the workshop outcomes, and to provide support for the preparation of the WP2 workshop report.

**Table 14** Dates of each CSs' work sessions with WP2 and of 2<sup>nd</sup> LL workshops

	Case study name	Date of workshop	2 <sup>nd</sup> Final review w/WP2	Post-workshop meeting
CS1	Athens	06/12/2022	24th May	To be defined
CS2	Medit Ports 1 - Piraeus LL	14/03/2023	06/03/23	To be defined
	Medit Ports 2 - Valencia LL	02/03/2023	28/02/23	To be defined
	Medit Ports 3 - Cyprus LL	02/03/2023	21/02/23	To be defined
	Medit Ports - International WG	End of March 2023.	To be defined	To be defined
CS3	Main River	18/11/2022	14/11/2023	25/11/2023
CS4	Ohrid & Prespa Lakes - North Macedonia	25/01/2023	19/01/2023	09/02/2023
	Ohrid & Prespa Lakes - Albania	27/01/2023		
	Ohrid & Prespa Lakes - Greece	03/02/2023		
	Ohrid & Prespa Lakes - International	24/02/2023	24/02/2023	To be defined
CS5	Canary Islands	24/01/2023	14/12/2023 and 10/01/2023	July 8th, 13th, September 6th
CS6	Black Sea - Bulgaria	28/02/2023	21/02/23	17/03/23
	Black Sea - Romania	27/02/2023	20/02/23	10/03/23
	Black Sea 3 - Turkey combined with Istanbul BRIDGE LL	17/03/2023	22/02/2023	To be defined
	Black Sea - International (lead by Greek team)	31/03/2023	To be defined	To be defined
CS7	Southern Denmark	30/01/2023	18/01/2023 and 26/01/2023	To be defined
CS8	Torbay&Devon county	09/02/2023	10/01/2023 and 03/02/2023	09/03/2023
CS9	Sardinia	07/03/2023	07/03/2023	To be defined

### 3.14 Next steps

After the second workshops, team members fill out the reporting template and meet again with WP2 to analyze outcomes and design in-between workshop activities. Whilst such activities may vary greatly

among locations, depending on specific needs and conditions, a core set of in-between tasks are to be performed by all CS teams:

- refine the maps and circulate them to the LL participants for any further input
- draft a problem statement based on the LL challenge
- Assess if there are gaps in the representation of stakeholders
- Decide on a time horizon for the future narrative
- Identify relevant SDG targets (based on WP6 Global Indicator Framework) to serve guiding principles for the envisioning exercise.

After all those tasks have been carried-out, CS teams are ready to begin preparing the second round of workshops.

## 4.0 IMPLEMENTATION OF FIRST ROUND OF LIVING LAB WORKSHOPS PER CASE STUDY

### 4.1 Case Study 1 – Greening Athens

#### 4.1.1 Introduction to the Living Lab focus

Extreme heat is defined by the recent Climate Action Plan of Athens, as the number-one threat, while at EU level Athens ranks first among 571 European cities studied, in terms of impact derived from heat waves<sup>1</sup>.

The mean annual temperature of Athens increases steadily since 1970, by 1.3 °C between 1970 and 2011, while the mean summer temperature increases even more sharply, by almost 1 °C per decade. The urban heat island becomes increasingly intensive (up to 8 °C has been recorded), along with the heat waves which are more frequent, intense, and prolonged. The recent climatic projections foresee further increase of the maximum summer temperature by 2 °C for the period 2031 to 2050.

The climate change impact, combined with the anthropogenic activities in a densely populated area, suffering from lack of sufficient urban green areas, also affected by the wildfires of its peri-urban forests over the last years, result in an alarming situation for Athens, with direct environmental and socio-economic impacts.

The need for action to protect the most vulnerable part of the population during heat waves, such as the elderly, and the children, with immediate response actions, as well as to plan and improve the city's preparedness and adaptation capacity are acknowledged priorities of the city's administration. Athens is the first city in Europe that has officially established the role of Chief Heat Officer since 2021, responsible for tackling the Urban Extreme Heat and ensuring protection of the most vulnerable citizens.

#### 4.1.2 First Living Lab workshop

**Date of the first WS:** 27/05/2022.

**Format:** Face to face.

**Location:** Electra Metropolis Hotel, Athens, Greece.

**Number of participants:** 31 participants in total (public, private sector, NGOs, academia).

**Living lab challenge presented at the beginning of the workshop:** Extreme Heat, which are the impacts for the Athens Metropolitan area, who is affected the most and how, how can we deal with these impacts/consequences, why are they essential (e.g. citizens' health and quality of life, socio-economic elements, touristic activity, biodiversity etc.).

**Key challenges:** extreme heat, accessibility, green & blue infrastructure, awareness raising and environmental education, governance and lack of communication, implications on health tourism, economy, well-being, biodiversity, cultural heritage.

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<sup>1</sup> Selma B Guerreiro et al, 2018, "Future heat-waves, droughts and floods in 571 European cities", Environ. Res. Lett. 13 034009

**Central themes:** Extreme heat, mobility, health, green areas, blue areas, Hadrian aqueduct, strategic planning, institutional framework, tourism.

**Main sectors concerned:** Water, Energy, transportation, health, urban planning, biodiversity, tourism, culture, poverty/social vulnerable groups, construction (e.g. building design & materials).

**Time horizon for future narrative:** 2040-2060

**Stakeholder gaps:** Health sector, additional NGOs.

**Table 15** First CS1 Living Lab workshop agenda

09.30 — 10.00	Welcome and introduction of participants
10.00 — 10.10	Agenda and Aims of the 1 <sup>st</sup> LL
10.10 — 10.20	Presentation of the ARSINOE Project
10.20 — 10.40	Case study #1 - the metropolitan area of Athens
10.40 — 10.50	Introduction to the Living Labs
10.50 — 11.15	Coffee break
11.15 — 12.45	Mapping participant perceptions
12.45 — 13.15	Conclusions – setting the goals of the Workshop
13.15 — 14.00	Light lunch

The stakeholders shared their views and experiences regarding the extreme heat: in terms of impacts, consequences, challenges, related systems and initiatives, and potential means, in terms of mitigation or response, to deal with them. In terms of impacts, the stakeholders referred to:

- The increased use of energy for cooling or transportation leading to increased air emissions and GHG; or the energy poverty increasing the vulnerability of the economically weak.
- Extreme heat and impact on physical & mental health and social well-being; increase of violence was also reported.
- Reduced touristic fluxes, leading to reduced income for the city.
- The challenges deriving from extreme heat can be grouped in environmental and socio-economic:
- Biodiversity loss, physical disasters, extreme heat, climate change, green degradation and lack of green corridors, were the main environmental challenges discussed.

Lack of an integrated legal framework, lack of equity/increased vulnerability intensified at the COVID era, limited free urban spaces/competitive land uses, insufficient accessibility to green spaces, were amongst the socio-economic challenges of concern.

The stakeholders referred to relevant initiatives such as the European Bauhaus, or policy documents at local/national/EU level, e.g. for the adaptation to climate change impacts or the protection of biodiversity, and the importance of the mobilisation of EU/national and private funds for dealing with extreme heat.

Related physical systems, such as green infrastructure and blue infrastructure were discussed for their immediate and positive impact in cooling the city and providing relief when it comes to extreme heat. Reference to parallel projects, aiming to reintroduce the Hadrian, roman, Aqueduct, into the city's life, in its original function, contributing to the regeneration and sustainability of green spaces, as well as a cultural landmark. Existing infrastructure and cultural sites, should be part of an integrated plan dealing with climate change impacts, addressing extreme heat.



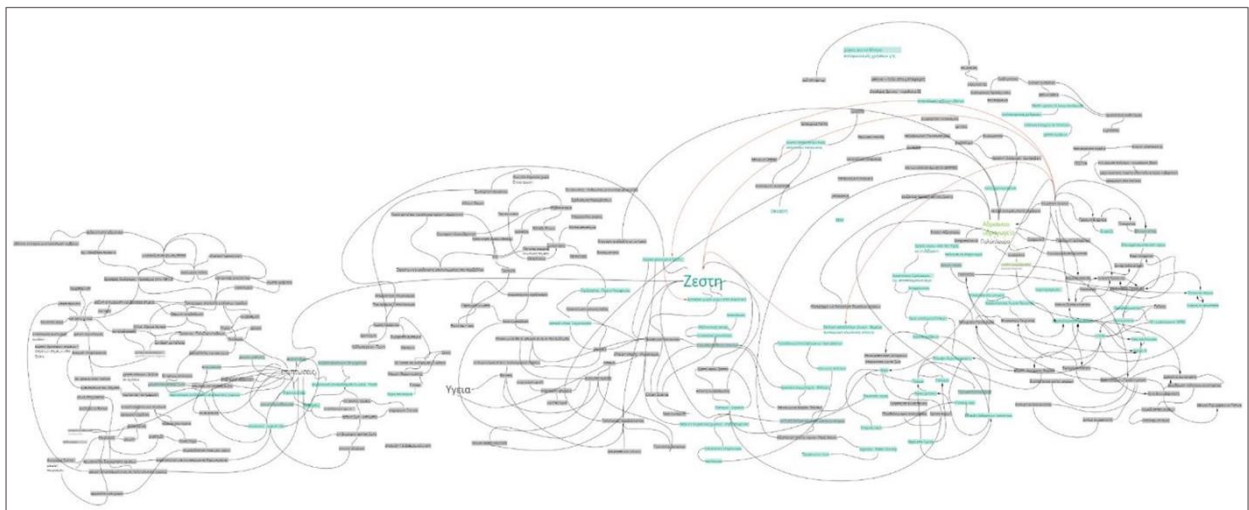
Even though not in the agenda of the first Workshop, the stakeholders referred to potential responses in dealing with extreme heat, such as nature-based solutions, sustainable infrastructure, energy efficiency of buildings, open and green spaces, strategic planning, raising of environmental awareness, co-design/co-decide & enhancement of participatory approach.

**Problem statement agreed during the first workshop:**

*Athens is becoming increasingly hot with significant impacts on health, society and the local economy. What is our vision for dealing together with this imminent and invisible threat?"*



**Figure 8** Photos of the first CS1 Living Lab workshop: drafting the mental map



**Figure 9** Mental Map, as produced during the Workshop (without refining) in Greek.

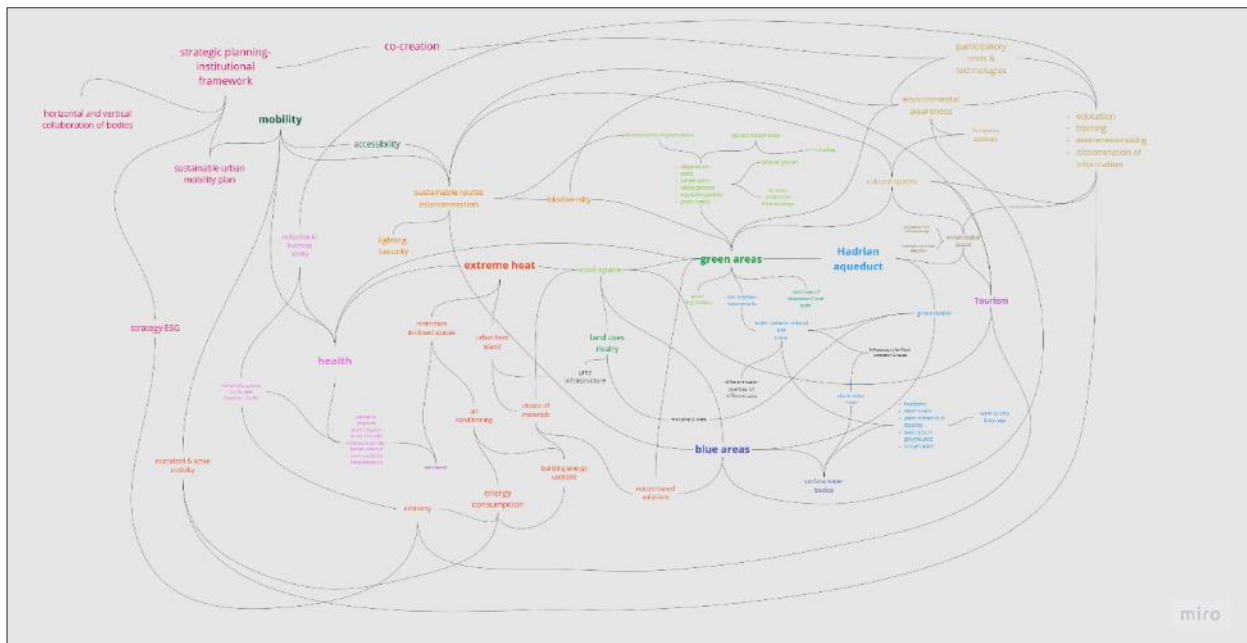


Figure 10 Refined Mental Map.

### 4.1.3 Main activities directed to stakeholders between workshops

- Factsheet produced, describing the outcome of the WS1 in the form of a mental map that was co-created with the SHs, describing ‘the problem (Athens – extreme heat) and the causes – impacts – related systems – responses. A refined map was included in the factsheet, after processing raw, and messy, mental map produced during the LL.
- Invitation for the 2<sup>nd</sup> Workshop, describing the goals of this WS (i.e. ratify the “problem”, formulate the ‘vision’), and draft agenda sent to Stakeholders, those participated in the WS1 and the new ones proposed to participate in the WS2.
- The new stakeholders also received a factsheet, describing the project and in particular CS1 and the objectives of the LL.
- WS2 reminder for confirmation, Final agenda and the Mental Map Factsheet sent to all Stakeholders, close to the WS2 (mid-November 2022).

## 4.2 Case Study 2 – Mediterranean Ports

### 4.2.1 Introduction to the Living Lab focus

Three local living labs have been organized in ARSINOE, one in each Study Case: Limassol, Piraeus and Valencia. Each location has its own idiosyncrasy and thus, the stakeholders joining the working group differ from one location to another.

Prior to the first LL, CS2 activities were centred on the mapping of the stakeholders for the Ports of Piraeus, Valencia and Limassol. An initial Long List of Stakeholders was delivered to WP2 at 20 January 2022.

All the interdependencies between the different operations, activities and systems, both internal and external to ports, must be analysed to determine climate-related hazards affecting ports. Even though expert judgment can provide valuable information for an initial approach, the arrangement of local living labs involving the main stakeholders that have their activity at each port is a desirable requisite.

The Port Authority is the main stakeholder in each living lab as they gather the knowledge, not only for the infrastructures and the hazards affecting them, but also the operations and the hazards that force operative stops inside the port. Companies developing part of their activity inside the port can provide their knowledge of their specific activities and the sensed risk of each hazard. The evaluation of these sensed risks can help determine the criticality of the hazard.

### 4.2.2 First Living Lab workshop

The development of an adaptation plan or strategy needs to be based on a full understanding of which port or waterway assets, operations and systems could be impacted by the changing climate.

The ARSINOE project conceives the analysis of vulnerabilities and risks associated with the effects of climate change in ports as an iterative process.

By arranging local living labs, ARSINOE partners gathered information on which climate parameters and extreme events are susceptible to affecting the port's assets, operations, and systems. In addition, the probability of these climate hazards affecting existing risks or introducing new ones was assessed based on the expert judgment provided by Port Authorities and Port operators. In summary, **potential climate risks (i.e. projected changes that have the potential to cause damage, disruption, or similar negative effects) have been identified and assessed in a generic manner.**

Consequently, the first step was to contact key players in the port activity, from within and beyond the Port Authority, for assessing **how operations and businesses will be affected by climate change**, including the dependency on external sources of energy, port road access or any external facility potentially affected by extreme weather events.

The local living labs have been a key factor to obtain a broader view and gather a better knowledge of the impact that all the environmental agents have in the multiple sectors involved in the port areas.

For all 3 ports, physical workshops were facilitated, and the project's key themes have been presented. Similarly, the objectives within the living lab were defined and the main sectors, which are affected throughout the work, have been identified and communicated to the attendees. The details are summarized below:

#### Port of Piraeus

**Date of the first WS:** 06/09/2022

**Format:** Face to Face

**Location:** Akti Miaouli 10, Piraeus, Athens

**Number of participants by sector:** Government/ Policy Makers: 3; Industry Business: 9; Association/ NGO: 2; Research: 3; Port Authority: 2

**Living lab challenge presented at the beginning of the workshop:** Port Climate change Resilience relative to its core Infrastructure, Operations and Socioeconomic Factors (Workers, Adjacent Communities)

**Key challenges:** Port Operations/ Infrastructure affected by the Climate Change:

- Port closure due to extreme weather conditions.
- Port congestion after port closure to navigation.
- Port operation stopped due to the wind.
- Increase of traffic accidents.
- Increase of accidents in docs.
- Increase of damage to good and claims.
- Impact of climate change in specific traffics.
- Impact of climate change in port/terminal roads and access.
- Impact of temperature to the dock operations

**Central themes:** Climate Change Variables (Heatwaves, Wind, Waves, Storm Surge), Port Operations, Port Infrastructure

**Main sectors concerned:** Shipping, Energy, Transportation

**Time horizon for future narrative:** 2040-2060

**Stakeholder gaps:** More than one participant from some of the stakeholders; adjacent communities were underrepresented; shipping sector companies were relatively underrepresented.

