Cross-sectoral planning decision-making platform to foster climate action

Rethink Action

D 2.5 | Report on the Activities with the End-User Community II

WP2 – Social Engagement Strategy: Co-Creating Products and Services with End-Users

Version 1.0 | September 2024

H2020-LC-GD-2020-2: LC-GD-9-2-2020. Developing end-user products and services for all stakeholders and citizens supporting climate adaptation and mitigation

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Document History

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Author(s)	Pourya Salehi [ICLEI], David Corbett [ICLEI], Amy Jones [ICLEI]

Date	Ver.	Contributers	Comment
07/07/24	0.1	ICLEI World Secretariat (WS)	Outline for Review
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27/09/24	1.0	ICLEI, CARTIF	Final Version

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List of Organizations

	Participant Name	Short Name	Country	Logo
1	Fundación CARTIF	CARTIF	Spain	
2	University of Valladolid	UVa	Spain	
3	IVL Swedish Environmental Research Institute	IVL	Sweden	
4	RINA Consulting	RINA-C	Italy	
5	Euro-Mediterranean Center of Climate Change	CMCC	Italy	
6	Climate Media Factory	CMF	Germany	
7	National Observatory of Athens	NOA	Greece	
8	GMV Aerospace and Defence SAU	GMV	Spain	
9	FCiências.ID - Associação para a Investigação e Desenvolvimento de Ciências	FC.ID	Portugal	
10	ICLEI - Local Governments for Sustainability e.V. (World Secretariat) 10 A | ICLEI European Secretariat GmbH	ICLEI	Germany	
11	United Nations University - Institute for Environment and Human Security	UNU-EHS	Japan	
12	Geonardo Environmental Technologies Ltd.	GEO	Hungary	
13	Institut National de la Recherche pour l'Agriculture, l'Alimentation et l'Environnement	INRAE	France	

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Abbreviation and Acronyms

Acronym	Description
CAP	Common Agricultural Policy
CSC	Case Study Committee
ECV	Essential Climate Variable
ES	Spain
EU	European Union
EUC	End-User Community
FR	France
GDPR	General Data Protection Regulation
GEO	Intergovernmental Group on Earth Observations
HU	Hungary
IAP	Integrated Assessment Platform
ICT	Information and Communication Technologies
IPCC AR6	Intergovernmental Panel on Climate Change Sixth Assessment Report
IT	Italy
KPI	Key Performance Indicator
LAMS	Land use-based Adaptation and Mitigation Solutions
NPO	Non-Profit Organization
PT	Portugal
SDG	Sustainable Development Goal
SE	Sweden
UN	United Nations

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Executive Summary

RethinkAction's main objective is to facilitate the design of climate action strategies and contribute to the assessment and implementation of land use-based mitigation and adaptation solutions to meet the decarbonization EU Green Deal objectives. It also aims to contribute to coping with climate change impacts to 2050 and beyond by developing an Integrated Assessment Platform (IAP) for enhancing citizens' and stakeholders' access to the information.

Sustained co-creative engagement with stakeholders is a critical component in the success of the project. The Engagement Strategy (Deliverable 2.3) provided a robust framework to guide actions taken in managing and engaging with the end-user community in a way that provides results to inform and shape the project. In particular, the engagement strategy is complementary with the overall work plan for the project with six engagements planned which are informed by the lifecycle of the project.

In addition to the ongoing recruitment process for the End-User Community (EUC), the third workshop has been successfully delivered in-person in each of the six case studies. This report provides a detailed account of the EUC activities for the period from M19-M36 (March 2023 to September 2024).

If you would like to find out more about the Engagement Strategy for the project and activities from the previous reporting period, please refer to previous Deliverables 2.3 and 2.4 respectively.

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1 Introduction

Human-induced climate change is a significant global challenge with effects ranging from increased occurrence and severity of extreme weather events, biodiversity loss, water shortages and food insecurity. Global inequality means that the effects of climate change and the capacity to mitigate and adapt are unequally distributed. More sustainable land use practices and behavioral change could be significant in addressing the climate emergency, reducing vulnerability and improving wellbeing. Examples of sustainable land use include the use of Green-Blue Infrastructure or allocation of protected land status to areas of biodiversity significance. An example of behavioral change includes diet transitions towards lower consumption of meat and dairy products, resulting in lower reliance on resource intensive animal agriculture processes.

Facilitating these transitions requires strong decision making, adoption of policies and suggestions and evidence of impact. The RethinkAction platform aims to address some of these facilitating factors by:

- Improving alignment between identified stakeholders and decision makers.
- Explaining and providing examples of climate change effects and the impacts of land use and behavioral solutions at local, EU and global levels.
- Transforming current practices and behaviors towards more sustainable actions.

RethinkAction aims to put citizens and decision-makers at the heart of climate action by developing a cross-sectoral planning decision-making platform to foster climate action across Europe. There are six case studies from across Europe with unique biogeographical and climate conditions that are critical to the development and iterative testing of the platform. The case study regions include:

- Boreal: Gotland region (SE)
- Atlantic: Tarn-et-Garonne, Occitanie region (FR)
- Continental: Southern Great Plain (HU)
- Mountain: Valle d'Aosta Region (IT)
- Mediterranean: Almeria province (ES)
- Coastal zones and regional seas: Azores archipelago (PT)

A process of sustained co-creative stakeholder engagement is an essential element of the project. This report documents the process of growing the EUC and, most notably, the third co-creative workshop for the project. It then outlines the next steps in engagement to be taken.

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1.1 Purpose of the Document

The purpose of this document is to report the process and outcomes of the engagement activities with the EUC from M19-26 of the RethinkAction project. This entails both the ongoing growth of the EUC by recruiting members and showcasing the project at key international events as well as the co-creative process applied in the workshops as stipulated in the Grant Agreement. This deliverable also reports on and presents a timeline for the next steps in the engagement process.

1.2 Structure of the Document

The Report on the Activities with the End-User Community I has the following structure:

Section 1: *Introduction, purpose and structure of the document*

Section 2: *Report on Engagement Activities for M19-M36*

The main activities of the early phases of engagement with the EUC are documented. Specifically, this includes:

- The process of collaboratively continuing to grow the EUC by the EUC manager (ICLEI) and case study leaders and consortium members.
- The process of collaboratively growing the Expert Advisory Board for the project.
- The report on the aim, process and outcomes of the third workshops that took place between and November – May 2024 and preparations for the fourth workshop planned for September 2024.