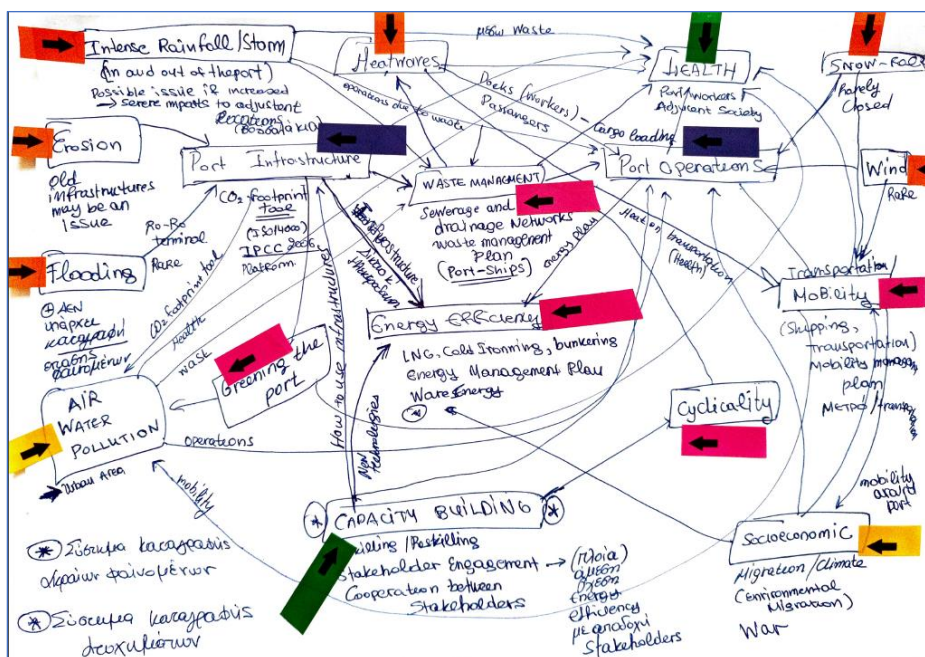
**Table 4.3 First CS2 - Piraeus Living Lab workshop agenda**

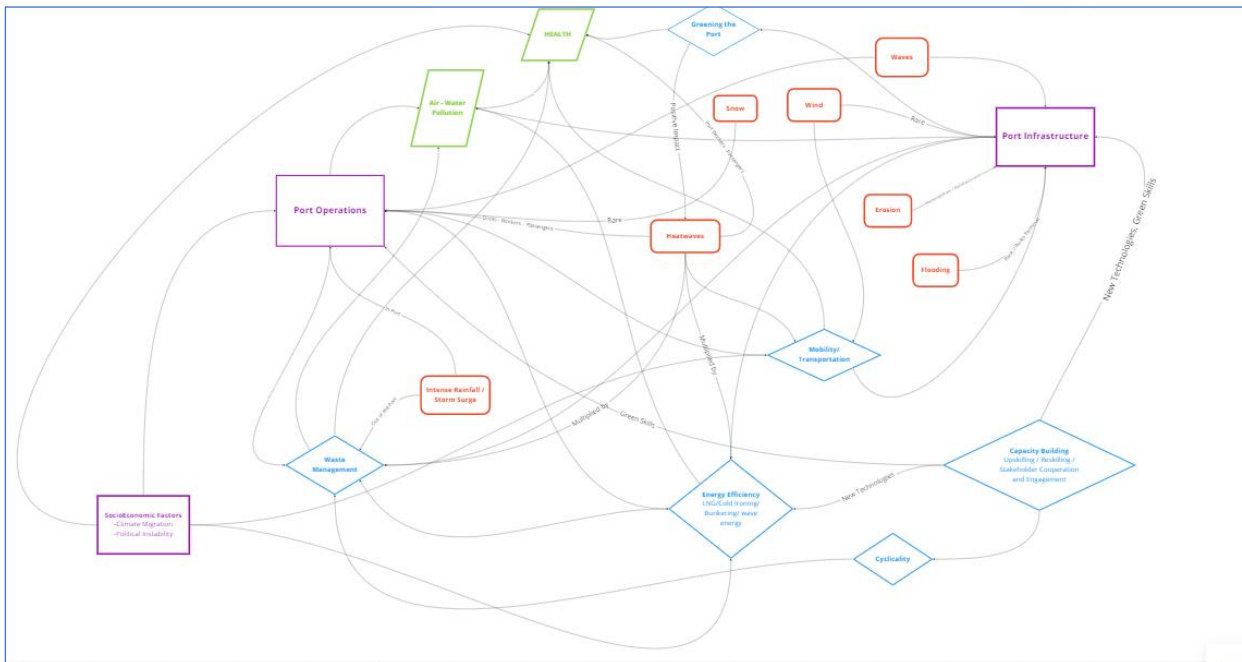
10.00 – 10.30	Registrations
10.30 – 10:45	Welcome
10.45 – 11.00	ARSINOE Project Presentation
11.00 – 11.15	ARSINOE CS2 – Case Study Presentation
11.15 – 11.30	Coffee Break
11.30 – 11.45	Living Lab presentation
11.40 – 12.55	Mapping, Scoping and Objective Setting
12.55 – 13.00	Conclusions
13.00 – 13.30	Light Lunch

**Problem statement agreed during the first workshop**

“Tackle the Most Critical Climate Change Negative Impacts (Heatwaves, Wind/Waves) to the Port Operations (Stop operations, increase of accidents, damage in goods, passenger’s health), Port Infrastructure (Infrastructures to increase Energy Efficiency, Waste Management) and nearby community (Air/Water Pollution)”.

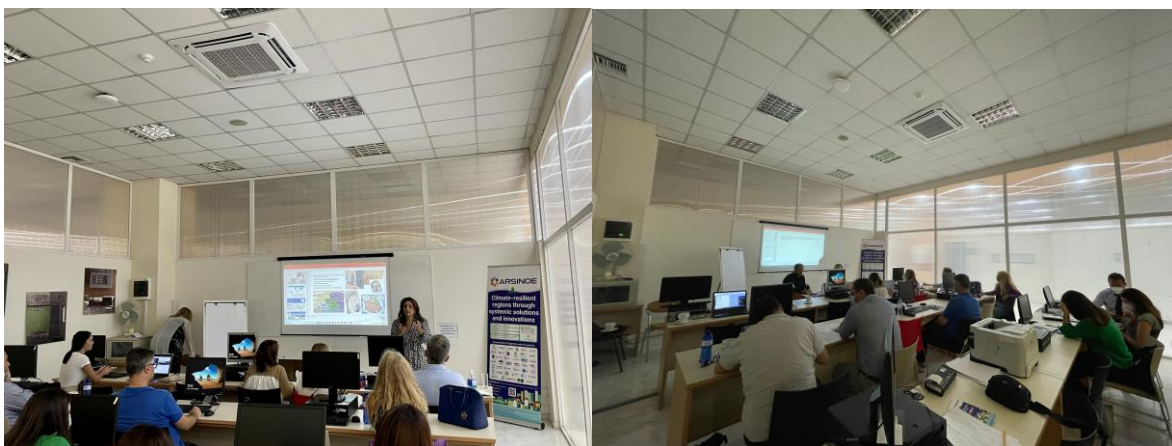
At the Workshop also participated as members of the organizing team 6 people from AUUEB, 1 from PPA and 1 from UTH. All participants have signed the Information Sheet and Consent Form. Information Sheet and Consent Form are available upon request. The Living Lab Language was Greek.


**Figure 11 Manual Mental Map first LL – Port of Piraeus**



**Figure 12** MIRO Mental Map first LL – Port of Piraeus

The Mental Map tracks the main impacts of climate change identified relative to port Operations and Infrastructures as well as connections with socioeconomic factor. The main variables identified are Heatwaves affecting Port Operations and Health (Workers – Passengers), Energy Efficiency Issues related to Port Infrastructure and Air Water Pollution related to Waste Management Plan of Port and Ships which affect the Urban area and adjacent communities.



**Figure 13** first LL Photos – Port of Piraeus

**Port of Valencia**

Date of the first WS: 6 July 2022

**Format:** Face to Face

**Location:** Fundación Valenciaport, Valencia

**Number of participants per sector:** 3 governmental institutions; 1 Research center; 2 key companies on nautical services; 9 port services companies comprising: 9 terminals (3 container terminals, 2 passenger/ferry terminal, 1 solid bulk terminal, and 1 ro-ro terminal), 1 stevedoring employment company.

**Table 16** First CS2 - Port of Valencia Living Lab workshop agenda

10.00 – 10.30	Welcome and introduction of participants
10.30 – 10.40	Agenda and Objectives
10.40 – 10.50	Introduction to ARSINOE
10:50– 11:10	Introduction to the Case study
11:10 – 11:20	Living Lab concept and objectives
11:20 – 11:30	Break
11:30-12:30	Mental mapping
12:30- 13:00	Conclusion – Setting the living labs objectives

**Living lab challenge presented at the beginning of the workshop:**

The potential climate-related hazards that have been selected in Valencia Port are the following ones:

Affecting operations:

- Heat waves
- Limited port operations due to port agitation
- Limited port operations due to wind
- Flooding
- Low visibility
- Heavy rainfall
- Electric storms

Affecting port infrastructures, including port handling equipment:

- Changes in waves regime (height and direction)
- Heavy rainfalls
- Fog
- Heat waves
- Flooding
- Changes in wind regime (height and direction)

During the living lab, the identification of the hazard was linked to each of the different environmental variables that provoked that hazard. Attending to the given answers, the main variables that lead to hazards are air temperature, agitation, wind and fog.

**Key challenges:** operations & infrastructure impacted by climate change, adaptation of the port staff works to the heatwave, long-term consequences of climate change in the port of Valencia.

- Port closure due to weather conditions, fog and waterplanes taking water for dealing with wildfires
- Port congestion after port closure to navigation.
- Port operation stopped due to the wind

- Increase of traffic accidents
- Increase of damage to good and claims
- Impact of climate change in specific traffics
- Impact of climate change in port/terminal roads and access
- Impact of temperature and sea water temperature in the cooling process
- Decision making for updating the port equipment

**Central themes:** Wind, waves, storm surges, heatwaves/extreme temperatures, fog, extreme rainfalls.

**Main sectors concerned:** port operations & infrastructure, insurance,

**Time horizon for future narrative:** 2040-2060 and 2080-2100.

**Stakeholder gaps:**

- The whole port community has collaborated in the definition of the mental map through the elaboration of personal interviews.
- Port Authority of Valencia was represented in the LL. Personal interviews were elaborated with key actors, consequently, the position of PAV is well defined.
- Port pilots, dockers, and mooring masters were not present but were interviewed.
- Bulk & liquid terminals were not present but interviewed.

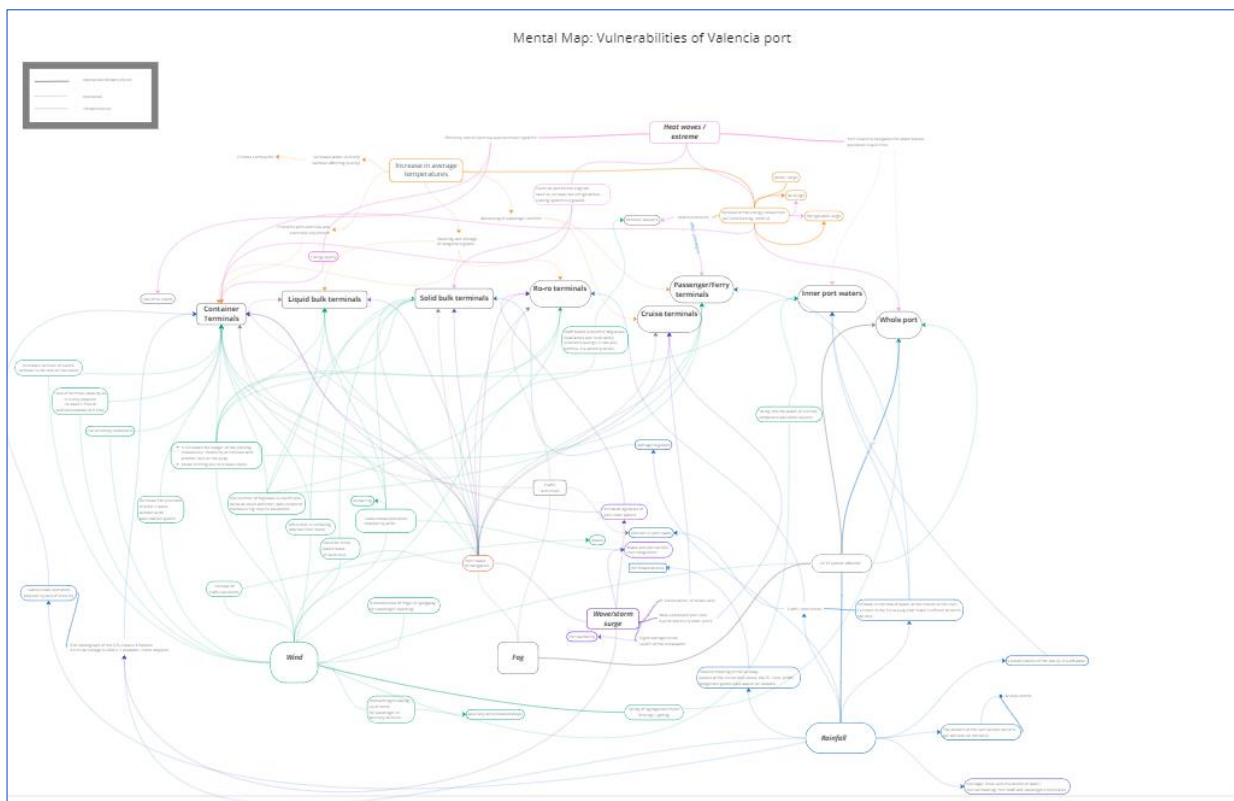


Figure 14 Miro Mental Map first LL – Port of Valencia





Mention was made of various weather phenomena such as heat waves, sea level rise, dry, earthquakes and other (vulnerability)

**Key challenges:** Fuel prices/Energy cost, Supply of energy, Infrastructure, expertise. Energy, Ecosystem, Pollution, Operations, heat and dust infrastructure and operations

**Central themes:** Pollution, Energy, Economic Impacts, Social Impacts.

**Main sectors concerned:** Energy, Environment, port and maritime activities (infrastructure and operations which are specific areas relevant for Ports)

**Time horizon for future narrative:** 2040-2060

**Stakeholder gaps:**

*Cyprus Ports Authority; Shipping deputy minister advisor; Ministry of transport, communication and work; Ministry of energy; Cyprus Energy Agency*

**Table 17** First CS2 – Limassol Living Lab workshop agenda

10.00 – 10.30	Welcome and introduction of participants
10.30 – 10.40	Agenda and Objectives
10.40 – 10.50	Introduction to ARSINOE
10:50– 11:10	Introduction to the Case study
11:10 – 11:20	Living Lab concept and objectives
11:20 – 11:30	Break
11:30-12:30	Mental mapping
12:30- 13:00	Conclusion – Setting the living labs objectives

**Problem statement agreed upon during the first workshop:**

*“Change in energy needs - supply and demand (based on the global market which is drive by climate change) and adapt to new energy trend, and energy demands including operation and infrastructural and of course financial.”*



Figure 16 Manual Mental Map first LL – Port of Limassol

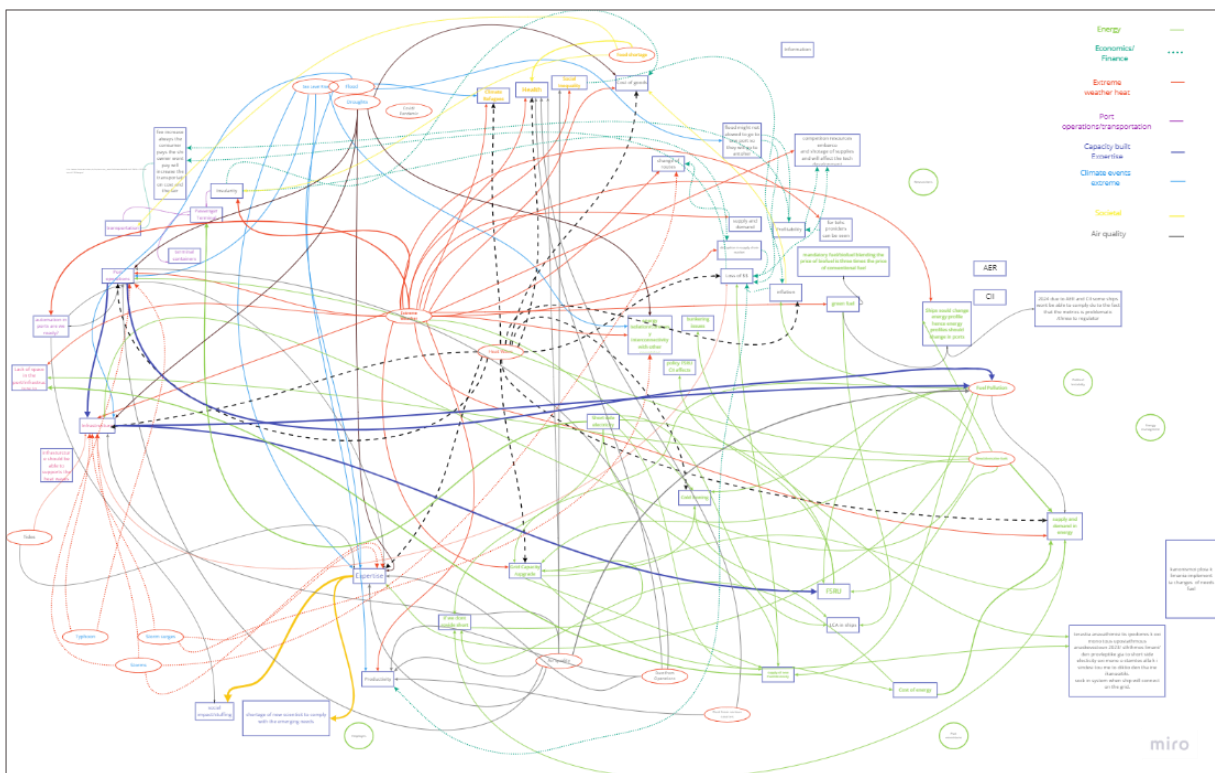


Figure 17 Refined MIRO Mental Map first LL – Port of Limassol



**Figure 18** Photos of first LL – Port of Limassol

### 4.2.3 Main activities directed to stakeholders between workshops.

After the first LL, the CS team drafted a mental map for the Mediterranean Ports to be shared with the stakeholders prior to the 2nd LL, which will be validated during the 2nd LL.

#### **Mediterranean Ports**

The analysis of the outputs of the first Living Lab (local mental maps) from all 3 ports resulted in the drafting of a unique Mental Map for the Mediterranean Ports, summarizing the most critical climate change impacts. The “Mediterranean Ports” mental map, created by the case study leaders, is depicted below.

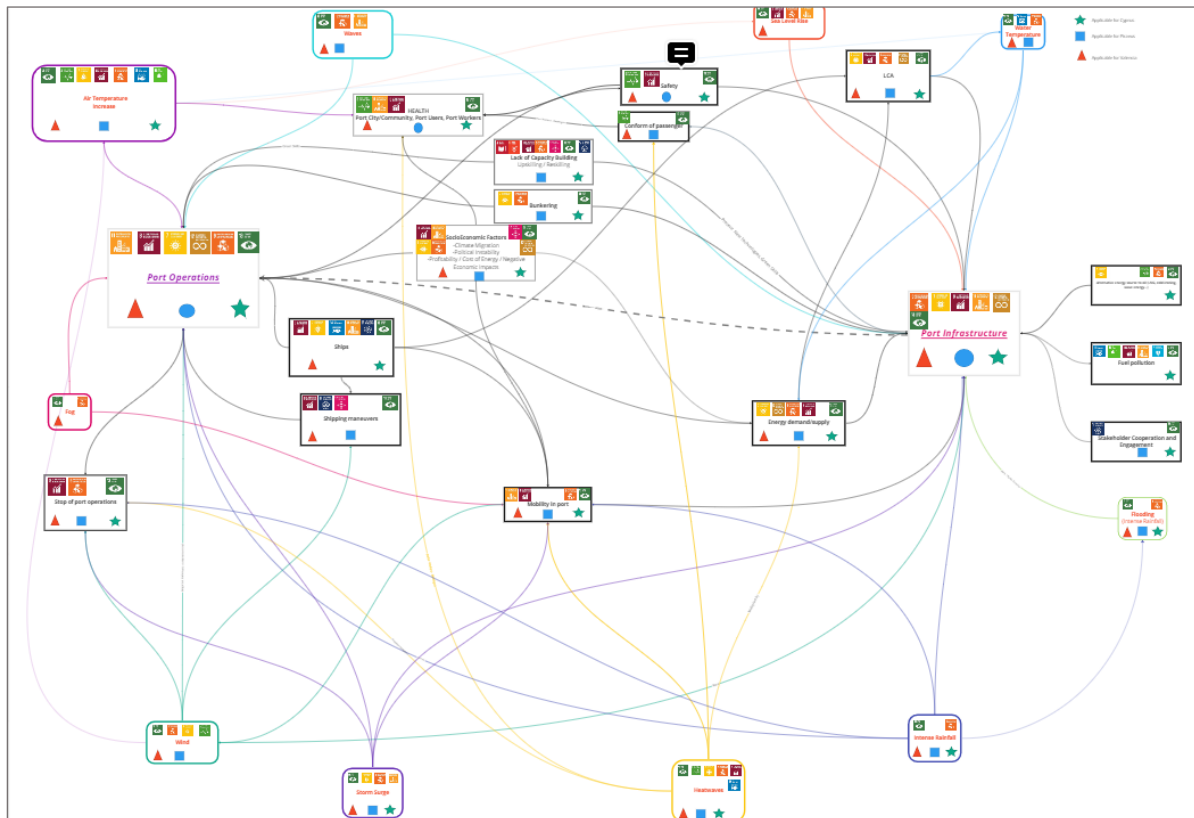


Figure 19 Mediterranean Ports Mental Map

The relevance of the items in the Mediterranean Ports mental map to the national cases is denoted as follows: a Green Star indicates the themes relevant to the port of Limassol, while a Blue Cycle and a Red Triangle denotes themes and nodes relevant for the Ports of Piraeus and Valencia respectively. Focusing at a Regional rather than a local scale (e.g. for each port individually), will provide stakeholders with a more holistic representation of the challenges Mediterranean Ports face adapting to Climate change.

The connections for all climatic variables with other nodes appear with a specific colour, while a dotted line indicates connections between climate variables. The Mental Map describes the holistic relationship between climate variables (climate change parameters) and their impact on Specific Port Operations or their infrastructures, as well as several impacts and socio-economic factors (energy supply / demand or health of workers, port users or adjacent community).

Each Node in the map is mapped with the relevant SDG goals, as identified by a set of KPIs (defined in the Global Indicator Framework) indicating how increasing the Port's resilience against several climate change instances can contribute to the implementation of the SDGs. In this direction the positive/negative spill overs between adapting to different climatic variables (different effects of climate change) can also be identified.

The Mediterranean Ports Mental Map has been presented to, discussed and validated by local stakeholders in each national port living lab.

## 4.3 Case Study 3 – Main River

### 4.3.1 Introduction to the Living Lab focus

In the CS3 Living Lab, we bring together various stakeholders affected by climate change and central to adaptation in the Würzburg region and create a platform for exchange between municipal companies, administration, agriculture and forestry, industry, and nature and environmental associations. In dialogue, we develop a common understanding of the problem and a systemic perspective on water and water management. Based on this, we formulate a common vision of what a region adapted to climate change could look like. New collaborations and networks as well as concrete projects and innovations are to emerge from the Living Lab, supporting development towards more resilience in climate change.

CS3's Living Lab is spatially limited. It covers the section of the Main River between Schweinfurt and Würzburg as well as the surrounding region. Nevertheless, the solutions and ideas developed in it should be transferable to other regions along the Bavarian Main and in other parts of Bavaria.

Central to the idea of "Living Labs" is the active participation of various stakeholders. By having actors with different perspectives working together, a cross-sectoral and systemic perspective on the topic complex of water and water management becomes possible. We identified several sectors that are currently and will be particularly affected by climate change impacts and should collaborate on moving toward greater climate change resilience. Within these sectors, we have selected individual actors and tried to attract them to participate in the Living Lab.

### 4.3.2 First Living Lab workshop

**Date of the first WS:** 15.07.2022, 09:30 a.m. until 03:00 p.m.

**Format:** Face to face.

**Location:** Würzburg.

**Number of participants:** 8 participants. Water (5), Energy (2), Environment (2), Agriculture (1) Viticulture (0), Forestry (0), Fishing (1), Shipping (2), Mobility (1), Waste Management (1)

Some stakeholders are active in more than one sector. Thus, the sum of stakeholders per sector can be higher than the total number of workshop participants.

**Living lab focus presented at the beginning of the workshop:** Issues related to the water-energy-food nexus.

**Key challenges:**

- Lack of precipitation already noticeable
- Water quality/quantity will be a big challenge in the future.
- Climate adaptation on its own is insufficient; Climate change must be mitigated
- Water holding capacity of the landscape is insufficient (soils and forests).
- Desire of all sectors for Main water (actors/sectors try to secure quotas for the future).
- Securing groundwater and drinking water supply (how can we create redundancy in our drinking water systems to be resilient in emergency cases).
- Lack of awareness for the severity of the water deficit in the public (public still waters the gardens, fill up the pools, etc.) as well as commercial users (I.e., entities who have set quotas or their own wells don't have the awareness that other sectors or entities suffer from water deficit).
- Water infrastructure (drinking water and wastewater) must be adapted to different climate

conditions: satisfaction of peak demands, usability during drought and performance during extreme weather events, redundancies.

- Climate impacts in cities (heat island, torrential rain).
- Main river no longer a natural river due to a cascade of barrages with influences on flow speed, oxygen content, water quality, migration of aquatic (invasive) species, water temperature, ...
- Water quality will be a problem in the future due to substance inputs and the altered mixing ratio due to lower water quantities.
- Lack of incentives/Lack of security to try out new agricultural practices - Governmental bodies still heavily think inside their own sectors; administrative structures and processes might have to be analysed critically.

**Central themes:** Water Quality, Water Quantity, Ecology, Land use/management, Infrastructure, Governance.

**Main sectors concerned:** Water, energy, agriculture, fishing, administration, environment, shipping.

**Time horizon for future narrative:** the group decided to discuss this point in the second workshop.

**Stakeholder gaps:** Forestry, winery, industry

**Table 18** First CS3 Living Lab workshop agenda

	Welcome and intro
	ARSINOE: Introduction of the project
	Goals of the workshop
	Lunchbreak
	Mental Mapping
	Next steps and end of day

**Problem statement agreed during the first workshop:**

*“Climate change poses major challenges in the region and is likely to exacerbate competition for water, land and energy resources. This will have considerable consequences for agriculture, forestry, water and energy management. Governance does not address challenges in holistic ways at present and might not do so in the future unless processes are revised. As such, the region is at risk for being pushed beyond its resilience thresholds and will need a new level of responsiveness to cope with climate change. A fundamental and forward-looking revision of available resource management measures is essential for ensuring a climate change resilient development of the region. Currently, most adaptation measures are sector-focused but the challenges are interconnected. Therefore, a common strategy is urgently needed that takes the interconnectedness of sectors and challenges into account. The co-design and co-production of science-driven technical, social and cross- sectoral innovations and governance is required to build new and climate resilient development and transformation pathways.”*

Based on the initial information, the participants performed a mental mapping within the workshop. This encompassed identifying the key challenges in the living lab area as well as the key actors, which must be taken into consideration. Moreover, possible innovations as well as solutions have been discussed. Within the workshop, several attendees already networked with the goal of contributing towards the problem at hand. Thus, positive relationships have been formed during the workshop and the workshop could

have been a first kick-off for a potential network of stakeholders. However, also some conflicts emerged between the different interest groups:

- Conflicts between biodiversity in the Main River and shipping
- Trade-offs between individual personal benefits and what is beneficial for the environment / society
- Competition for water resources for different uses
- Incentive structures for agricultural land use when land is owned and used by different people (leasing agreements).

A fruitful discussion led to specific challenges and topics to address in the region, which were depicted in the mental map. Water quality and water quantity issues are highly interconnected, although water availability in the region seemed to be a major concern. In particular due to the recent trends, such as higher frequency of dry periods. The ecological perspective contributed to highlighting the relevance of water flows (e.g.: sedimentation issues) and water quality (e.g.: water temperature) in the area. Land use changes were both a challenge and an opportunity to adapt to new climatic conditions and as strategy for water retention in the basin. From the infrastructure perspective, cascading use of water, water reuse, and water efficiency measures (e.g.: irrigation infrastructure) were mentioned. Economic incentives to develop more efficient infrastructure or water management capabilities were directly connected to governance in the region.

Overall, stakeholders agreed upon the fact that climate change poses major challenges in the Main River basin and is likely to exacerbate competition for water, land and energy resources. Sectors such as agriculture, forestry, water supply and energy management will be affected. From the mental map creation process it was also highlighted that the governance strategies currently in place do not address these challenges in a holistic way. Thus, the revision of these processes is needed to ensure a more agile reaction capability, which would imply a transformation towards becoming a resilient region. A fundamental and forward-looking revision of available resource management measures is essential for ensuring a climate change resilient development of the region. Currently, most adaptation measures are sector-focused but the challenges are interconnected. Therefore, a common strategy is urgently needed that takes the interconnectedness of sectors and challenges into account. The co-design and co-production of science-driven technical, social and cross-sectoral innovations and governance is required to build new and climate resilient development and transformation pathways.





One-to-one interview with the Managing director of a regional water supply company  
(13.09.2022)

## 4.4 Case Study 4 – Ohrid and Prespa Lakes

### 4.4.1 Introduction to the Living Lab focus

This CS aims at improving the climate resilience of environmental, economic, and social sectors related to water use, by providing an intelligent comprehensive innovation set of long-term planning solutions, allocation and use of sufficient quantity and of adequate quality water for all users, respecting their interests in order to improve human health, food production, conservation of natural environmental systems, clean energy production and sustainable growth of all sectors. Water availability will be analyzed in the wider transboundary region of the lakes Ohrid/Prespa, to propose a new water governance management framework, adapted to climate change challenges. This CS will contribute to secure a balanced use of available water resources and bridge the gap between social and economic aspect facing the climate change impacts on the transboundary surface and groundwater systems of Ohrid and Prespa lakes.

All socio-economic sectors are highly dependent on the water regime of the greater Ohrid/Prespa region and therefore highly sensitive to water scarcity induced by climate change. Existing studies and management plans for the region have identified need for adaptation to climate change impacts and foreseen urgent actions for improvement of quality and quantity of surface and sub-surface water, based on a sustainable and efficient use of water, supported by the appropriate water governance solutions. The 3 countries in the Ohrid/Prespa watershed, North Macedonia, Albania and Greece, have an excellent collaboration and experience in common planning and coordination actions; the partners involved in this CS established new communication channels and models to engage a wider range of stakeholders.

The First Case Study 4 Living Lab was organized online. We had 27 participants, from different sectors from all 3 countries, with nice translation on 4 languages (AL, GR, EN, MK). Before the Transboundary LL we had National Working Groups because of many circumstances, different languages, different locations and many differences in the challenges in each country.

The First Living Lab was organized common with all partner organisations, with translation and plenary session where all stakeholders from the 3 countries could discuss and share a knowledge. We plan to organise the Second and Third LL with the same methodology.

### 4.4.2. First National workshop of the LL in North Macedonia

**Date of the first Transboundary WS:** 08.07.2022 (12-16 CET)

**Format:** Face to face

**Location:** IECE Conference Hall, Skopje, North Macedonia

**Number of participants by sector:** 16

**Living lab challenge presented at the beginning of the workshop:** Water consumption patterns, sectors' interests and policies, protection of biodiversity dependant on water.

**Key challenges:** Water consumption patterns, Sectors' interests and policies, protection of biodiversity dependant on water.

**Central themes:** Climate change indicators, water bodies status, sectors affected, endangered sectors in short and long terms, causes and consequences of water scarcity.

**Main sectors concerned:** social sector, water management, health, environmental systems and biodiversity, agriculture, fishery and fishing, forestry, industry, hydropower generation, tourism, cultural heritage

**Time horizon for future narrative:** 2050/ 2070/ 2100

**Key challenges:** Water consumption patterns, sectors' interests and policies, protection of biodiversity dependant on water

**Central themes:**

1. To compare and compile prospections of stakeholders from the three countries
2. To identify similarities, differences and gaps in problem formulation
3. To set basis for further steps in problem solutions

**Main sectors concerned:** social sector, water management, health, environmental systems and biodiversity, agriculture, fishery and fishing, forestry, industry, hydropower generation, tourism, cultural heritage

**Time horizon for future narrative:** 2050/ 2070/ 2100

**Stakeholder gaps:** n/a

**Table 19** First CS4 -North Macedonia Working Group workshop agenda

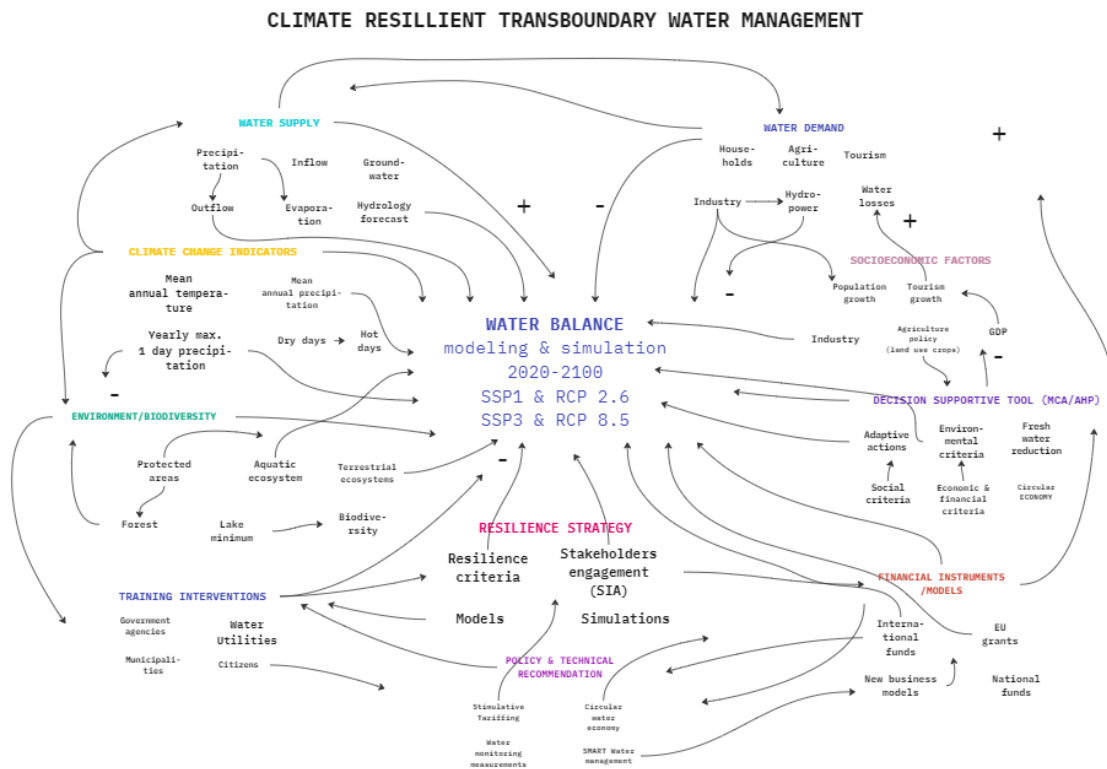
11:30-12:00	Welcome and intro
11:30-12:00	ARSINOE: Introduction of the project
12:30 – 12:40	Goals of the workshop
12:40-12:50	Lunchbreak
12:50-13:10	Mental Mapping
13:10-13:20	Next steps and end of day
13:20-13:40	Break
13:40-15:00	Mental mapping and discussion on Problem(s) statement(s)
15:00-15:30	Conclusion: Setting the LL objectives and next steps.

**Problem statement agreed during first workshop:**

*“Integration of climate adaptive actions by individual sectors, symbiotic attitude towards use of water among sectors, improved water measurement and monitoring as a pre-condition for an effective water management in long terms.”*



**Figure 22** The first National Living Lab was held on July 08th, 2022, at the IECE Conference Hall, Skopje, North Macedonia



**Figure 23** Refined version of the mental map produced during workshop 1.

In the mental map it can be seen that all sectors recognize their impact on water status, as well as their responsibility for a more resilient consumption patterns. They recognize interdependences among sectors when sharing the same valuable resource -the water (both surface and groundwater) - and are aware of the climate change impacts.

Communication and collaboration among sectors should be better, having consideration for individual sector needs. Collaboration among countries is good, but there is room for improvement thereof, including share of information, knowledge, best practices, funding, research and innovation.

Deployment of existing climate adaptivity strategies and plans should be reinforced by better coordination among authorities and stakeholders.

Innovations, funding, business models should be sought for and harnessed by stakeholders from economic sectors. Measurement and monitoring of water status and data sharing across borders should be improved and become permanent. Raising capacities of citizens and institutions towards climate adaptivity of water allocation and use is needed.

Water is a common and scarce resource and sectors are aware of this fact.

Sustainable and climate adaptive development is necessary and actions should be consensual, accorded and respecting needs and priorities.

Actions need to be taken to improve integrally climate adaptiveness of water use in all sectors and, in the same time, to restore and preserve as much as possible natural ecosystems of the lake regions.

Key words are: **integrated, symbiotic, climate change adapted, smart water planning, management**

#### 4.4.3 List the main activities directed to stakeholders between workshops

**05 August 2022:** the stakeholders of the first National Living Lab in North Macedonia have been contacted again and the SIA Workshop Reporting and Mental Map was shared with them.

#### 4.4.4 First National workshop of the LL in Greece

**Date of the first WS:** 08.07.2022 (09-14 EET)

**Format:** *Face to face*

**Location:** Thematic Centre Pyli, Prespes, Greece

**Number of participants by sector:** 8 (3 Agriculture, 3 Environment, 1 Administration/Water, 1 Fishery)

**Living lab challenge presented at the beginning of the workshop:** *Loss of biodiversity, vegetation changes around and inside the lakes, population decrease in rural areas and related changes in economy, degradation of water quality in lakes, possible negative effects on tourism related to these issues*

**Key challenges:** Loss of biodiversity, vegetation changes around and inside the lakes, population decrease in rural areas and related changes in economy, degradation of water quality in lakes, possible negative effects on tourism related to these issues.

**Central themes:** Water scarcity and drop in water level in the lakes. Causes and effects on biodiversity, agriculture/fisheries, natural and cultural heritage

**Main sectors concerned:** Water supply, biodiversity, tourism, protection of natural & cultural heritage, fisheries, agriculture, livestock farming

**Time horizon for future narrative:** 2050/ 2070/ 2100

**Central themes:**

1. Identify the relationships between climate change and water quantity and quality, as well as the effects on and interlinkages among various sectors (fisheries, agriculture, livestock farming), as well as the preservation of biodiversity and cultural and natural heritage.
2. Define expectations of stakeholders in terms of policies.
3. Identify areas where interventions and innovations can be particularly helpful in achieving resilience in water management.

**Main sectors concerned:** Water supply, biodiversity, tourism, protection of natural & cultural heritage, fisheries, agriculture, livestock farming.