Section 3: *Planned & In-Progress Next Steps*

A description of the future engagement activities for the RethinkAction project. This includes the ongoing development of an Expert Advisory Board and plans for the first workshop for these experts to provide technical feedback on the RethinkAction platform once the first release is ready for evaluation. Also included is a brief report on plans to leverage the international members of the the EUC – built largely through showcasing the project at significant international events such as COP28 – to build a community of potential early replicators to apply the platform in diverse contexts.

Section 4: *Conclusion*

The key aspects of the report are summarized with a final note on the role of co-creation in the project and an assessment of the enaction of the engagement strategy to this point in achieving the goals of the strategy.

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2 Report on Engagement Activities

In this section the engagement activities that have been completed since the previous reporting period in the RethinkAction project are reported upon in more detail. This includes the internal activities related to coordinating for the growing of the EUC and successful delivery of in-person workshops and a comprehensive report on the outcomes of the third project workshops from each of the six case study regions.

2.1 Continuing to Build the EUC

Following the conclusion of the previous reporting period a significant effort was made by the project consortium to increase the number and distribution of registrations for the EUC. In line with the future actions identified in the previous report and to coordinate this effort, ICLEI conducted multiple workshops on 30 March 2023, 24 August 2023, during the project Plenary Meeting in Milan on 18-19 October 2023 and 28 February 2024. Internal coordination during these workshops aimed to:

- clearly communicate the status of the EUC.
- Co-develop solutions for growing the EUC.
- Ensure active participation in the remaining workshops.
- Share and recap the strategy for conducting the in-person workshops.
- Discuss the strategy for coordination.

ICLEI developed several materials to support the process of building the EUC, facilitate the workshop coordination and reporting and to clearly define the roles and responsibilities within the consortium for their successful delivery. In this section, only the materials focused on building the EUC will be reported. In addition to the previously-established and regularly-updated spreadsheet for transparently tracking registrations for the EUC, ICLEI conducted desktop research to develop an index of potential relevant contacts to be approached in each of the six case study regions. This spreadsheet was presented to the Case Study Leaders (and broader consortium) on 24 August 2023 and they were invited to add additional potential contacts to the list. This spreadsheet in combination with the successful delivery of in-person workshops by the Case Study Leaders has resulted in significant improvements in the overall numbers and distribution of membership of the EUC. The diagram below demonstrates the significant effect that the in-person workshops (January 2024) on the rapid increase in registration for the EUC. From a total of 64 registered members at the end of the previous reporting period, the current number of registrants

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is 101 which aligns with the KPI outlined in the Grant Agreement for the project (KPI 5.2, p. 33) and represents a 58% increase since the previous engagement report.

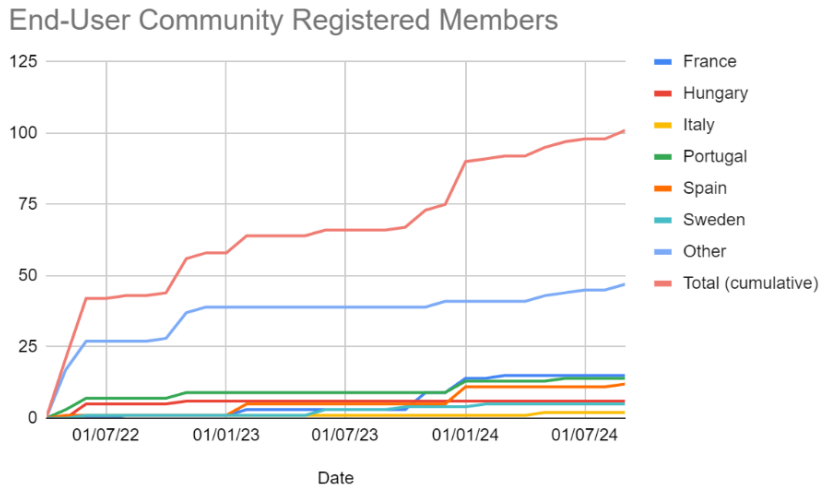

Figure 1: End-User Community Registration.

In addition to an overall increase, there has been a significant improvement in the distribution of sectors represented in the EUC with fairly even distribution across the private sector, public sector, academia, non-profit and international organizations. This distribution has reflected in the majority of the case studies with an overall improvement in the balance of representation across the case study regions.

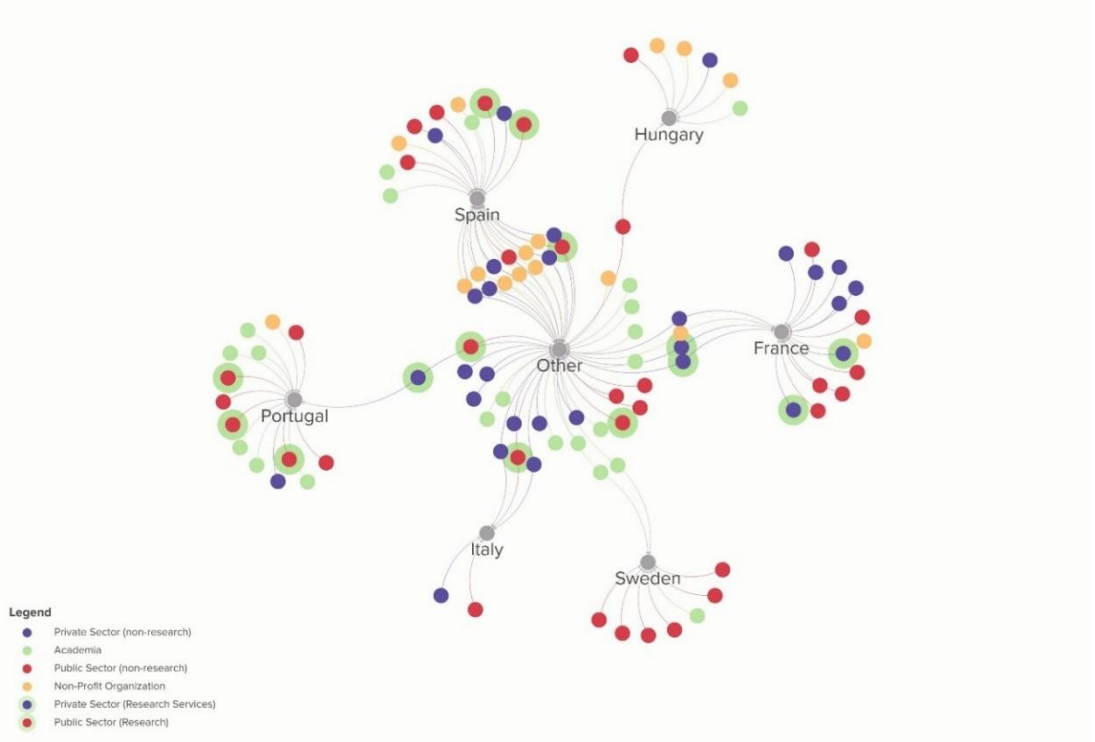

Figure 2: Network Map of the End-User Community.