**Time horizon for future narrative:** 2050/ 2070/ 2100

**Stakeholder gaps:**

1. Decentralized Administration of Western Macedonia and Epirus
2. Western Macedonia Region

3. Fishing Association Psarades
4. Livestock Farming Association of Prespes

**Table 20** First CS4 -Greece Working Group workshop agenda

09.00 – 09.20	Arrivals
09.20 – 09.50	Welcome and introduction of participants
09.50 – 10.00	Agenda and objective of 1 <sup>st</sup> working group workshop
10.00 – 10.10	Introduction to ARSINOE
10.10 – 10.30	Introduction to Case Study 4 Orhid/Prespa Lakes
10.30 – 10.40	Introduction to Living Labs
10.40 – 11.00	Coffee break
11.00 – 12.30	Mental mapping
12.30 – 13.00	Conclusion – setting the LL objectives
13.00 – 14.00	Light lunch

**Living lab problem statement agreed during the first workshop:**

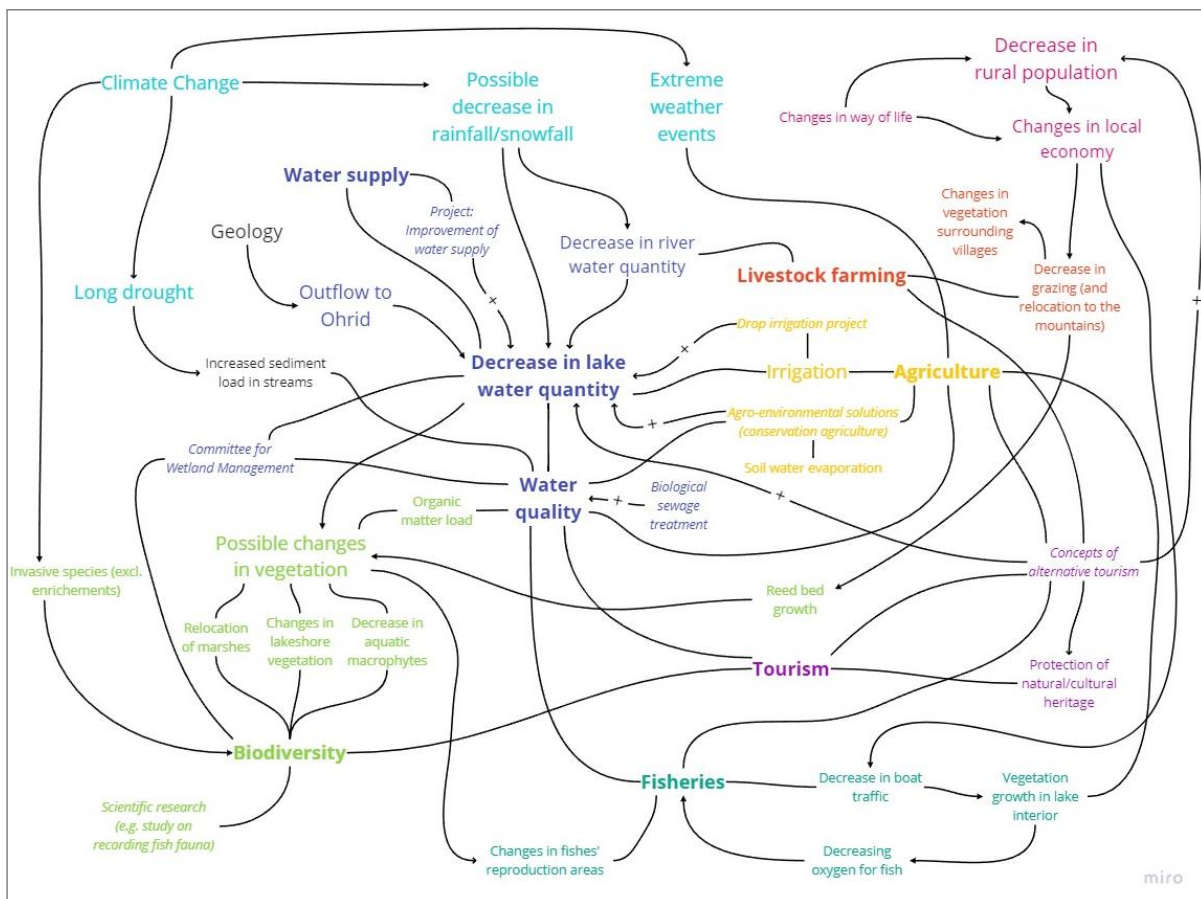
*“Sectors such as biodiversity, agriculture, fisheries, livestock farming, tourism and protection of natural and cultural heritage are affected from climate change in several ways, including possible water scarcity in the future. There are already institutions and ongoing projects, but they have to be supported and expanded, and enriched with new measures and ideas for climate adaptation”.*



**Figure 24** The first National Living Lab was held on July 8<sup>th</sup>, 2022, at Thematic Centre Pyli, Prespes, Greece



**Figure 25** The first National Living Lab was held on July 8<sup>th</sup>, 2022, at Thematic Centre Pyli, Prespes, Greece



**Figure 26** Refined version of the mental map produced during workshop 1.

As seen in the mental map, the main concerns of the group were, besides decrease in the lake water quantity, also its relationship with water quality, biodiversity and economic activities (mainly agriculture, livestock farming, fisheries and tourism).



#### 4.4.5 List the main actions directed to stakeholders between workshops

- **21 July 2022:** the stakeholders of the first National Working Group in Greece have been contacted, in order to share with them a refined draft of the mental map produced during the workshop and request their comments on it.
- Personal interviews were carried out with 4 stakeholders, who could not attend the National Working Group (between 28/7/2022 and 1/9/2022), in order to gather their input and adjust the mental map accordingly.
- **05 September 2022:** the stakeholders of the first National Working Group in Greece have been contacted again to invite them and to inform them that the First Transboundary LL will take place virtually on 23<sup>rd</sup> of September, and also share with them the latest refined versions of the mental map and problem statement.

#### 4.4.6 First National workshop of the LL in Albania

**Date of the first WS:** 12.08.2022 (10-13 CET)

**Format:** Hybrid

**Location:** Tirana, Albania

**Number of participants by sector:** Water sector: 4; Environmental and protected area: 2; Technology, innovation and monitoring: 2; Education: 2; Planning and urban developing: 2; Agriculture and forest: 2

**Living lab challenge presented at the beginning of the workshop:** In Prespa lake there is a quantitative loss and In Ohrid lake there is a loss of quality. Change and loss of Biodiversity which can have an impact on genetic collapse of ecosystem. Pollution discussed as a negative possible impact in the tourism aspects and locally.

**Key challenges:** Both Prespa and Ohrid lakes have continues impact from climate change. Due to the previous events in Ohrid lake (with a loss of the quantity) a negative impact in tourism, agriculture, social, economy. In Prespa lake (loss of the quality) due to climate change impact influences the biodiversity and the tourism aspect of the area.

**Central themes:** Water scarcity and drop in water level of the lakes. Causes and effects on biodiversity, agriculture/fisheries, planning, tourism, environmental and cultural heritage

**Main sectors concerned:** Environmental, Forest, Energy, Water Sector Social, Farming, Tourism, Mining activity ,Industrial, Agriculture, Economic, Urban, Health &Care

**Time horizon for future narrative:** 2050/ 2070/ 2100

Key challenges: Water consumption patterns, sectors' interests and policies, protection of biodiversity dependant on water

**Central themes:**

1. Identify the relationships between climate change and water quantity and quality, as well as the effects on and interlinkages among various sectors (fisheries, agriculture, livestock farming), as well as the preservation of biodiversity and cultural and natural heritage.

2. Define expectations of stakeholders in terms of policies.
3. Identify areas where interventions and innovations can be particularly helpful in achieving resilience in water management;
4. Drafting a transboundary-guideline action plan;
5. Action plan on awareness and dissemination
6. Activities for capacity building, school curricula's and universities

**Main sectors concerned:** social sector, water management, health, environmental systems and biodiversity, agriculture, fishery and fishing, forestry, industry, hydropower generation, tourism, cultural heritage, planning

**Time horizon for future narrative:** 2050/ 2070/ 2100

#### Stakeholder gaps

1. Biodiversity association needs to be taken in consideration
2. Farming and fisheries association to be involved in decision making

**Table 21** First CS4 -Albania Working Group workshop agenda

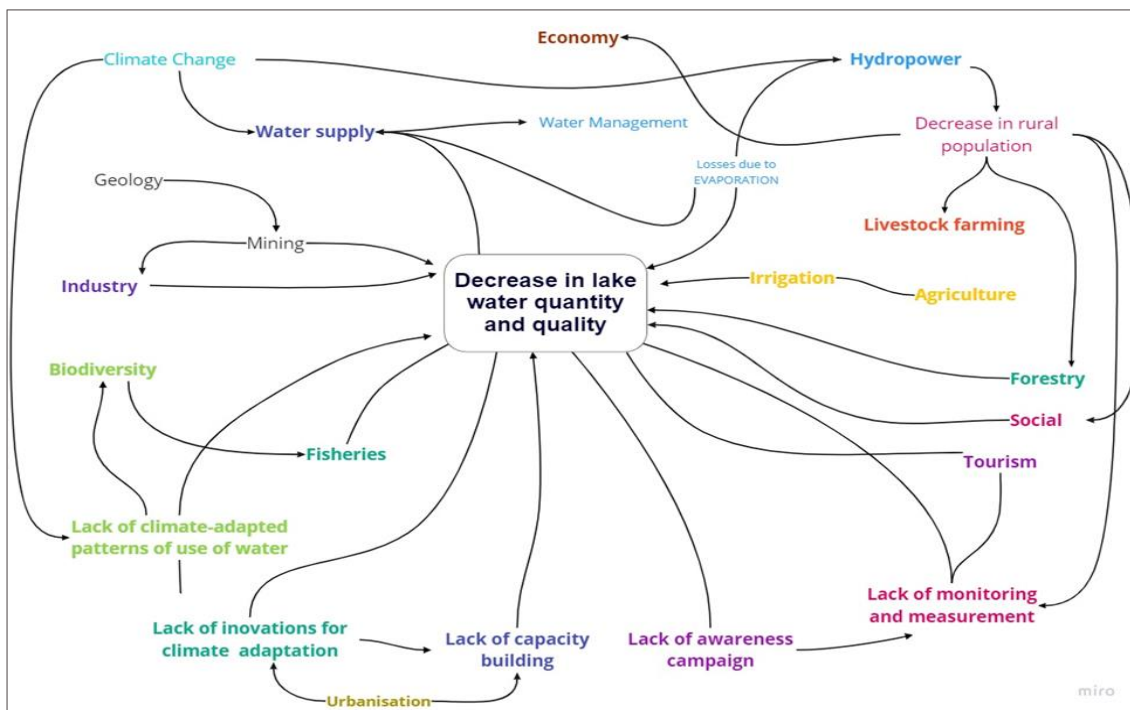
10:00-10:20	Welcome and intro
10:20-10:30	Agenda and objectives
10:30-10:40	Introduction to ARSINOE
10:40-11:00	Introduction to CS4
11:00-11:10	Introduction to Living Lab
11:10-11:20	Coffee Break
11:20-13:00	Mental Mapping
13:00-13:20	Conclusion and next steps

#### Living lab problem statement agreed during the first workshop:

*“Sectors such as biodiversity, agriculture, fisheries, livestock farming, tourism and protection of natural and cultural heritage are affected from climate change in several ways, including possible water scarcity in the future. There are already institutions and ongoing projects, but they have to be supported and expanded, and enriched with new measures and ideas for climate adaptation”.*



**Figure 27** The first National Living Lab was held on August 12th, 2022, at Tirana, Albania



**Figure 28** Refined version of the mental map produced during workshop 1.

In the mental map that was produced during the first national living lab in Albania, two main issues were evidenced in terms of water scarcity: the water quantity and water quality in Ohrid and Prespa Lake.

Main sectors of the first national living lab were: energy, agriculture, water and sewerage, education, urbanization, research and innovation, environmental and protected areas.

Each sector evidenced climate change as one of the main impacts with influence in both lakes in ARSINOE's Case Study 4.

Communication and collaboration between sector in national and international level is needed. Data sharing and international strategies in terms of protection of nature and environment, resilience and urbanization. International adapting strategy should be considered as a new opportunity for the case study in terms of collaboration of authorities, research, academia, innovators and third parties interested.

Actions need to be taken to improve integrally climate adaptiveness of water use in all sectors and, in the same time, to restore and preserve as much as possible natural ecosystems of the lake regions.

Measurement and monitoring data for the lakes with open access, intelligent farming can be considered as an important output of the case study. Capacity building for water issues, citizens and institutions awareness in water scarcity and pollution.

#### 4.4.7 List the main actions directed to stakeholders between workshops

**25 August 2022:** the stakeholders of the first National Living Lab in Albania have been contacted again and the SIA Workshop Reporting and Mental Map were shared with them.

**10 September 2022:** the stakeholders of the first National Living Lab in Albania have been contacted again to invite them and to tell them that the First Transboundary LL will take place virtually in September.

#### 4.4.8 First Transboundary workshop of the LL

**Date of the first Transboundary WS:** 23.09.2022 (09-12 CET)

**Format:** Remote

**Location:** Remote (Skopje, Tirana, Athens)

**Number of participants:** 27.

**Participants per sector:**

North Macedonia: water sector-administration:3; agriculture:2; tourism:2; industry:1; environment:1; cultural heritage:1; Social Sciences/university:1; fishery:1; energy:1

Albania: planning and urbanization: 2 ; environmental and protected areas: 2; water sector: 2; social and education: 2; agriculture and forestry: 1; Institute of monitoring, education:1.

Greece: 5 total (3 Environment, 2 Administration/Water)

**Living lab challenge presented at the beginning of the workshop:** Water consumption patterns, sectors' interests and policies, protection of biodiversity dependant on water.

**Key challenges:** Water consumption patterns, sectors’ interests and policies, protection of biodiversity dependant on water

**Central themes:**

1. To compare and compile prospections of stakeholders from the three countries
2. To identify similarities, differences and gaps in problem formulation
3. To set basis for further steps in problem solutions

**Main sectors concerned:** social sector, water management, health, environmental systems and biodiversity, agriculture, fishery and fishing, forestry, industry, hydropower generation, tourism, cultural heritage.

**Time horizon for future narrative:** 2050/ 2070/ 2100

**Key challenges:** Water consumption patterns, sectors’ interests and policies, protection of biodiversity dependant on water

**Main sectors concerned:** social sector, water management, health, environmental systems and biodiversity, agriculture, fishery and fishing, forestry, industry, hydropower generation, tourism, cultural heritage.

**Time horizon for future narrative:** 2050/ 2070/ 2100

**Stakeholder gaps:** n/a

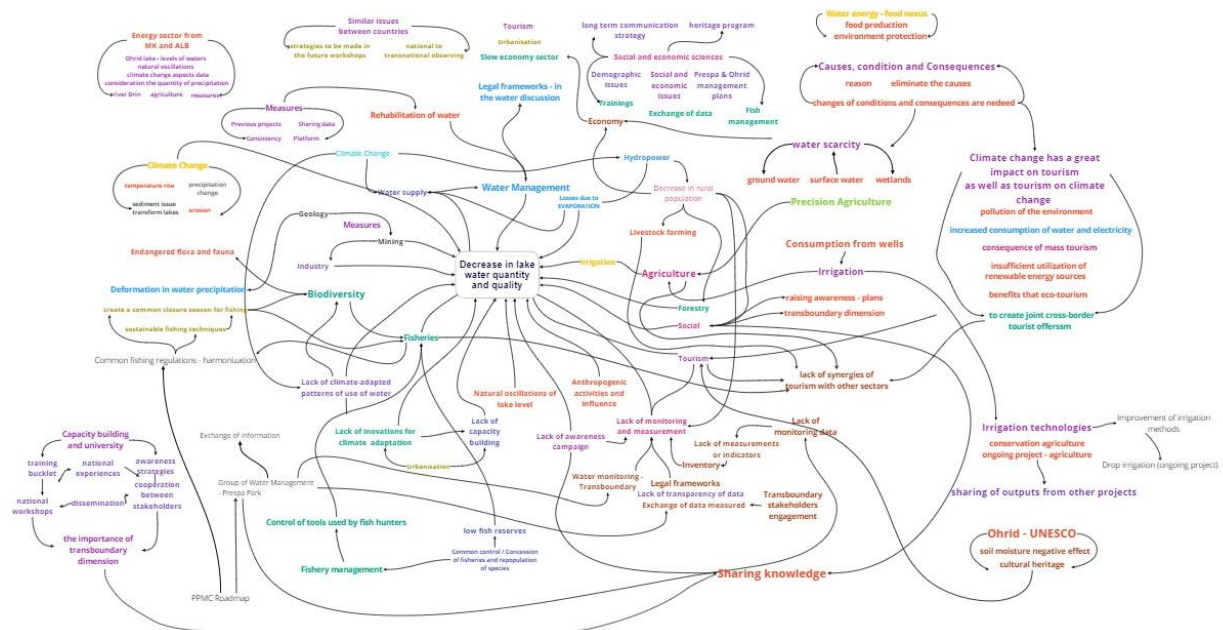
Table 22 First CS4 -International Living Lab workshop agenda

09:00-09:15	Welcome and intro
09:15- 09:20	Objectives of the Transboundary Living Lab 1
09:20-09:25	CS4 objectives and expected outputs
09:25-09:35	Overview of results produced on National Workshops
09:25-09:45	Problem statement(s) at National Workshops
09:45-11:15	Mental Mapping: Alignment and Cohesion in Problem Statement
11:15-11:30	Conclusions and next steps

**Living lab problem statement agreed during the first workshop:**

*“Not enough integration of climate adaptive actions by individual sectors, lack of symbiotic attitude towards use of water among sectors, need for improved water measurement and monitoring on transboundary level, as well as for further transboundary cooperation, as a pre -condition for an effective water management in long terms.”*

### Modelling of lake - water balance - users



**Figure 29** Refined version of the mental map produced during the first CS4 international workshop.

## 4.4.9 Main actions directed to stakeholders between workshops

- **1 September 2022:** the stakeholders invited to the first Transboundary Living Lab have been contacted again to prepare it for the 23<sup>Rd</sup> and the SIA Workshop Reporting and Mental Map from their respected country was shared with them.
- **6 October 2022:** the stakeholders of the first Transboundary Living Lab have been contacted again to invite them and to tell them that the Second Transboundary LL will take place virtually in February, 2023.

## 4.5 Case Study 5 – Canary Islands

### 4.5.1 Introduction to the Living Lab focus

The Canary Islands have a subtropical climate that allows a number of fruit trees to be grown that are not cultivated in the rest of Spain. In addition, again due to the climate and natural isolation, the islands have maintained varieties that have given rise to numerous designations of origin in the field of vines, and the banana has also received a protected geographical distinction. All these crops are very sensitive to changes in temperature, and to water shortage deriving from it. This is why a context of climate change, in which a general increase in global temperatures is to be expected, could seriously affect these tropical crops, which are also the Islands' main export.

## 4.5.2 First Living Lab workshop

**Date of the first WS:** 21/06/2022

**Format:** Face to face.

**Location:** University of La Laguna.

**Number of participants:** 14 participants and 3 facilitators. Public administration (5); Water (3); Agriculture (4); Digital tools (2).

**Living lab challenge presented at the beginning of the workshop:** “how will the increase of temperatures affect the main crops of the Canary Islands?”

**Key challenges:** Temperature increase, change of crops, change of cultivation sites, irrigation, use of technology, regenerated water, recovery of abandoned agricultural land, assertive communication, etc.

**Central themes:** Climate change, generational replacement, water availability, tourism model for the islands, food sovereignty

**Main sectors concerned:** agriculture, water, tourism, wastewater

**Time horizon for future narrative:** 2050

**Stakeholder gaps:** tourism, policy makers.

**Table 23** First CS5 Living Lab workshop agenda

10.30 – 11.00	Welcome and coffee
11.00 – 11.10	ARSINOE project presentation
11.10 – 11.20	Participant’s presentation
11.20 – 11.30	Introduction of the Mental Mapping exercise
10:00 – 10:15	Discussion
10:15 – 10:30	Discussion and questions

### Problem statement agreed during the first workshop:

*“To have truthful and adequate information based on scientific and traditional knowledge, including environmental, agronomic, economic and social aspects and taking advantage of the opportunities provided by digital tools. All this aimed at facilitating participatory decision-making at all levels, for the adaptation of agriculture to climate change and for its ecological transformation, taking into consideration the social and, specifically, gender perspective.”*

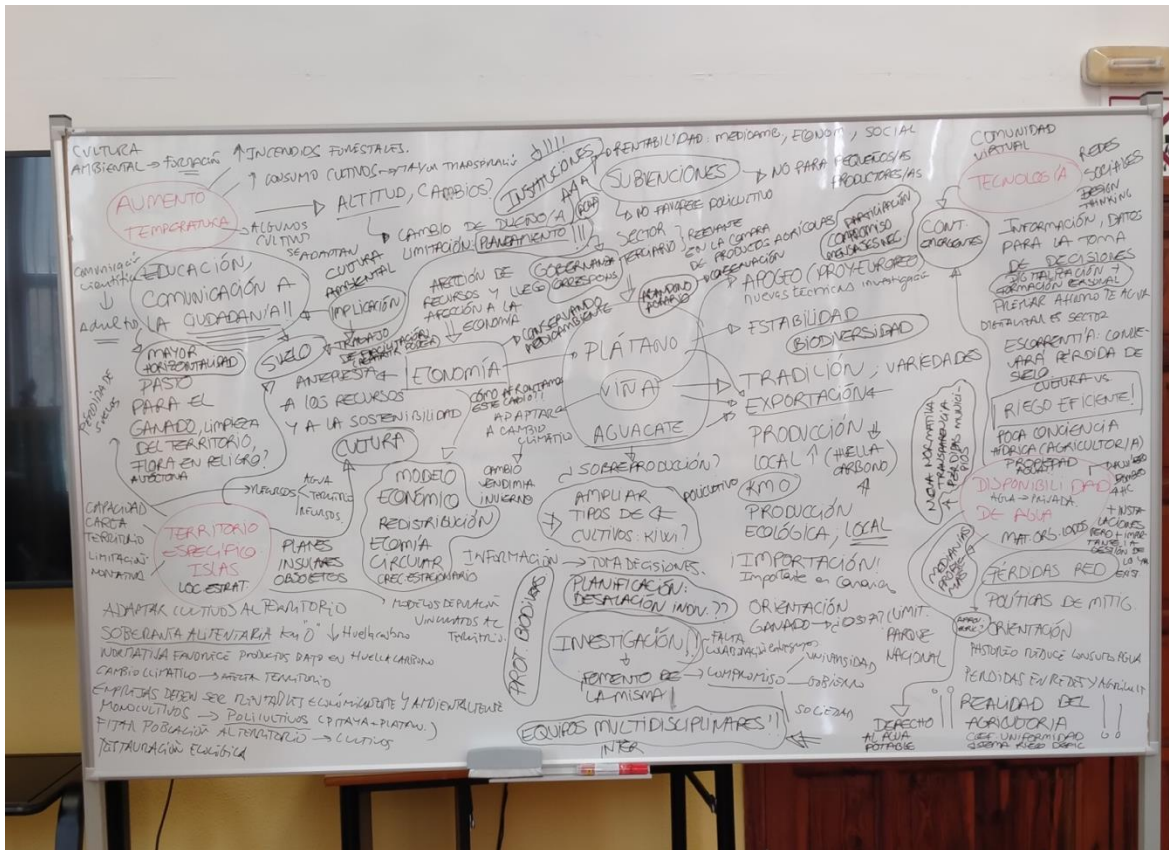


Figure 30 Mental Map produced during the workshop.

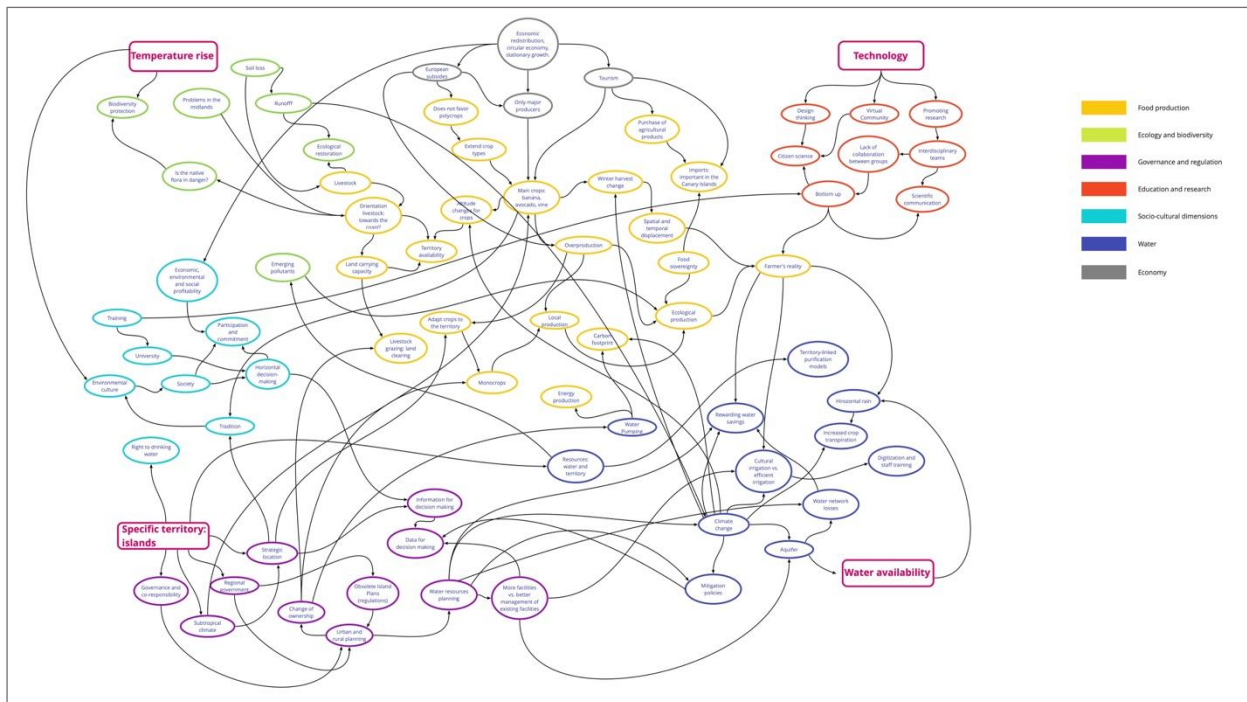


Figure 31 Refined version of the mental map produced by CS5 team



The mind map has started from 4 strategic axes, which are the following: i) temperature increase, ii) technology, iii) water availability and iv) all this applied to a specific territory such as the islands.

Our objective was to determine what the main problem is that crosses all these aspects in the Canary Islands, when specifically, we talk about how the increase in temperature will affect the main crops in the Canary Islands.

With respect to the situation of crops in the Islands, the following factors affecting the sector have been determined:

- The increase in temperature increases crop evapotranspiration, which is closely related to the availability of water that crops will need to maintain themselves.
- On the other hand, and in relation to water availability, in the midlands of the Canary Islands there is a natural process of capturing humidity from the trade winds, which allows rainfed crops to be maintained naturally. In a scenario of climate change, this situation could change, which generates an uncertain future where we could technify the plots to make a forced irrigation reach them, or we could change the type of crop, or variety, etc.
- Another of the alternatives presented to us due to climate change is the possibility of gaining height when cultivating, but this in turn generates various aspects to be taken into account such as: (i) there may be a change of owner when changing height, (ii) it could be that the land to which we refer is contemplated in the planning as a different use, which does not allow us this solution, (iii) naturally, at least on the island of Tenerife, there is the limitation of the Teide National Park, iv) gaining height also means having to carry water to a higher point, which translates into greater pumping, which may in turn increase the carbon footprint in this aspect.
- The marked tendency to monoculture that exists in the Islands, favored by subsidies, is also noted. Monocultures do not give rise to research on what other types of crops can be grown better in a context of climate change, and the attendees suggest that the use of polyculture would provide tools for knowledge and diversification of the agricultural supply in the archipelago, which could have a very positive impact on the issue discussed in the session.
- In addition, the need to increase food sovereignty in the Canary Islands is highlighted, thus reducing imports (nowadays very important in the Islands) and exports, promoting a km0 agriculture and consumption.
- The important role that the tertiary sector could play in this aspect has also been highlighted, as hotels are large consumers of agricultural products, which would make a difference if they demanded the purchase of local products.
- With regard to subsidies, it was noted that these tend to favour the large producer rather than the small producer, which generates a certain uneasiness and abandonment on the part of the institutions, making the option of working in agriculture less and less attractive to young people. It is mentioned that there is no generational replacement in the primary sector in the Islands.

The fact that we are talking about such a specific territory as the islands also raises the following intrinsic questions:

- The Canary Islands have a strategic location between three continents, in addition to having a subtropical climate that favours the cultivation of banana and avocado, which is gaining strength day by day.
- Of course, a natural limitation of the Islands is the availability of territory and, therefore, of soil. It is important to consider the carrying capacity of the territory.
- With regard to livestock, a number of questions arise: Would it be possible to graze to other areas of the islands such as the south, is livestock a danger to the native flora, are livestock suffering from climate change in terms of availability of natural pasture?
- Water is a very important element in the islands, especially in the Canary Islands, where groundwater and desalination are particularly relevant.

The water sector is a sector that is managed in a mixed way in the Islands, that is, with public and private funds. This characteristic endows the sector with a series of advantages and disadvantages; however, we will focus on the comments that arose from the state of the networks and the form of irrigation used by the farmers:

- On the one hand, the aquifer has been exploited in the Canary Islands since the 1920s, providing water resources especially to the western islands where, in addition, the largest consumer of water is agriculture.
- On the other hand, the state of the distribution networks is, in general, deficient. This leads to high losses of drinking water along the supply chain, resulting in over-drainage and over-abstraction of groundwater (with the associated energy and carbon footprint implications).
- Greater digitization of the network would help to detect where the most problematic points of the network are and would help to better manage and maintain it, but this must be accompanied by training for staff, who know how to integrate and treat the data derived from introducing technology into the network.
- In addition, we should not forget that the right to water is a universal right, and not all farmers and ranchers in the Canary Islands have access to water in their installations (for example, the case of the *medianías* mentioned above).
- With respect to the irrigation used by farmers, we also find a series of difficulties such as the following: i) lack of information when it comes to correctly managing the irrigation needed for their crops, ii) lack of digitalization of irrigation systems, iii) cultural practices instead of practices derived from a specific study depending on the location and crop used. Therefore, there is a need to promote farmers' knowledge so that they can have information that will help them make the best decisions. Evidently, this is a strategy that must be approached with a technological base.

Therefore, these considerations lead us to the more technological area, where the following observations were made by the group:

- Virtual communities and social networks can be used to publicize local problems, and make people feel that they are part of a common problem.
- Information is key to good decision-making, and data is a very powerful tool for good management of facilities, in this case, agricultural facilities.
- All the information that science deals with and extracts must be adequately communicated to society. Moreover, it is interesting that it is not only scientists who generate knowledge, it is necessary that farmers become "sensors of the territory" (as was rightly mentioned in the session), that they become involved in the process of doing science.
- All this requires, therefore, interdisciplinary teams.



**Figure 32:** Photo of the first CS5 Living Lab workshop with the initial version of the mental map



**Figure 33** Photo of the first CS5 Living Lab workshop.

### 4.5.3 Activities carried out between workshops 1 and 2

- **6 September 2022:** finalisation of the report after the first session, as well as finalisation of the mental mapping activity in Miro.
- **15 October 2022:** on the occasion of the Rural Women's Day, stakeholders from the first workshop session were contacted again to invite them to the Rural Women's event and to inform them that the second session would take place in January 2023.

## 4.6 Case Study 6 – Black Sea

As a trans-boundary case study, it was decided that three (3) separate Working Groups will be organized and held prior to the International Living Lab, to enable the involvement of a wider group of stakeholders and prevent excluding local stakeholders due to barrier language. As a result, during M1-M12, three (3) national online Working Groups workshops were held, one in Romania, one in Bulgaria and one in Turkey, where local stakeholders were invited to implement the Living Lab activities at national level. Finally, an international Living Lab workshop was held, where the results of the national Working Groups were discussed from a regional perspective (Western Black Sea). The focus of the CS is related to freshwater resource management from source-to-sea in the context of climate change.

### 4.6.1 First workshop of the LL

#### Bulgarian Working Group

In preparation for the first LL workshop key stakeholders were contacted and 1-on-1 meetings with them were. All stakeholders were engaged in a professional manner, by identifying the exact contact person and directing the communications in a suitable to the type of stakeholder way. The pre-workshop

meetings allowed the engagement of additional stakeholders who couldn't attend the WG meeting, but deemed impactful and/or useful to the development of the Ropotamo part of CS6.

A list of the pre-workshop meeting held:

- Municipality of Primorsko– June 2022
- Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences (IBER-BAS) - June 2022
- Ministry of Environment and Water of Bulgaria – July 2022
- University “Prof. d-r Asen Zlatarov” – Burgas – July 2022
- Regional Inspectorate of Environment and Water (RIEW) - Burgas – August 2022
- Black Sea Basin Directorate – August 2022

All meetings were conducted online, via Zoom.

**National workshop:** Bulgaria

**Date:** 09/09/2022

**Format:** remote

**Location:** Zoom

**Number of participants by sector:** 5 persons from 4 stakeholders (Public Authority, Academia, Research Institution)

**Key challenges:** Identification of problems connected to the protection and management of the Ropotamo Area

**Central themes:** Climate change and its effects on different aspects: Biodiversity, Environmental protection and human activities, challenges to dealing with issues; Identification of relevant stakeholders in terms of solutions to existing problems.

**Main sectors concerned:** Biodiversity, water, tourism, infrastructure

**Time horizon for future narrative:** 2050

**Key challenges:**

- Drying of flooding of certain areas of the reserve and changes in vegetation
- Invasive species and their management
- Impact of infrastructure on the protected area and of the protected area status on developing infrastructure
- Pollution of the Ropotamo River (silting and flooding)

**Central themes:** Extreme events (drying or flooding of certain areas), invasive species, infrastructure development, pollution (wood and plastic), beach and picnic activities in proximity of protected areas

**Main sectors concerned:** Climate Change adaptation, Infrastructure, Society (Population),

**Time horizon for future narrative:** 2050

**Stakeholder gaps:**

As identified in the process of mental mapping:

- Ministry of Environment and Water (MoEW) – not a GAP, but wishes to be involved at a later stage (Workshop 2 onwards; RIEW – Burgas is set to represent the ministry on local level)
- Executive Environment Agency (EEA)
- Road Infrastructure Agency (RIA)
- National Institute of Meteorology and Hydrology (a contacted stakeholder in the project)

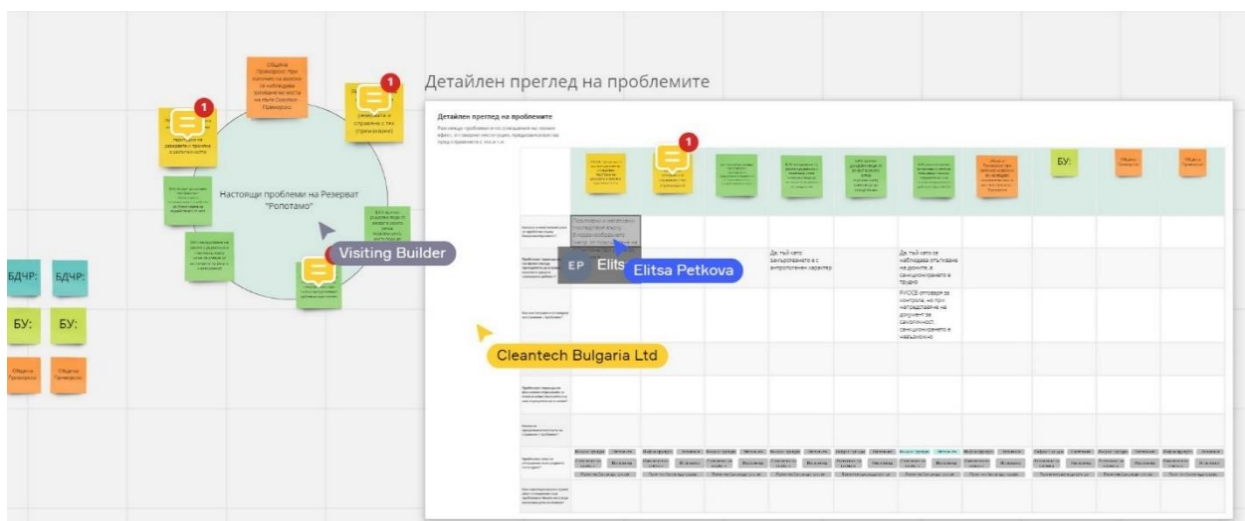
### Key concerns:

There is a conflict between area development and environmental protection (Nature 2000 - protected area)

Frequent periods of drought / abundant precipitation affect the functioning of ecosystems - the capacity for adaptation - Extreme events and pollution formulated as dangers to biodiversity

### Living lab problem statement agreed during the first workshop:

*How can we make sure to be in the best position to effectively tackle climate change effects in the Ropotamo reserve?*



**Figure 34** Refined version of the mental map produced by the CS6 Bulgarian working group after the workshop.

Knowing the difficulties to sustain the online discussion and interactions with their local stakeholders, the facilitation team opted for a more structured approach for harnessing local knowledge. This allowed the active participation of online participants while covering all problems and related challenges the region face when it comes to fresh water management. The result was used to set the boundaries for the international living lab mental mapping.

### **Main activities directed to stakeholders between workshops**

Following the guide on engaging stakeholders; sharing relevant information with them; bilateral meetings to increase willingness to participate in the process; bringing on board stakeholders identified as gaps.

#### **Romanian Working Group**

**National workshop:** Romania

**Date of the first WS:** 14/09/2022

**Format:** remote

**Location:** Zoom

**Number of participants by sector:** 15 persons from 10 organisations (1 – NGO, 2 – Policy, 1 – Industry, 6 – R&D)

**Living lab challenge presented at the beginning of the workshop:** Freshwater management in the context of climate change in the Danube Delta

#### **Key challenges:**

- Eutrophication and Biodiversity loss
- Changes in hydrologic regime; Erosion
- Invasive species ; How to preserve / restore the ecosystems services
- Changes in the sediments on the Danube channels and in the coastal area,
- Massive discharge of sediments,
- Wastewater management,
- Residual water quality of the Danube water during periods of drought,
- Delays in the transition of the circular economy model,
- Understanding the differences between acclimatization / adaptation for biofiltration bacteria

**Central themes:** Water quality and quantity; Biodiversity; Sediments; Regional development

**Main sectors concerned:** Aquaculture/Agriculture, Environment, Tourism, Economy, Society

**Time horizon for future narrative:** 2050

#### **Stakeholder gaps:**

- Tourism, Agriculture / Aquaculture
- Local and regional authorities

#### **Key concerns:**

- There is a conflict between area development and environmental protection (Nature 2000 - protected area)
- Many villages are isolated / access only by water
- Long periods of eutrophication generate multiple problems on the trophic chain within the ecosystem

- Frequent periods of drought / abundant precipitation affect the functioning of ecosystems - the capacity for adaptation

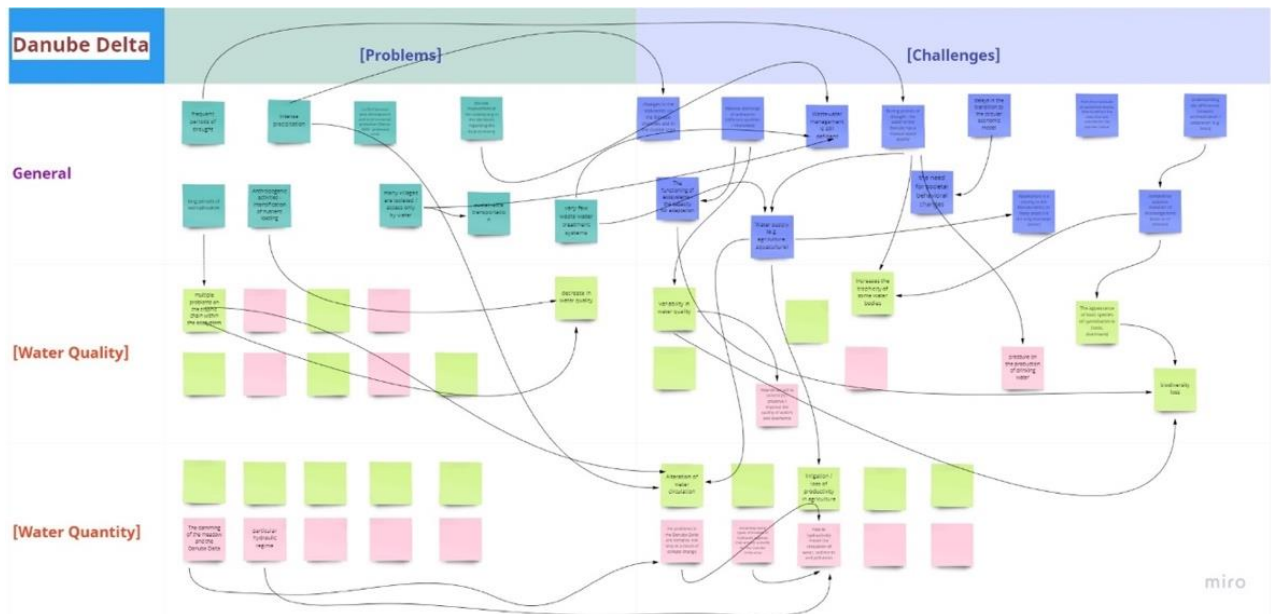


Figure 35 Refined version of the diagram produced by the local team after the workshop.