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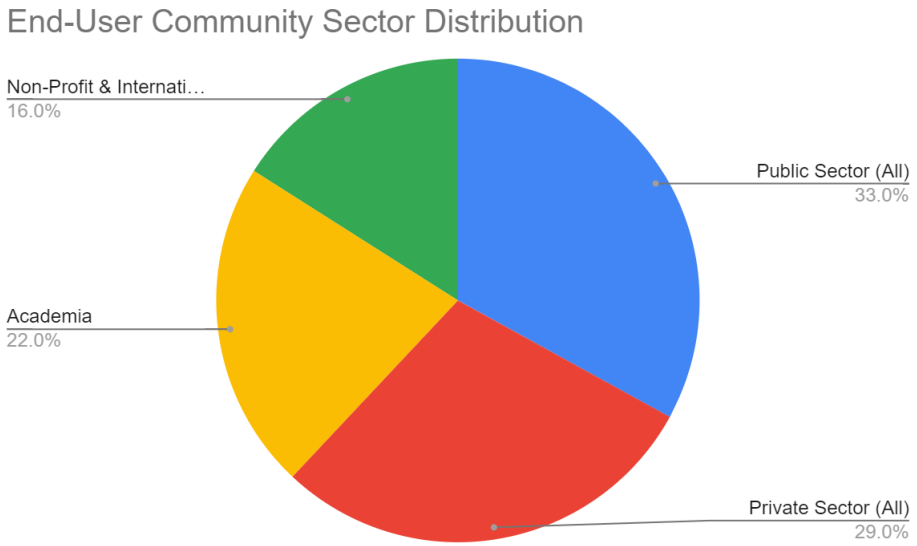

Figure 3: Sectoral Distribution of the End-User Community.

Table 1: Percentage Increase in EUC Registration per Case Study Region.

Reporting Period	Spain	France	Portugal	Italy	Hungary	Sweden	Other	Total
Report 1 (M1-18)	5	3	9	1	6	1	39	64
Reporting Period 2 (M19-36)	12	15	14	2	6	5	47	101
% Increase (from previous engagement report)	140	400	56	100	0	400	21	58

Since the development of the previous report (D2.4) the sign-up data has been further analyzed to account for registrants who expressed interest in specific case studies but are not based there. They must be situated in a case study area to be counted as a local stakeholder. Therefore, the performance of the case studies has been adjusted accordingly. Of the total signups from the previous reporting period (64), 39 were from international contexts without affiliation to one of the six case studies. The updated data is included in Table 2 above. Urgent action was taken by the consortium to increase the overall number of EUC registrants and to ensure their representation across the case studies. The total number of sign-ups currently is 101. There has been a significant improvement in the majority of case

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studies with France and Sweden achieving the most significant recruitment. The slowest-growing case study is the Valle d'Aosta Region. ICLEI and CARTIF have communicated regularly with the Case Study Leader, RINA-C, regarding the challenges affecting recruitment which include the Case Study Leader not being situated in the area. Mitigation actions to improve recruitment include working with an external consultant from the region to identify and engage more effectively with local stakeholders and ensuring that registration is a core focus of the upcoming workshops in the region. All workshops must include a strong focus on encouraging participants to register for the EUC and further increase the overall numbers and representation from the six case study regions. To enable this and attract early replicators for the project, the Case Study Leaders will have the flexibility to provide the workshops either online or in-person and aim for the same attendance goal as in previous workshops of 15 stakeholders from at least 5 different organizations.

Progress has been made in growing and improving the distribution and representation of the EUC since the previous report on engagement. In parallel, recruitment has taken place for the Expert Advisory Board for the project who will engage at a more technical level with the platform as was identified as a future action in the previous report. There are currently five invited experts in the core Expert Advisory Board who represent the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH), University of the Azores, University of Bonn, Wageningen University and the University of Lisbon respectively. A specialized workshop delivered by CARTIF will aim leverage the expertise of the Expert Advisory Board to receive specific feedback on the RethinkAction platform. With over 100 registrations for the broader EUC, there is now a strong foundation for the forthcoming engagement where the RethinkAction will be showcase and user feedback will be collected. As a future priority, ICLEI and CARTIF will collaborate with RINA-C to address the issue of low representation from the Italian case study region to ensure that the needs of this locality are sufficiently reflected in the platform. Although the number of registrants is low, it should be noted that 10 local stakeholders attended the in-person workshop that took place in May 2024. This indicates that it should be possible to encourage interested parties to register formally for the EUC.

2.2 Engagement at International Events

As part of the push to recruit more registered members to the EUC both from the case study regions and as potential early replicators, ICLEI and consortium partners have presented RethinkAction at multiple notable international events within the period of M19-M36. Notable presentations are listed below. In addition to attracting further registrations for the EUC, they have served to disseminate information and results from the project and to engage with relevant international experts.

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2.2.1 COP28

At COP28, the RethinkAction project was featured at multiple sessions. First, it was showcased at the session titled "Cities and Innovation at COP28: Expanding Climate and Innovation Agendas to Deliver 11 Billion Flourishing Lives" in the Cities and Innovation Zone on December 4th 2023. The project was also referenced on December 5th at a day-long event named CapaCITIES Day that was co-hosted by the United Nations University and ICLEI. Last, RethinkAction was presented on December 11th at the UNFCCC Global Innovation Hub Pavilion at a session titled "Digitalization and Human Needs: How Science Can Foster Transformation at the Local Scale." This session was recorded and remains available on YouTube as an online resource.