Knowing the difficulties to sustain the online discussion and interactions with their local stakeholders, the facilitation team opted for a more structured approach for harnessing local knowledge. This allowed the active participation of online participants while covering all problems and related challenges the region face when it comes to fresh water management. The result was used to set the boundaries for the international living lab mental mapping.

After the review of the mental map that was generated from the workshop, the following relationships were revealed:

- There is a conflict between area development and environmental protection (Nature 2000 - protected area)
- Many villages are isolated / access only by water
- Long periods of eutrophication generate multiple problems on the trophic chain within the ecosystem

Frequent periods of drought / abundant precipitation affect the functioning of ecosystems - the capacity for adaptation.

### Activities carried out between workshops 1 and 2

Bilateral meetings to promote the ARSINOE project and enhance the interest to participate in the 2<sup>nd</sup> workshop; direct contact with stakeholders identified as missing in the 1st workshop.



### **Turkish Working Group**

METU IMS has been working on marine water quality. The mucilage occurrence in 2021 appealed public interest in the issue and the theme for the Turkish Working Group was selected as “water quality”. Based on this theme, stakeholder mapping was conducted and those identified with “high interest/high impact” were invited to the working group. The number of stakeholders invited was 24.

**Date of the first WS:** 16/09/2022

**Format:** remote

**Location:** Zoom

**Number of participants by sector:** 15 participants from 11 stakeholders joined the discussion. There were 3 NGOs, 1 research institute, 1 business association, 2 local government bodies, and 4 public institutions.

### **Living lab challenge presented at the beginning of the workshop:**

The focus of Turkish Working Group discussion, focused on the land-sea interaction along the south-eastern part of the Black Sea.

**Key themes:** Marine water quality, climate change, natural processes, anthropogenic processes, resilience, climate change adaptation, innovation, and blue economy.

These themes were debated in relation to water, energy, agriculture/livestock, tourism, construction, health, waste management, urban management, fishing/aquaculture, and ecosystem services, which were the result of the participants’ inputs.

### **Main challenges:**

- urban development,
- tourism development,
- coastal population growth,
- temperature rise,
- energy generation,
- extreme events,
- lack of sectoral plans and policies,
- agriculture/livestock,
- wastewater discharge,
- governance,
- lack of conservation areas and identified key species,
- fishing/aquaculture, and
- climate change.

**Stakeholder gaps:** no stakeholder gap is identified, the different groups from the quadruple helix were represented in the workshop, the 15 different stakeholders reflected the key sectors to be heard in relation to the keys challenges discussed.

### **Living lab problem statement agreed during the first workshop:**

*“sustaining safe operation of ecosystem services in the Black Sea”.*



Figure 36 Mental Map Generated During the Turkish WG Meeting

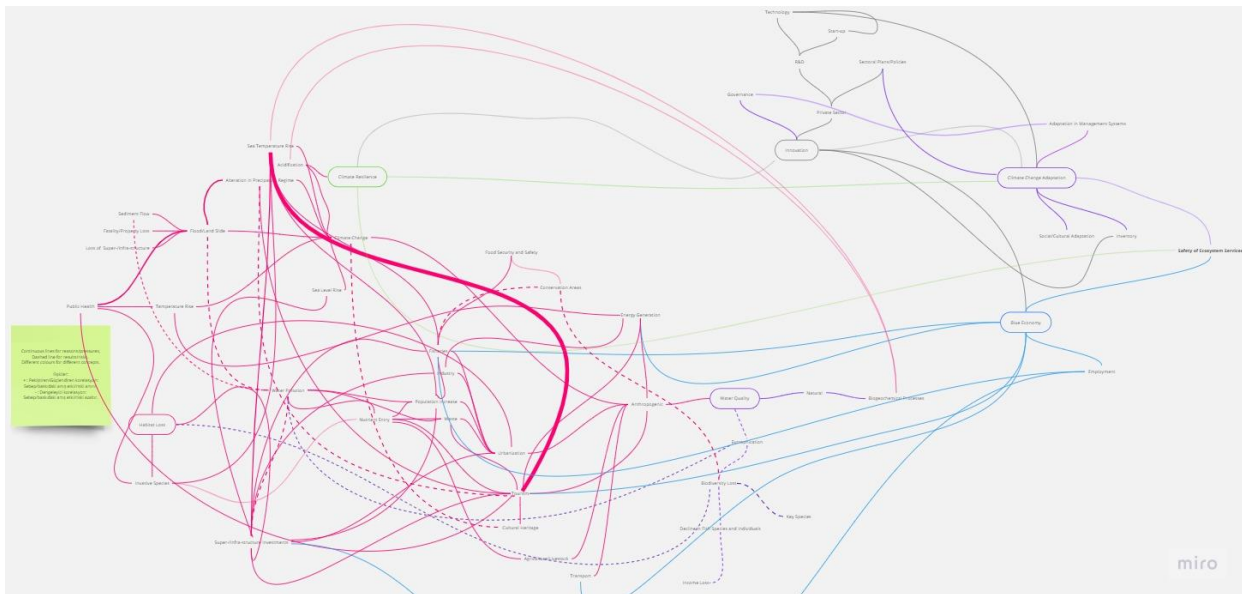


Figure 37 Refined Mental Map

With the discussions a mental map (see Figures 34 and 35) was generated and the below relationships were revealed:

- Population rise requires more infra- and super-structure investments.
- Increasing tourism and energy consumption also requires more infra- and super-structure investments.

- Infra- and super-structure investments will increase employment and contribute to the blue economy sectors.
- Sea temperature rise will increase tourism in the area.
- Enhancing environmental legislation will improve waste management and emissions to marine water.
- Enhancing governance among the stakeholders will contribute to adaptation in management systems.
- Preparation of sectoral plans/policies will contribute to climate change adaptation.
- Climate change adaptation will support resilience.
- Climate change adaptation and increased resilience will promote the safety of ecosystem services.
- Declaration of conservation areas will promote biodiversity and food security and safety.
- Declaration of conservation areas will protect fish stocks.
- Low water quality results in habitat and biodiversity loss.
- Biodiversity loss will result in the depletion of fish stocks.
- Depletion of fish stocks will result in income loss for the fishermen.
- Nutrient entry will promote eutrophication.
- Invasive species will result in habitat loss.
- Increasing population and tourism will bring public health risks.
- Changing precipitation regimes will result in frequent floods and landslides.
- Extreme events will cause fatalities and property loss.
- Extreme events will require investments in infra- and super-structure.
- Sea temperature rise and acidification will alter natural biogeochemical processes.
- Industry and urbanization will cause uncontrolled wastewater discharge.
- Urbanization will generate waste and wastewater.
- Human activities will generate noise pollution.

### **Activities carried out between workshops 1 and 2**

After the first workshop, the participants received information letters regarding the developments and events which took place under the scope of ARSINOE.

#### **2.1.1.4 International Living Lab**

**Date of the International Living Lab:** 17/10/2022

**Format:** remote

**Location:** Zoom

**Number of participants by sector:** 14 participants from 5 stakeholder categories (1 – NGO, 6 – Policy Makers/Government, 1 – Private Sector, 5 – R&D, 1 Association)

**Key challenges:** Land-Sea Interactions in the Western Black Sea region in the context of climate change

**Central themes:** Water Quality Degradation; Agriculture; Invasive Species; Biodiversity Loss; Tourism.

**Time horizon for future narrative:** 2050

**Main sectors concerned:** Aquaculture/Agriculture, Environment, Tourism, Energy, Economy, Education & Training, Research & Development & Innovation, Society

**Stakeholder gaps:** *Increased NGOs participation.* Organisations with a regional perspective (basin scale) such as the Black Sea Commission, Black Sea Ngos Network, CPMR...

**Key concerns:**

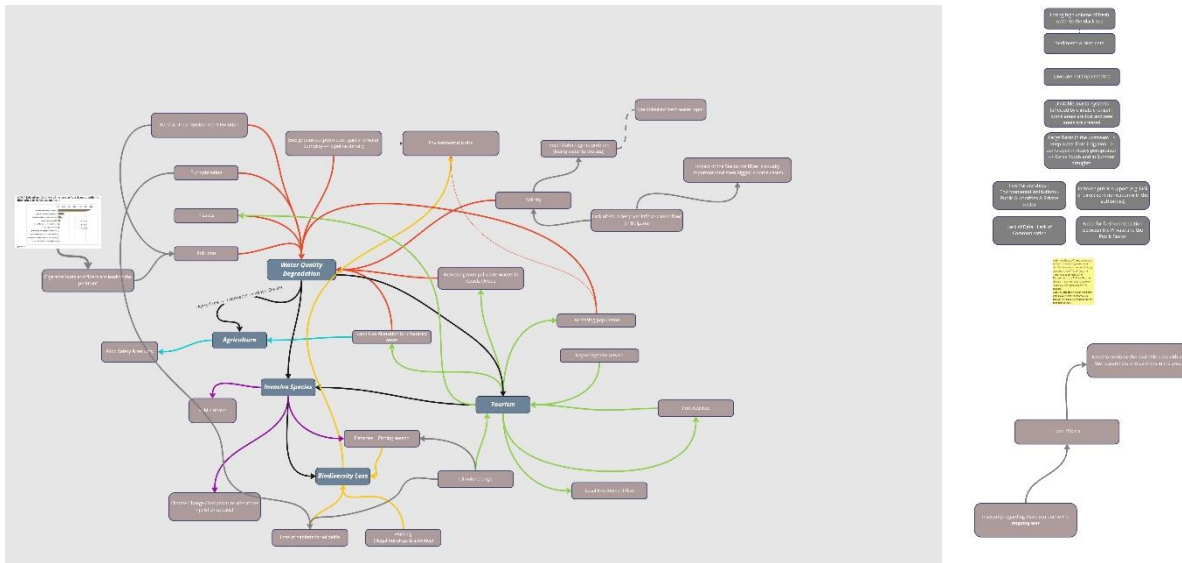
- More and more species affect the biodiversity;
- Agriculture activities affecting the water quality;
- Water quality is also affected by the energy sources and the water pumping that takes place in land uses in the Black Sea.

**Table 24** Agenda of the First International Living Lab workshop for CS6

10.00 — 10.10	What is ARSINOE? + CS6: Black Sea Presentation
10.10 — 10.15	Intorduction to the Living Lab: the SIA approach
10.15 — 10.30	Identified challenges in local Working Groups
10.30 — 10.40	Introduction of the Challenge
10.40 — 10:45	Cofee Break
10:45 – 11.50	System Mapping — Open Discussion
11.50 — 12.00	Recap

#### **Living lab problem statement agreed during the first workshop**

*The discussions conducted during the 1<sup>st</sup> International Living Lab were mostly based on the concerns the Stakeholders have about the area. A main point that was raised in Climate change and the affects it has directly and indirectly on the Black Sea. For instance, climate change affects tourism by prolonging the tourist season as well as the intrusion of invasive species. In continuation, increased tourism produces more municipal waste that end up in water, leading to greater water quality degradation. Tourism also leads to land use alteration to urbanized areas, affecting to the decrease of agricultural sites. This raises the issues of food safety & security (already affected by climate change). Furthermore, the overuse of nutrients in agriculture leads to water quality degradation and pollution. In general, discussions were made within the framework of exploring the land-sea interactions.*



**Figure 38** Refined Mental Map of the first international Living Lab of CS6

During the workshop, participants stated, from their point of view, which issues are the most important in the region. This led initially to the identification of some general issues, such as “rural & urban environment pollution” and “climate change”, that helped unravelling the participants’ concerns, leading to the specification of causes, such as the pipeline density due to energy sources and land uses. Some participants were even more specific, providing information on which is the leading pollutant for the seacoast. During the conversation the issues mentioned were linked according to their co-dependence and influence. Tourism, for instance, is a main source of pollution, as it increases port activities, helps in alien species invasion and increases municipal waste and plastic use and ultimately degrading water quality. On the other hand, tourism was identified as an important activity for the economy of the Black Sea region, as it increases port activities and raises local employment. Another core issue is climate change. The raise of temperatures aids in alien species invasion, extends fishing period, directly aiding in the loss of biodiversity, but at the same time extends high-tourist season which is something desired by the locals. These opposing, yet interesting views, were depicted in the main frame of the mental map. The connections made were refined after the analysis of the Living Lab, the integration of the post-workshop questionnaire and the national Working Groups participants’ views. The end-product is a quite entangled mental map with “Agriculture”, “Water Quality Degradation”, “Invasive Species”, “Biodiversity Loss” and “Tourism” in the centre of the discussion.

Moreover, all the comments that were made and cannot be directly connected to other main issues, were written down in a separate section, as, even though they cannot be directly part of the mental map, they are still valuable and useful for further discussion and that can be used as “food for thought”. Such comments include the need to increase of public support in data collection, monitoring and direct communication between the authorities and the lack of interaction between the Private and the Public Sector in the region.

### Activities carried out between workshops 1 and 2

After the first Living Lab, the participants received a follow up questionnaire regarding the developments and events took place under the scope of ARSINOE.

## 4.7 Case Study 7 – Southern Denmark

### 4.7.1 Introduction to the Living Lab focus

During the first period of ARSINOE, it was discussed among the partners in CS7, including the additional 3 Wadden Sea municipalities who are not formal partners, how to work with the SIA and the Living Lab (LL) in the project.

Through these discussions, the partners agreed to focus on the following specific geographical area in Esbjerg:

An area along the coast of Esbjerg and part of the inner city was in 2018 pointed out by the EU Flood Directive as in severe risk of flooding from storm surge. According to law this obliged the municipality of Esbjerg to develop a risk management plan. To ensure a holistic management of water in the area, Esbjerg Municipality themselves identified an area in the central part of the city, which is in high risk from flooding from surface water as well as high groundwater levels, as per the Danish Law of Planning (in Danish: Planloven). A Climate & Risk Management plan for Esbjerg city and harbour 2022-27 was made in close cooperation with relevant stakeholders and adopted by the City Council by end of 2021.

The plan's focus is the area in the most northern part of the city because the area is very low-lying and besides from sea water receives surface water from quite a huge catchment area upstream the roundabout on Strandby Plads. In the Climate and Risk Management plan, 4 main actions were identified to be highly prioritized, which point towards managing security to people and assets from flooding in the area along Esbjerg city and harbour using a co-creation approach with stakeholders and civil society.

This was therefore chosen as a possible focus for our LL.

During the LL process we consider that a number of existing plans and projects are already under development and will cause influence on the LL area. This is the case e.g., for the strategic plan *Esbjerg to the Coast*, *Coast & Art*, *Comprehensive plan for the city centre of Esbjerg* and finally *the project for a storm surge barrier along the area*.

That several planning processes and potentially synergetic projects run in parallel tracks with the need for integration is a fully normal situation for urban development, and we didn't find this as an obstacle for implementing the SIA approach, but rather as an advantage, since it dramatically increases the potential for the LL to lead to real-life innovations and value creation.

The initial formation of the "long stakeholder list" took place during a physical meeting in Esbjerg with participation of all partners in the case study as well as the other municipalities in the Wadden Sea region.

The list was later refined, and the matrix analysis was done by DTU and Esbjerg Municipality as preparation for choosing participants to be invited for the LL and the following workshops.

In preparation for the first LL workshop, 3 "coffee-meetings" were held in order to introduce the project and concept, prepare key stakeholders and ensure support for the process to come.

- The first one in June 2022 with the emergency preparedness agency and the police.
- The second one in October 2022 with the utility company.
- The third one also in October 2022 with the Port of Esbjerg.

These coffee-meetings were found to be extremely valuable.

## 4.7.2 First Living Lab workshop

**Date of the first WS:** 11/10/2022.

**Format:** Face to face.

**Location:** NorSea House of Offshore Innovation, situated at the harbour of Esbjerg.

**Living Lab Focus:** Security from flooding in the area along Esbjerg city and harbour.

**Participants:** 14 stakeholders (and 2 facilitators from Esbjerg Municipality and DTU). Business/industry: 6; Government/policy makers: 6; Local citizens: 2

**Central themes:** Risk of flooding, industrial development, urban development, connection between coast and city, economy/financing, and involvement of civil society.

**Main sectors concerned:** Business and industry, Harbour (port of Esbjerg), Investment (business and urban development), Housing.

**Time horizon for future narrative:** 2050

**Stakeholder gaps:** Energy sector.

Three representatives from the business side couldn't make it for the first workshop but wanted to participate at the next one.

The workshop was introduced with information about ARSINOE and the SIA approach and then followed by an introduction to the geographical area of the LL and the challenges. Experiences from historical storm surges was presented, especially the storm surge in 1981, which caused severe material damage at the harbour as well as in the lower part of the city.

**Table 25** First CS7 Living Lab workshop agenda

17:00—17:10	Welcome and purpose of the workshop
17:10 — 17:30	Agenda and presentation of participants
17:30 — 17:40	Introduction to ARSINOE
17:40 — 18:00	Introduction to Esbjerg as a case
18:00 — 18:30	Food (Shared areas outside the meeting room)
18:30 — 18:40	Introduction to the LivingLab method
18:40 — 19:40	Mindmap
19:40 — 20:00	Wrapping up and the process towards next workshop

### Problem statement agreed during the first workshop:

The final conclusion on a joint problem statement was not reached during the first LL workshop. This task remained for the facilitators to work on in the period between the first and the second LL workshops.

*“How to ensure efficient flood risk management making the area robust towards citizens safety as well as investment safety for both existing as well as future buildings and assets, built upon shared solutions and financing towards mitigating storm surge risk and more individual solutions for extreme rainfall, supported by the public as well as civil society?”*



Figure 39 Photo of the first CS7 Living Lab workshop.