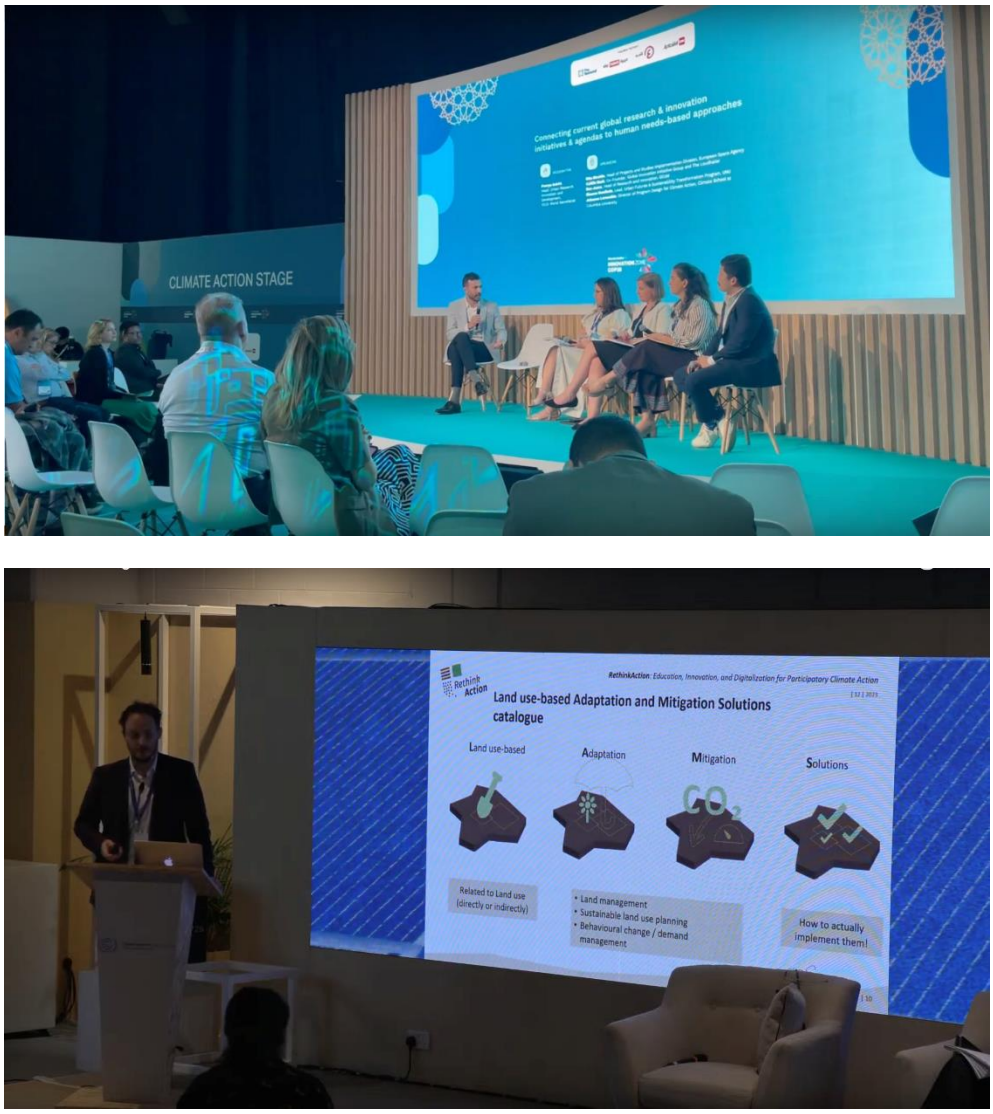

Figure 4: RethinkAction at COP28.

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2.2.2 ICLEI World Congress 2024 Global Research & Innovation Symposium

On 18 June 2024, the RethinkAction project was featured at the Global Research & Innovation Symposium on the opening day of the ICLEI World Congress 2024. The event was co-designed in partnership with Mission Innovation Net-Zero Compatible Innovations Initiative, UNFCCC Global Innovation Hub, Open Earth Foundation, and Global Covenant of Mayors for Climate and Energy (GCoM), and was delivered as a complementary event to the Innovate4Cities 2024 Conference taking place in September 2024 in Montreal, Canada. The Symposium was co-organized by the São Paulo School of Management of Fundação Getulio Vargas (FGV EAESP) and the University of São Paulo (USP).

With over 300 registrations, participants included global representatives from cities, practice, academia, business and international organizations. The Symposium aimed to foster exchange of knowledge and practices in Research and Innovation through panel discussions and collaboration via a "Global Marketplace" that gave selected pitchmakers the chance to present and further refine their projects with the audience and a panel of experts. The RethinkAction project was selected to be showcased at the "Knowledge Hall" with other impactful projects. Participants had the opportunity to find out more about the project, join the End-User Community and express interest in becoming early replicators and applying the RethinkAction platform in their own contexts.

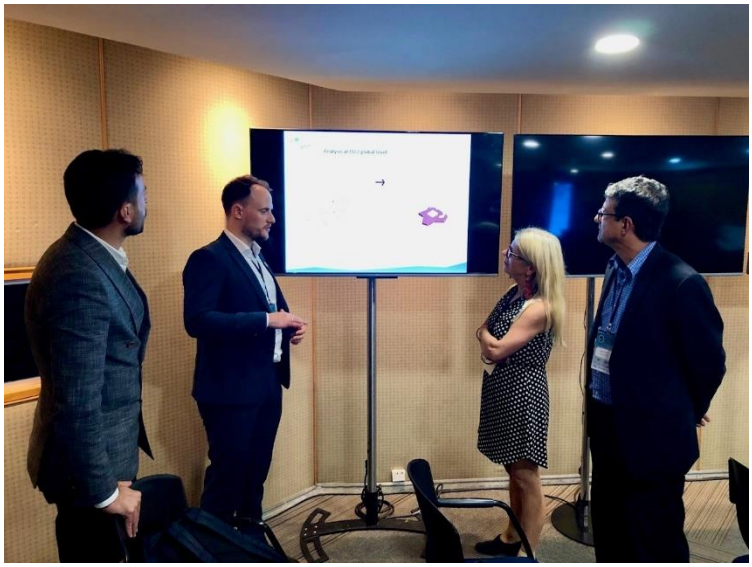

Figure 5: RethinkAction Presented to IPCC Vice-Chair Diana Ürge-Vorsatz and FGV EAESP Professor, Jose Puppim de Oliveira at the ICLEI World Congress 2024.

2.2.3 EURESFO24

The RethinkAction Project was included as a co-organizer for the European Urban Resilience Forum (EURESFO) 2024 that took place in Valencia, Spain on 27 June 2024. In a dedicated session titled

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"Digitalization for Climate Action: Co-Creation, Collaboration, and Just Transitions" RethinkAction and the co-creation strategy provided a foundation for a stimulating discussion by a panel of invited experts including Roos Meilink, Chief Resilience Officer of the Hague Municipality, Alison Gilliland, EU Climate Pact Ambassador, Joanna Heyda, Head of Climate Policy Division at the City of Warsaw and Pourya Salehi, Head of Urban Research, Innovation, and Development Team at ICLEI World Secretariat. The session was moderated by Selene Angelone, Senior Expert of Resilience and Climate Adaptation at ICLEI Europe. In addition to the panel that featured RethinkAction, there was a stand managed by CMF where participants had the opportunity to engage more deeply with the project inbetween sessions.

Figure 6: Dedicated Session for RethinkAction at EURESFO24.

2.2.4 IGARSS2024

Partners from the National Observatory of Athens, Iphigenia Keramitsoglou and Panagiotis Sismanidis showcased the RethinkAction project at the IEEE Geoscience and Remote Sensing Society Symposium

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held in Athens, Greece on 22 July 2024. With over 3000 attendees, the event provided a fantastic opportunity to share the project via a conference paper and poster titled “Multi-criteria spatial analysis for urban land-based solutions suitability maps in the context of RethinkAction Project.” The poster received significant interest and engagement from attendees.

2.2.5 URBIS24

With two experts from ICLEI on the Program Committee for the URBIS24 Conference delivered by the European Space Agency, it was possible to present the project in the main auditorium as well as secure a dedicated demo session of the RethinkAction platform to be included in the program along with other aligned projects and technical solutions. The event took place from 16-18 September 2024. Pourya Salehi presented the demo session included a brief background of RethinkAction, a walkthrough of the platform and its functionality using materials provided by CARTIF and CMF and a call for the audience to register to join the EUC for the project as potential early replicators.

Figure 7: RethinkAction Presented and Showcased at Demo Session at URBIS24.

2.3 EUC Workshop III

2.3.1 Decision to Postpone the Workshop

During the Plenary Meeting in Milan on 18-19 October 2023 one of the workshops was dedicated to the co-creation elements of the project – most notably the process of growing the EUC and successfully delivering the upcoming in-person workshops. The majority of the case studies cited concerns regarding the recruitment of local stakeholders to achieve the agreed threshold of 15 total participants from at least 5 different organizations. In coordination with CARTIF as project coordinator, the decision was made to provide Case Study Leaders with the opportunity to postpone the workshop from November

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2023 to January/February 2024 to allow for a consolidated effort to recruit more stakeholders and ensure the success of the workshop.

2.3.2 Workshop Delivery Process

ICLEI designed a comprehensive approach to the delivery of in-person workshops and mapped out the roles and responsibilities including coordination, provision of materials and content, implementation and promotion. The roles and responsibilities are outlined in the diagram below (Figure 8). Successful delivery of the first in-person workshop required close coordination between the Project Coordinator (CARTIF), End-User Community Manager (ICLEI), relevant task leaders (FC.ID and IVL) and Case Study Leaders. The task leaders FC.ID and IVL designed the materials and agenda for the interaction and were responsible for guiding the case study leaders on how the workshop should be delivered on the ground in each of the case study regions. In addition to familiarizing themselves with the technical content of the workshop, Case Study Leaders were responsible for inviting participants, planning and delivering the workshops either in the local language or in english and recording the outcomes of the workshop in English to be used in the project. An overview of these roles is in the figure below.

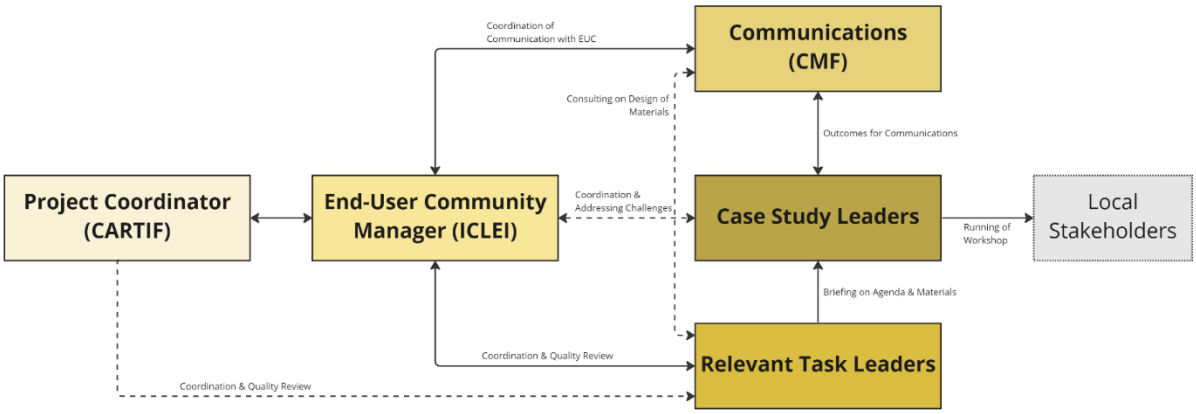

Figure 8: Roles in In-Person Workshop Delivery.

In addition, ICLEI designed and distributed an Excel sheet for tracking both the planning and outcomes of the workshop. This sheet was shared with the Task Leaders for their input based on the content and agenda of the workshop and desired outcomes before being distributed to the Case Study Leaders to ensure a consistent and timely approach to organization and data capture during the workshops. The goal for attendance at the in-person workshops was 15 participants from at least 10 different organizations. Overall, the average across the six workshops was 13.5 participants from 8 organizations which is slightly below the goal but significantly better than in previous consultations. In terms of overall attendance, Sweden (17) and Portugal (16) achieved the highest number of participants. France (11)

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and Italy (10) had the lowest number of participants. The case study region with the best participants to organizations ratio was Spain with 13:10. Overall, the in-person workshops demonstrated a consistent improvement in representation across the different case study regions from the online workshops recorded in the previous report (D2.4).

Table 2: Attendance of Workshop III.

Case Study (Case Study Leader)	Workshop Date	Number of Participants
Almeria, Spain (UNU-EHS)	25/01/2024	13 (10 organizations)
Tarn-et-Garonne, France (INRAE)	23/01/2024	11 (6 organizations)
Azores Archipelago, Portugal (FC.ID)	23/01/2024	16 (11 organizations)
Valle d'Aosta, Italy (RINA-C)	20/05/2024	10 (6 organizations)
Gotland Region, Sweden (IVL)	07/11/2023	17 (7 organizations)
Southern Great Plain, Hungary (GEO)	25/01/2024	14 (8 organizations)
Average no. of participants and organizations		14 (8 organizations)

EUC Workshop III, which was held in person in each of the six case study areas of the project in the local language and on different dates according to stakeholder availability. These workshops focussed on presenting the risks of the most vulnerable sectors, developing the associated Impact Chains (i.e. a visual mapping activity to explore how a specific climate stimulus causes a chain of effects through a system affecting both nature and society) interactively with the stakeholders and evaluating and prioritizing a set of LAMS according to the local context. This led to the co-development of the local risk analysis (T6.1) and adaptation and mitigation capacities analysis (T6.2).