Figure 40 Mental Map, as produced during the Workshop (without refining)



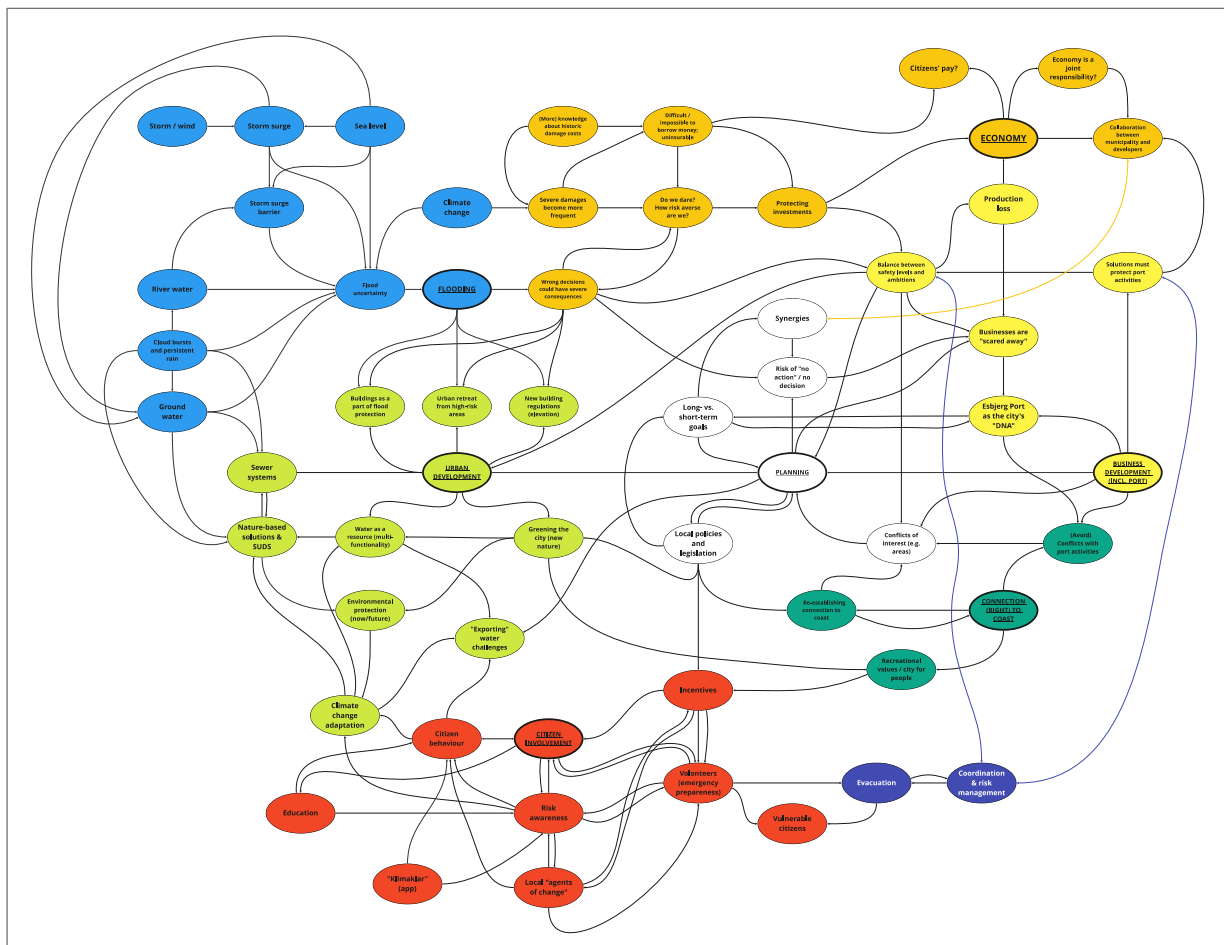


Figure 41 Refined Mental Map

The CS7 mental map depicts the interrelations between the main themes confirmed in LL1. The light blue ovals indicate interrelated aspects related to the “Flooding” theme, e.g., flooding from different sources, climate change modifications and the associated uncertainty. The light green ovals comprise aspects related to the “Urban development” theme, including climate change adaptation to reduce the impact of flooding. The red ovals describe barriers and drivers related to the “Citizen’s involvement” theme, including behaviour, risk awareness, incentives, education and vulnerable groups. The dark green ovals are related to the theme named “Connection to coast” and represent the objective of ensuring the access to the coast for citizens in the city alongside port operations and development. The yellow ovals are the responses of businesses and in particular Esbjerg Port to flood risk. The orange ovals represent different aspects of the “Economy” theme: economic risks, e.g., flood damage risk and loss coverage, financing and insurance, and risk aversion. Finally, the central white ovals indicate the fundamental and overarching challenges in CS7 related to “Planning”, i.e., prioritization. The supplementary dark blue ovals represent aspects of disaster risk preparedness.

### 4.7.3 Activities carried out between workshops 1 and 2

After the workshop several key challenges were listed based on analyses of the mental map:

- The lack of ability to prioritize what to protect
- It is not clear who is going to pay for adaptation and resilience building solutions
- A risk of paralysis against decisions and actions (on a larger scale?)
- Individual solutions cause asymmetric damage cost and insurance burden between older existing property on one side and new and future property on the other side, as well as between harbour and city.
- Investors are surprised and confused by requirements for flood safety and there is a risk that investments may be scared off.
- Vulnerable citizens in areas with storm surge risk are difficult to manage.
- Unrealistic expectations from citizens and landowners for societal preparedness in all flood situations
- Lack of awareness of the flood risk
- Lack of knowledge and understanding from citizens and landowners of what they could, should and should not do, to protect themselves while at the same time not transferring the risk to neighbors
- Connection between coast and city will be of important benefit for the city but must not disturb daily harbour operations. This is a potential point of conflict.

A refined mental map was made and then pre-validated with the following participants providing additional input:

- The utility company
- Port of Esbjerg
- Danish Coastal Authority

This led to the suggestion for a refined mental map that was circulated to participants before workshop no. 2 and discussed during the meeting.

Similarly, the facilitators from Esbjerg Municipality and DTU worked out a suggested problem statement as well as suggestion for guiding principles to be presented at the following workshop with guidance from WP2.

Before the workshop, additional meetings and telephone calls were held with the potential new participants to bring them onboard:

- Education Esbjerg
- Verdensmålhuset
- A youth representative (suggested by Education Esbjerg), representing efforts to form a complementary “city council of youth” in Esbjerg
- Total Energies

We decided to leave out CIP because of their peripherally geographical connection to the area. Total Energies needed more time to decide whether to participate or not. They will decide before workshop no. 3.

## 4.8 Case Study 8 – Torbay & Devon County

### 4.8.1 Introduction to the Living Lab focus

The Torbay Living Lab was framed as being at the intersection of water, infrastructure, health, transport and biodiversity, with flooding being a connector among these themes and topics. Challenges set by existing climate impacts of flooding within Torbay link out to social and infrastructural issues, which a range of stakeholders are keen to turn into opportunities. Some infrastructure plans have been suggested by the Council but there has been community push-back as none of the plans sit well with the local community. Common ground and collaboration are sought to support the efficacy and effectiveness of any interventions. Nature-based solutions and blue-green infrastructure are being explored by various stakeholders, as well as conventional grey (concrete) ones.

The methodology undertaken for the LL included the technical modelling work on flooding, the SIA, the Asset Based Community Development (ABCD) approach and co-creation of outputs through stakeholder-led mapping and narrative work. ABCD was selected as being of particular relevance due to the active community development aspect already active in Torbay and also as this linked-in community co-creation, which seemed highly relevant based on the tensions over existing interventions. The LL worked with guidance and support from workshop facilitators who introduced the SIA and themes and then started the participants on the activities, providing guidance and support to keep them on track during each LL workshops. At each stage connections through to the modelling work were established to enable the holistic nature of ARSINOE to come through for the participants and so the stakeholders could explore the possible opportunities in their own way.

### 4.8.2 First Living Lab workshop

**Date of the first WS:** 22/09/22

**Format:** Face to face

**Location:** Wesup Coffee House, Marina, Torquay

**Number of participants by sector**

13 people from different sectors plus 9 people from CS\* core team (UNEXE/WRT/TC).

Water: 4; Community: 1; Health: 1; Energy/power: 1; Transport: 1; Climate planning: 2

**Living lab challenge presented at the beginning of the workshop**

To map the problem space and define the problem statement with a focus on water, environment, health and infrastructure with a particular emphasis on flooding interactions.

**Key challenges**

Interconnections amongst water, health, community & infrastructure and ensuring resilience of all these during floods of multiple types

**Central themes**

Water, environment, health, infrastructure, emphasis on flooding interactions; community focus came out strongly on the day, adding a new co-created theme

**Main sectors concerned**

Water/drainage/wastewater; Electricity; Transport; Planning; Health; Community

**Stakeholder gaps:**

The only gaps identified were those participants who had been invited but couldn't attend at the last minute – it is hoped they will be able to attend the 2nd workshop. Participants on the day also mentioned it would potentially be useful to hear from stakeholders relating to gas supply, The Met Office, SEMD, Local Resilience Forum, IDNO networks in the relevant geographical areas (as these represent independently supplied housing networks on the electricity grid), Devon & Cornwall Impact Group, EA Flooding Steering Group.

**Time horizon for future narrative:** ~2050

**Table 4.11** First CS8 Living Lab workshop agenda

12.00 – 12.30	Welcome lunch with show & tell
12.30 – 12.45	Introductions
12.45 – 13.00	ARSINOE overview
13.00 – 14.30	Mapping exercise
15.30 – 16.00	Walk & Talk
16.00	Finish

**Problem statement agreed during the first workshop:**

*“How can Torbay identify the extent of and reduce the wide-ranging impacts and consequences of future flooding of all types within a context of structured, reactive responses rather than organic, proactive prevention and adaptation; limited collaborative planning, communication and community empowerment; limited inclusion of data and people in solutions in real-time; limited current capacity in systems; and limited mechanisms to join up plans, agencies, sectors and systems across the longer-term?”*



**Figure 42** Photos of the first CS8 Living Lab workshop

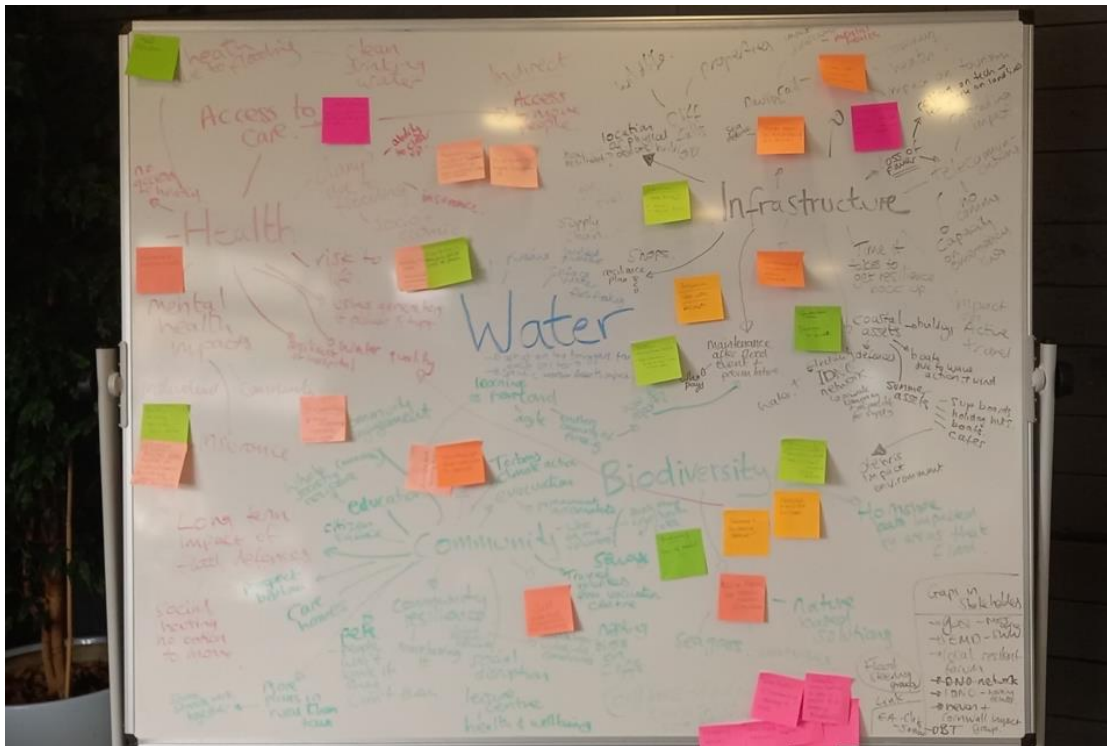


Figure 43 Mental Map, as produced during the Workshop.

### 4.8.3 Activities carried out between workshops 1 and 2

Post-workshop analysis was undertaken by circulating the problem statement and mental map and digitising any additions, as well as fielding discussion on gaps and the narrative around current flood management in Torbay (additional perspective added by the Environment Agency by email who were unable to attend last minute on the day).

UNEXE team members contacted some of the stakeholders to follow-up conversations started during the networking time (lunch, walk) at the LLSW1. LLSW1 outputs (problem statement and mental map) were circulated, and participants asked to feedback any additional suggestions or changes, as well as to share anything with the LL.

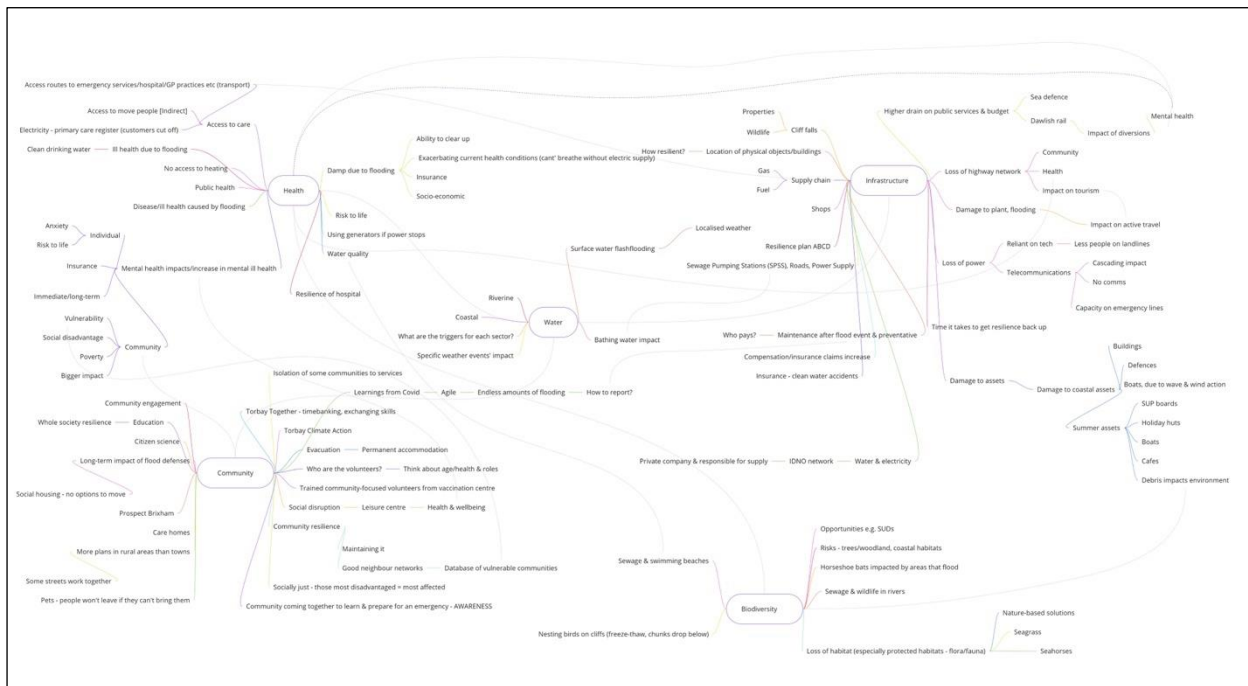


Figure 44 Refined Mental Map

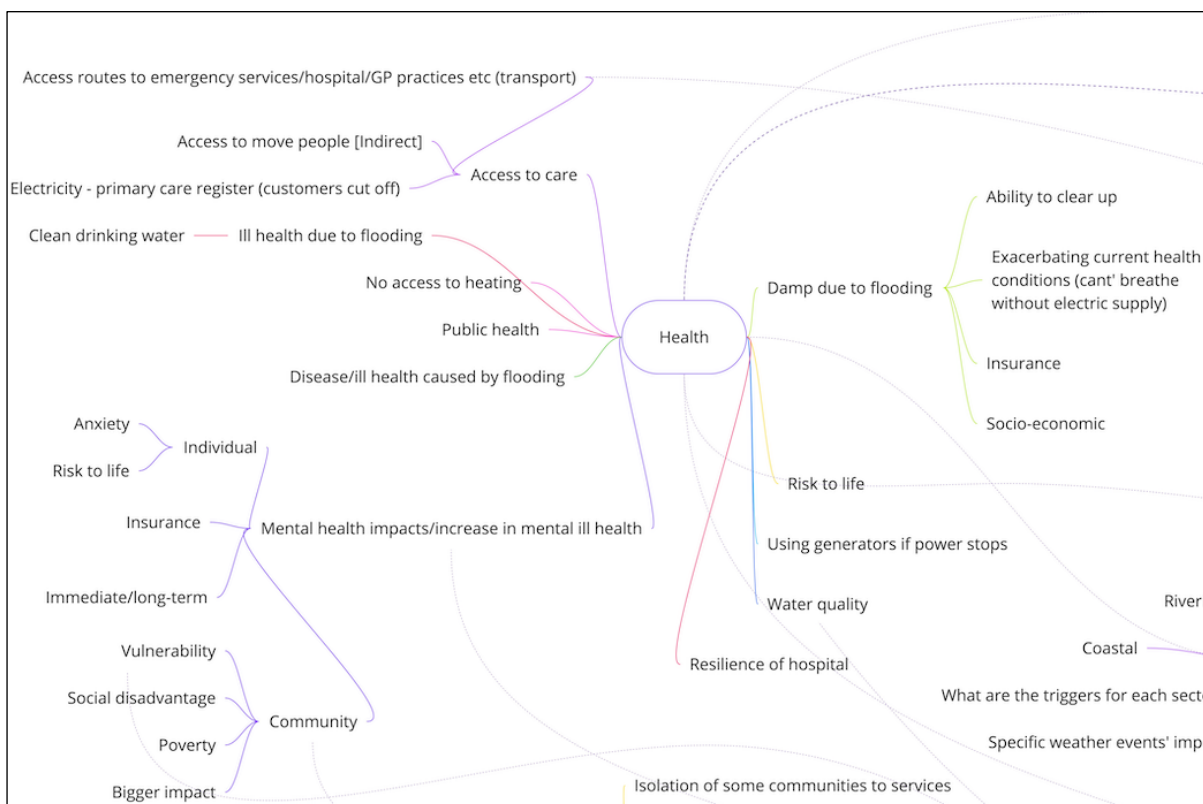
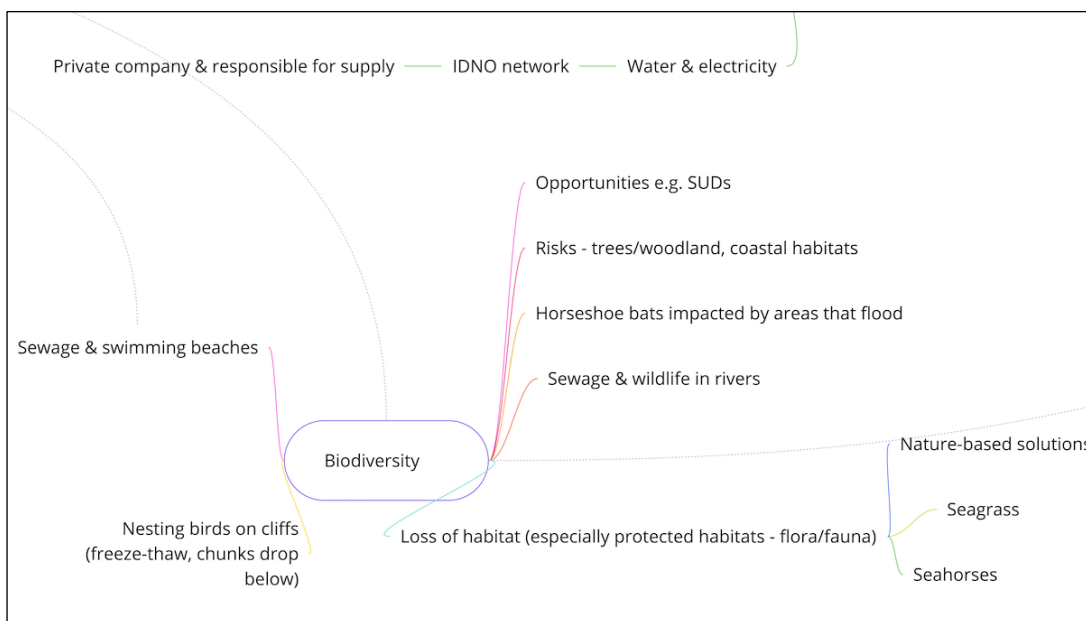