2.3.3 Workshop Content and Agenda

The content of the workshop was developed by FC.ID and IVL as the leaders of the two activities of WP6 involved in the consultation, Tasks 6.1 *Analysis of climate change impacts, risks and vulnerabilities at local scale* and 6.2 *Analysis of land-based adaptation and mitigation capacities at local scale*. Therefore, the content of the workshop was divided into two main parts:

- Impact Chains: Mapping of risks, climate signals, exposure and vulnerability in the case study regions using “Impact Chains”, where stakeholders identified the main the main hazards and interlinkages for risk quantification. For example, in Gotland, the problem of drought and reduced access to freshwater was central.

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- Land-Based Adaptation and Mitigation Solutions: Focused on a refined list of climate measures. Specifically, what measures are available and how these can be prioritized on a local scale.

Case Study Leaders decided on the duration of the workshop based on the availability of local stakeholders and the briefing from the task leaders FC.ID and IVL. The duration ranged from 3-6 hours. Examples of the agenda for the case study region in Portugal is included in the table below.

Table 3: Agenda for Workshop III.

9.15-9.30	Reception		
9.30-9.40	Welcoming	Welcome participants (include EUC invite), present agenda and first speaker	Host 3
9.40-9.50	Local intervention – opening speech	State expectations of the project and the challenges that the project can help to address	Policy maker or local representative
9.50-10.00	Introduction and short overview of RethinkAction	Presentation of RethinkAction (includes data availability). Problem statement, associated risks, and most vulnerable sectors in Azores	Host 1
10.00-10.20	External presentation about Agriculture and Water	Climate change in agriculture water from local perspective – risks and solutions	External presenter
10.20-10.30	Short Q/A and Discussion	Extract relevant perspectives from stakeholders	Host 2
10.30-10.40	Coffee break		
10.40-10.50	Impact chains on Azores	Impact chain presentation – Crop yield variability	Host 2
10.50-11.40		Workshop 1 – Impact chain feedback and discussion from stakeholders	Hosts 1, 2 and 3
11.40-12.00		Plenary session (if breakout groups were used). Extract relevant perspectives from stakeholders	Host 3
12.00-12.15		Summary and next steps for Impact chains	Host 1
12.15-13.30	Lunch		
13.30-13.40	Land-based adaption and mitigation measures (LAMS)	LAMS and criteria	Host 2
13.40-14.30		Workshop 2 – which criteria are most important? Which LAMS are most relevant to implement?	Host 3
14.30-14.50		Plenary session (if breakout groups were used). Extract relevant perspectives from stakeholders	Host 1
14.50-15.00		Summary/next steps for LAMS and criteria	Host 2
15.00-15.10	Summary and conclusion of workshop	Summary/next steps	Host 3
15.10-15.20	Local intervention – closing speech	State review of the workshop and frame final issues of relevance for the Region	Policy maker or local representative

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15.20-15.25	Wrap-up	Thank you note, reinforce EUC participation and farewell	Host 2
15.25-15.40	Coffee		

The two main elements of the workshop were the Impact Chains and the LAMS Prioritization. An Impact Chain, or cause-effect chain, is an analytical tool that helps to better understand, systemize and prioritize the factors that drive risk in the system of concern.

A manual was developed by FC.ID and IVL to guide Case Study Leaders on the delivery of the Impact Chains exercise in the workshops. This manual is included in Annex I of Deliverable 6.2. The full method of building Impact Chains is included and described in 'Climate Risk Assessment for Ecosystem-Based Adaptation–A Guidebook for Planners and practitioners" [1] as well as in Deliverable 5.2. Its main purpose is to systematically consider Ecosystem-based Solutions (EbA). It is the latest update in what is considered as an Impact Chain-based Climate Risk and Vulnerability Assessments (IC-based CRVA) framework [2]. The activity involves the collaborative guiding of mapping the impact chain of a specific issue – such as fresh water availability – through an impact chain and the categorization of Hazard, Vulnerability of different systems (e.g. social, environmental), Exposure, Intermediate Impacts and Risks. This is a useful process for addressing local climate risks from a system perspective. Specifically, to systematize, build upon and clarify the result of the climate risks analysis, including the risk

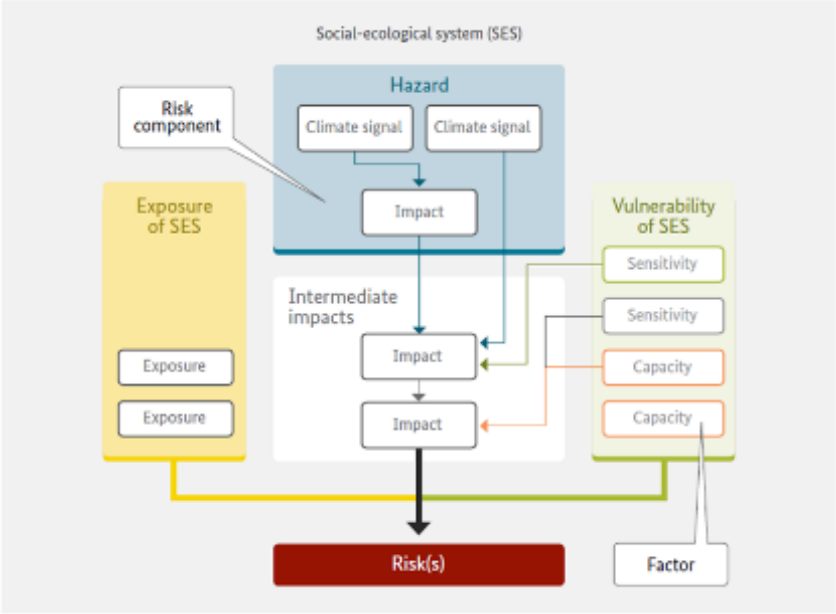

Figure 9: Impact Chain Assessment [3].

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components (hazard, exposure and vulnerability) and the intermediate impacts. The Impact Chains were captured using Miro for each of the case studies and these will be shared in the following section of the report on the outcomes of the workshop.

For the exercise on LAMS, IVL prepared a shortened list of LAMS that would be manageable to go through within the time constraints of a workshop. The RethinkAction Land use-based Adaptation and Mitigation Solutions (LAMS) catalog includes a set of 60 LAMS obtained from a literature review on adaptation and mitigation solutions. These solutions are consistent across different scales and policy sectors, tailored to the end users and incorporating societal behavior to foster adoption of land use management and planning solutions to overcome climate change adaptation and mitigation barriers. The LAMS were presented to the workshop participants using cards as in the example from the Azores case study below (Figure 10).

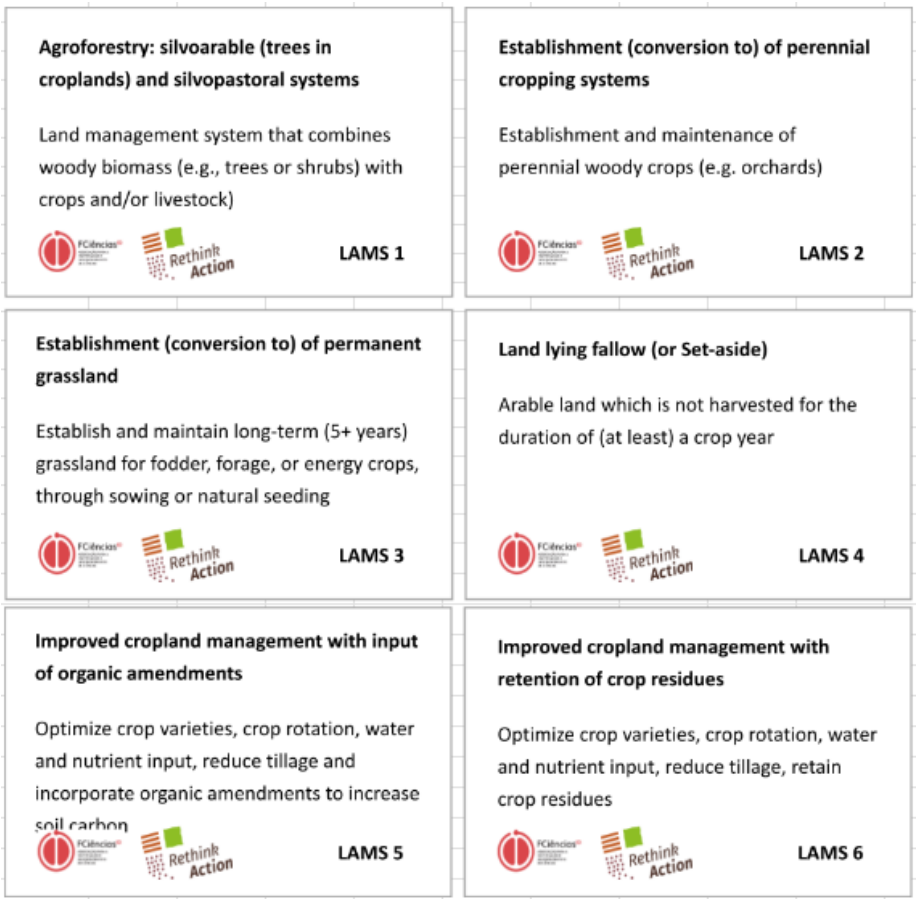

Figure 10: LAMS Cards.

The prioritization of LAMS was conducted in each case study. This was guided by a brief presentation of the ecological, economic and social sustainability factors that contribute to the identification of the most suitable/sustainable LAMS (Figure 11).

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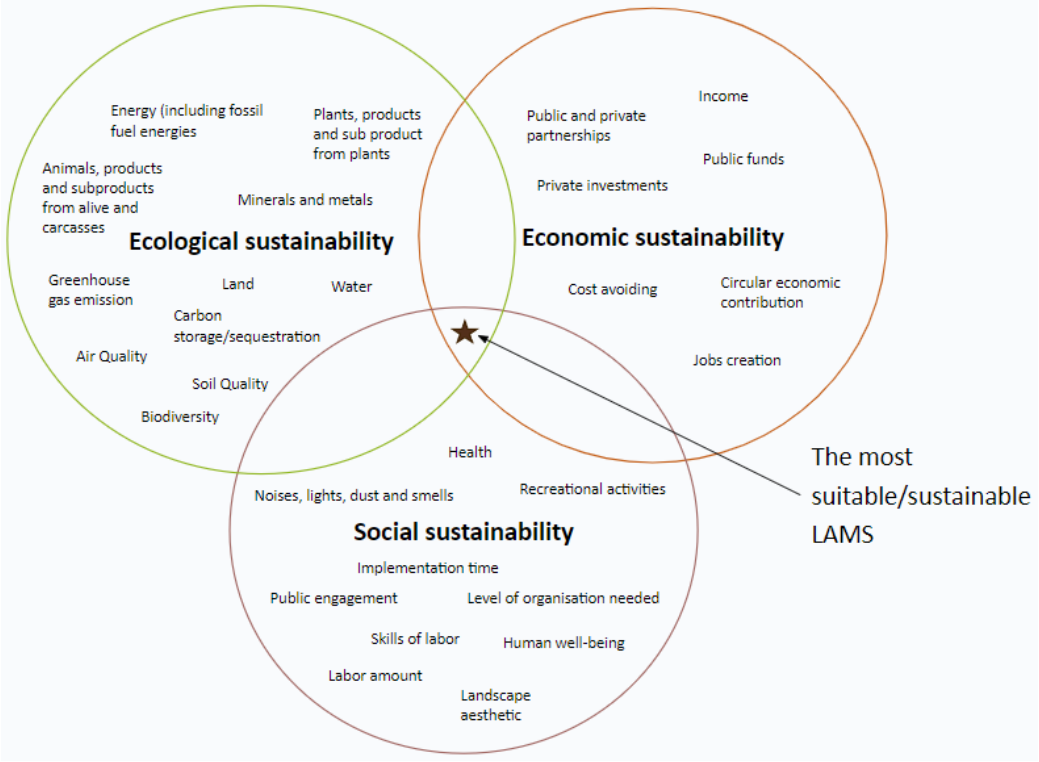

Figure 11: LAMS Suitability - Ecological, Economic and Social Factors.

A two-step process was used to categorize the LAMS within the local case study context. First, a matrix mapping urgency versus feasibility (Figure 12) and second a scoring system to identify the feasibility of LAMS relevant to available resources versus potential for impact (Figure 13 and 14).

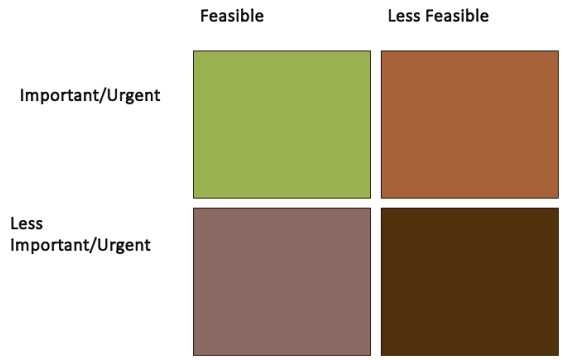

Figure 12: Index of Urgency Versus Feasibility for LAMS.