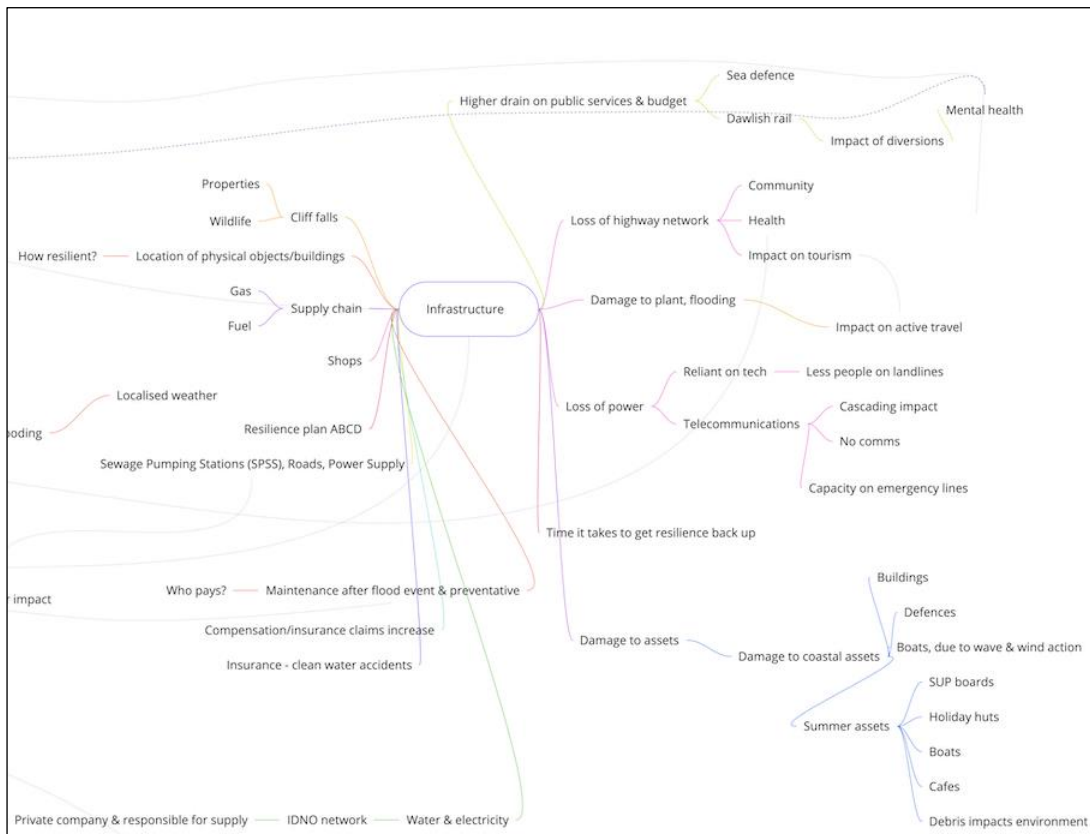
Figure 45 Focus on the health impacts of flooding with concerns ranging from risk to life to the long terms impacts after a flood event.



**Figure 46** Focus on how the community is influenced by flooding. Themes include community resilience, evacuation plans, and social disruption.



**Figure 47** Focus on how biodiversity is influenced by water and flooding. Themes include loss of habitat, sewage, and nesting birds.



**Figure 48** Infrastructure is influenced by water and flooding. Themes include loss of highway network, maintenance after a flood event, and damage to assets.

## 4.9 Case Study 9 – Sardinia

### 4.9.1 Introduction to the Living Lab focus

The Sardinian Case Study addresses the following goals: (1) ensuring food security in the face of climate change; (2) ensuring sustainable food production based on local chains; (3) stimulating sustainable food processing; (4) promoting sustainable food consumption and facilitating the shift to healthy sustainable diets. Since staple food production is projected to be seriously threatened by climate change in the area and considering the strategic importance of durum wheat and its end-use products to preserve food security and avoid social conflicts, particular emphasis in this Case Study to durum wheat and its related focus areas (water, energy, food, ecosystems) will be given. As a result, stakeholder choice is basically linked to this crop and to its agricultural- and economic-related activities. As these central themes of the case study are broad-ranging issues, we included in the long list of stakeholders four different scales: (1) International; (2) National; (3) Regional; (4) Local. The main sectors considered in the long list were: Agriculture, Agri-Food, Construction, Culture, Economy, Energy, Environment, Financial, Food, Handicraft, Maritime, Media, Social, Technology, Tourism and Water.



## 4.9.2 First Living Lab workshop

**Date of the first WS:** 27/09/2022.

**Format:** Face to face.

**Location:** Sala stampa Seminario Arcivescovile, Cagliari, Italy.

**Number of participants:** From a total of 21 stakeholders, 11 were from the agricultural sector, 2 from food and agri-food, 2 from handicraft, 1 from water, 4 from policy, and 1 from the social sector.

**Living lab challenge presented at the beginning of the workshop:** The Living lab was related to the main challenges that agriculture, and in particular durum wheat production, is facing: stabilizing yields, improving sustainable food production and adaptation to climate change, enhancing short chains, raising awareness in consumers, and improving the information on food safety.

**Key challenges:** increasing temperatures, rainfall variability, income and production stability, food security, local chains, public incentives.

**Central themes:** Right to food access, Food quality, Sustainable crop management, Limited resources (water, soil, fertilizers), Short chain regulation, Awareness-raising, shared information, and training (for producers, consumers, and policy makers).

**Main sectors concerned:** agriculture and agrifood system. The water sector was represented but water availability and competition between sectors were not perceived as pressing issues by the selected stakeholders.

**Time horizon for future narrative:** 2050, in agreement with the Regional Adaptation Strategy to Climate Change (SRACC) of the Autonomous Region of Sardinia.

**Stakeholder gaps:** Climate scientists.

**Table 4.12** First CS9 Living Lab workshop agenda

09.30 – 10.00	Welcome
10.00 – 10.10	Presentation round
10.10 – 10.20	Agenda and objectives of the Living Lab
10.20 – 10.30	ARSINOE Project presentation
10.30 – 10.50	CS9 presentation
10.50 – 11.00	The Living Lab concept
11.00 – 11.20	Coffee break
11.20 – 11.50	Mental Mapping
12.50 – 13.20	Conclusion: setting the Living lab objectives
13.20	Lunch

### Problem statement agreed during the first workshop:

*“Limited access to information and solutions to tackle climate change, optimize sustainable crop management, and limited agricultural inputs.  
Lack of awareness, information, and training on food chain actors about climate-related issues  
Inequalities in access to quality food and lack of transparency on the origin of food  
Poor aggregation capacity of producers as well as reduced regulation and incentives for the short food chains”*

The main key concerns and challenges emerged during the first workshop were related to the limited access to information and solutions to tackling climate change and optimizing sustainable crop management and agricultural inputs. Moreover, stakeholders highlighted the lack of awareness, information and training on food chain actors about climate related issues and the inequalities in access to quality food and lack of transparency on the origin of food. In addition, poor aggregation capacity of producers as well as reduced regulation and incentives for the short food chains were mentioned as key elements to be improved.



Figure 49 Photos of the first CS9 Living Lab workshop.



Figure 50 Mental Map, as produced during the Workshop.

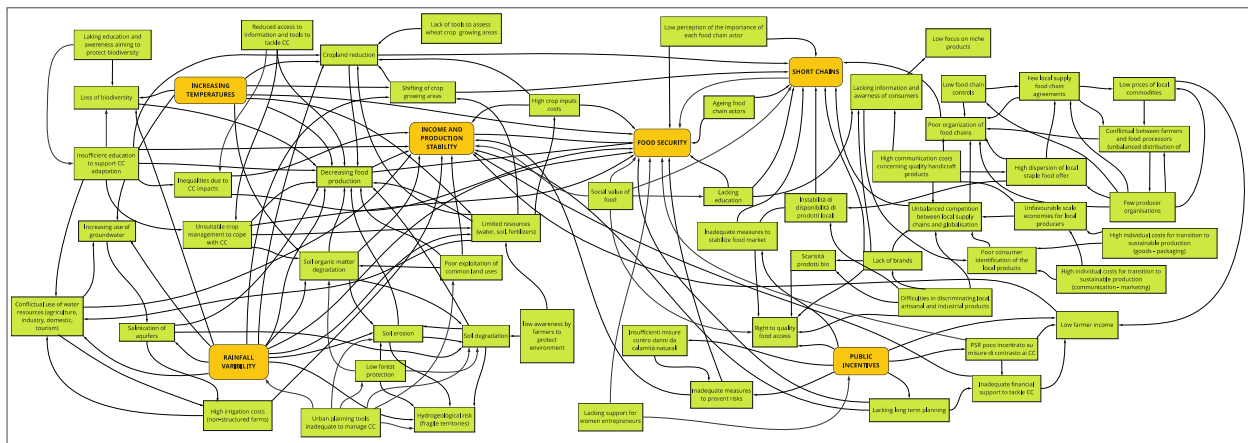


Figure 51 Refined Mental Map

The orange boxes represent the key themes selected to start the discussion and the green boxes the issues raised during the discussion with stakeholders.

The main key concerns and challenges that emerged during the first workshop were related to the limited access to information and solutions to tackling climate change and optimizing sustainable crop management and agricultural inputs. Moreover, stakeholders highlighted the lack of awareness, information, and training of food chain actors about climate-related issues and the inequalities in access to quality food, and lack of transparency on the origin of food. In addition, the poor aggregation capacity of producers as well as reduced regulation and incentives for short food chains were mentioned as key elements to be improved.

### 4.9.3 Activities carried out between workshops 1 and 2

Mental map refinement and validation by email.

## INTERMEDIATE CONCLUSIONS AND NEXT STEPS

The first phase of implementation of the System Innovation Approach within ARSINOE was focussed on revealing the main concerns, present and future, of climate change impacts across a diversity of case studies in Europe from a local stakeholder perspective, outside of the academia. All CSs followed the methodology proposed by WP2, with some adaptations for the facilitation, and succeeded to progress within the required deadlines. The local knowledge harnessed, contributed not only to a better understanding of specific climate change impacts and local needs in term of climate change adaptation, but also in raising awareness and ownership of local challenges within LL participants. It is also the basis for the development of a network of actors, ready to work together to solve a common challenge within the scope of ARSINOE and beyond.

The stakeholder mapping process, described in subsections 2.2 to 2.6, was a crucial initial step to prepare the workshops. In this part of the work, the support of WP2 team has been essential to help CS teams take ownership of the SIA methodology, adapt it to the specific local conditions, and accelerate the process in order to respect all the deadlines. It was observed that there are broad cultural and political differences across the different case studies, some of which greatly affect the perception of who “key

players” are. Whose opinion is relevant, who should be invited, who has agency, are controversial issues, and answers do not necessarily coincide with the place participants hold within established political and social hierarchies. Moreover, the Influence/Interest Matrix tool proposed for initial stakeholder mapping is still used as a tool to analyse the system and fill stakeholder gaps ahead of the next workshops. A detailed account of the work performed in this task can be found in ARSINOE’s deliverable D2.2.

The mental mapping exercise triggered a systems thinking mindset among participants, encouraging them to look at the system within which they are embedded in a holistic way, across sectors and challenges. This exercise was an opportunity for local groups to self-assess the state of their system through an integrated image that gathers a diversity of perspectives and their interplay, raising awareness about potential interconnections, synergies, and cascading effects beyond specific fields of intervention and expertise. Problem statements produced by CSs after the first round of LL workshops can significantly diverge from the initial problem definition by case study teams, an indicator of the transformative effect of the activity. Perceptions of what the main challenges are, and how to tackle them, are shifting from initial approaches focused mainly on technical aspects, to new ones that consider social dimensions as central elements of the system.

### **Lessons learned**

International Living Labs were the most difficult to implement because of the need to plan both national workshops and international ones, across different languages. These CSs also required additional time from WP2, as they multiply the number of pre- and post-workshop meetings. However, also the international CSs succeeded to respect the deadlines.

Regarding the composition of Living Labs, despite it being a priority for ARSINOE, it has sometimes been difficult to respect the gender balance, especially within sectors traditionally associated with male roles, such as port operations or agriculture. All case studies are taking this factor into account and do their best to find solutions to involve more women in the workshops.

In terms of in-between workshops activities, keeping stakeholders informed on progress, and requesting validation of workshop outputs is important for keeping contact and building commitment towards the next steps of the process.

Finally, in terms of workshop formats, even though they may be more difficult to implement, face-to-face gatherings have consistently proved to be more productive, and allow for side interactions between participants that continue beyond the Living Lab setting, contributing to the overall goals of the project in novel ways.

### **Performance indicators**

Several indicators confirm the effectiveness of the SIA methodology and of WP2’s support throughout the SIA implementation process:

- WP2 written guidelines and templates for reporting were essential to prepare the workshops and conduct them successfully.
- The face-to-face SIA training in Tours was important to build confidence in the process among facilitators.
- Touch-base, pre- and post-workshop meetings with WP2 allowed CS teams, most of which had no previous experience with participatory research.
- The respect of the methodology and the deadlines mentioned in the roadmap by all CSs represent another two key performance indicators of the task 6.2. Thus the SIA implementation progress

follows the WP6 roadmap and supports the interactions with WP5 and the open call for tenders for innovation.

Moreover, the presence of all case studies at the weekly meeting by describing the activities and the progress of the SIA implementation is another KPI (see D6.2 for description of the minutes of each weekly WP6 meeting). The WP6 weekly meeting gives the chance to follow the progress of SIA of each case study week after week. WP2 frequently asked for a dedicated time slot during WP6 weekly meeting for CS leaders to expose their success stories or difficulties in implementing the SIA. Thus, week after week, CSs can all benefit from the experience of others. Additional touch-based meetings between CSs and WP2 were programmed whenever it seemed necessary.

### **Next steps**

Now that the key challenges, issues, sectors to be involved are agreed upon, the CS leaders have developed their problem statement, expressing in the form of a question the key problem to be tackled by the living lab within ARSINOE.

The second living lab workshop has the aim to develop a vision, describing, in the time horizon agreed, a desirable state (a sustainable future) of the case study where we expect the problem to be solved. This future narrative will give the main goal(s) to be achieved by the innovation pathways (T2.4.) to be co-developed in the phase 3 of the SIA. All 2<sup>nd</sup> LL workshops were held as scheduled by the end of March (see [Table 14](#)), as planned in the roadmap. Post-WS meetings are under progress and reports are under preparation. Thus at the date of the D6.5 the WP6 roadmap is followed for the SIA implementation led by WP2.

The training for WS3 is planned for the 3<sup>rd</sup> of May 2023. A new set of written guidelines is under preparation and will be circulated among CS teams two weeks ahead of the event.

## GLOSSARY OF KEY TERMS

**Backcasting:** A method to collectively create pathways to an envisioned future, taking the future as starting point and going step- by- step back in time. The choice to start from the envisioned future is essential to enable the formulation of future- oriented strategies that go beyond “business as usual” solutions and are not constrained by vested interests and stakes.

**Facilitation:** Facilitation as well as the process setting is important to enable an open atmosphere with a positive group energy, that will allow for more quiet members of the group to be heard . An inspiring process setting can be achieved by holding the meetings in different places, thereby physically exploring the challenges and opportunities of the city. As facilitator your job is also to inspire, give possible inspiration when the discussion starts to fade and let the rather “introvert” people also talk.

**Future Vision:** To plan the future, you need to imagine how it might look. VISIONING is about picturing the desirable future and describing what the community wishes its future to look like. It answers the question WHAT... What is my desired future? What does it look like?

**Living Lab:** Living Labs are a participatory research tool often used in planning, product design and innovation which brings together a collective of key stakeholders to explore a focal issue. Living Labs act as open innovation spaces which foster co-creation with users and the end result is expected to better solve stakeholder needs.

**Guiding Principles:** are words or short phrases extracted from relevant SDG targets, which serve as inspirational building blocks for the development of the Future Narratives.

**Mental Mapping:** Mental mapping is a graphic representation of ideas and concepts, and the relationships between them. It is a visual thinking tool that helps structuring information, helping you to better analyse, understand, synthesize, recall and generate new ideas. Causality between key variables is an important aspect of the mental maps (sometimes referred to as ‘mind maps’). Within the ARSINOE project, this is carried out via a participatory process (an open discussion with stakeholders) in collaboration with LL members in order to visualise key aspects of their systems.

**System:** a set of things working together as parts of a mechanism or an interconnecting network; a complex whole that is more than the sum of its parts.

**Systems Thinking:** Systems thinking is a way of addressing systems from a broad perspective that includes seeing overall structures, patterns and cycles, rather than seeing specific events in an isolated manner. By focusing on the entire system, actors can attempt to identify solutions that address as many problems as possible in the system. In the context of ARSINOE, the process is participatory and involves different stakeholders within the framework of SIA.

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Systems Innovation Approach (SIA) addresses the growing complexity, interdependencies and interconnectedness of modern societies and economies, focusing on the functions of the cross-sectoral system as a whole and on the variety of actors. The Climate Innovation Window (CIW) is the EU reference innovations marketplace for climate adaptation technologies. ARSINOE shapes the pathways to resilience by bringing together SIA and CIW, to build an ecosystem for climate change adaptation solutions. Within the ARSINOE ecosystem, pathways to solutions are co-created and co-designed by stakeholders, who can then select either existing CIW technologies, or technologies by new providers (or a combination) to form an innovation package. This package may be designed for implementation to a specific region, but its building blocks are transferable and re-usable; they can be re-adapted and updated. In this way, the user (region) gets an innovation package consisting of validated technologies (expanding the market for CIW); new technologies implemented in the specific local innovation package get the opportunity to be validated and become CIW members, while the society (citizens, stakeholders) benefits as a whole. ARSINOE applies a three-tier, approach: (a) using SIA it integrates multi-faceted technological, digital, business, governance and environmental aspects with social innovation for the development of adaptation pathways to climate change for specific regions; (b) it links with CIW to form innovation packages by matching innovators with end-users/regions; (c) it fosters the ecosystem sustainability and growth with cross-fertilization and replication across regions and scales, at European level and beyond, using specific business models, exploitation and outreach actions. The ARSINOE approach is show-cased in nine widely varied demonstrators, as a proof-of-concept with regards to its applicability, replicability, potential and efficacy.



This project has received funding from the European Union's Horizon H2020 innovation action programme under grant agreement 101037424.