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Grading of Resources

Relatively unimportant — Quite important — Very important

0 1 2 3 4 5 6 7 8 9 10

Natural resources

Criteria	Points (1-10)
Energy (including fossil fuel energies)	
Plants, products and sub-products from plants	
Animals, products and sub-products from live animals and carcasses	
Water	
Land	
Minerals and metals	

Social resources

Criteria	Points (1-10)
Length of time to implement the solutions	
Level of organisation required for implementation	
Labour amount	
Public / community engagement	
Skills of labour required and technologies	

Economic and financial resources

Criteria	Points (1-10)
Public funds	
private investment	
Public and private partnerships	

Name: **Organisation/position:**

Figure 13: Grading of LAMS According to Resources.

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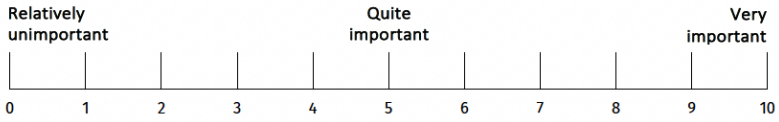
Grading of Impact



Environmental impacts

Criteria	Points (1-10)
Greenhouse gas emissions	
Carbon storage/sequestration	
Water resources (quality and quantity)	
Air quality	
Soil quality and natural resources related to the soil and underground	
Biodiversity	

Social impacts

Criteria	Points (1-10)
Landscape aesthetic	
Noises, lights, dust and smells	
Health	
Human well-being	
Recreational activities	

Economic and financial impacts

Criteria	Points (1-10)
Income	
Cost avoiding	
Jobs creation	

Name: **Organisation/position:**

Figure 14: Grading of LAMS According to Impact.

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2.3.4 Workshop Outcomes & Application in the Project

The outcomes of the third in-person workshops directly informed project deliverables D6.1 and D6.2 and Tasks 6.1 *Climate change impacts, risk and vulnerabilities in each case study* and 6.2 *Analysis of land-based adaptation and mitigation capacities at local scale*.

2.3.4.1 Impact Chains (Deliverable 6.1)

Using the provided manual Case Study Leaders developed several Impact Chains which were based on the risk analysis of their case studies. Subsequently, using the Workshop Guide, Case Study Leaders co-developed impact chains with the stakeholders. The impact chains were represented in diagrams showing the direct and indirect connections between the different elements. Having these impact chains developed the quantification process was pursued to find indicators for hazards, exposure, and vulnerability factors. The identification of indicators and data collection was co-developed with the stakeholders. The developed Impact Chains and the quantification indicators are described in detail in Deliverable 6.1. Examples of the Impact Chains developed collaboratively with stakeholders from each case study are included below (Figure 15).

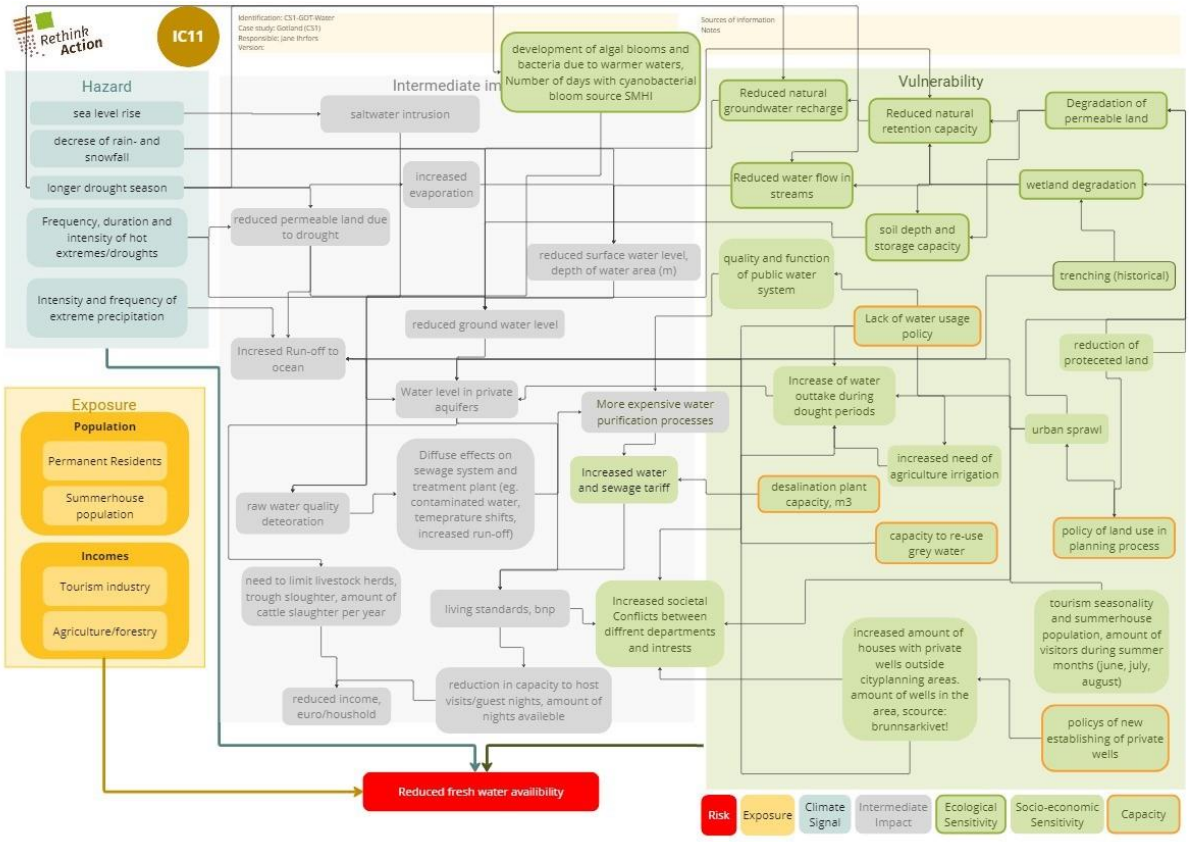

Figure 15: Impact Chain from Gotland.

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The stakeholder community has mentioned water scarcity as a major challenge on Gotland. One respondent also shares that more people want to build houses on Gotland, but they believe that the water and sewage system cannot currently handle this. Water scarcity on Gotland is a significant challenge, especially during the summer months when the temporary increase in population leads to higher water consumption. The groundwater reservoirs in the soil layers and bedrock on Gotland are small or poorly known, contributing to the problem. While there is generally good water availability in Sweden, both supply and demand vary across the country. Water scarcity occurs periodically, especially in southern and central Sweden, as well as in coastal areas. In recent years, droughts and water scarcity have been discussed more seriously in Sweden.

During December 2023 a workshop on the theme of water scarcity was carried out in accordance with the methods described in D5.2. 17 stakeholders participated from different sectors. The stakeholders were divided into four different groups that created four impact chains.

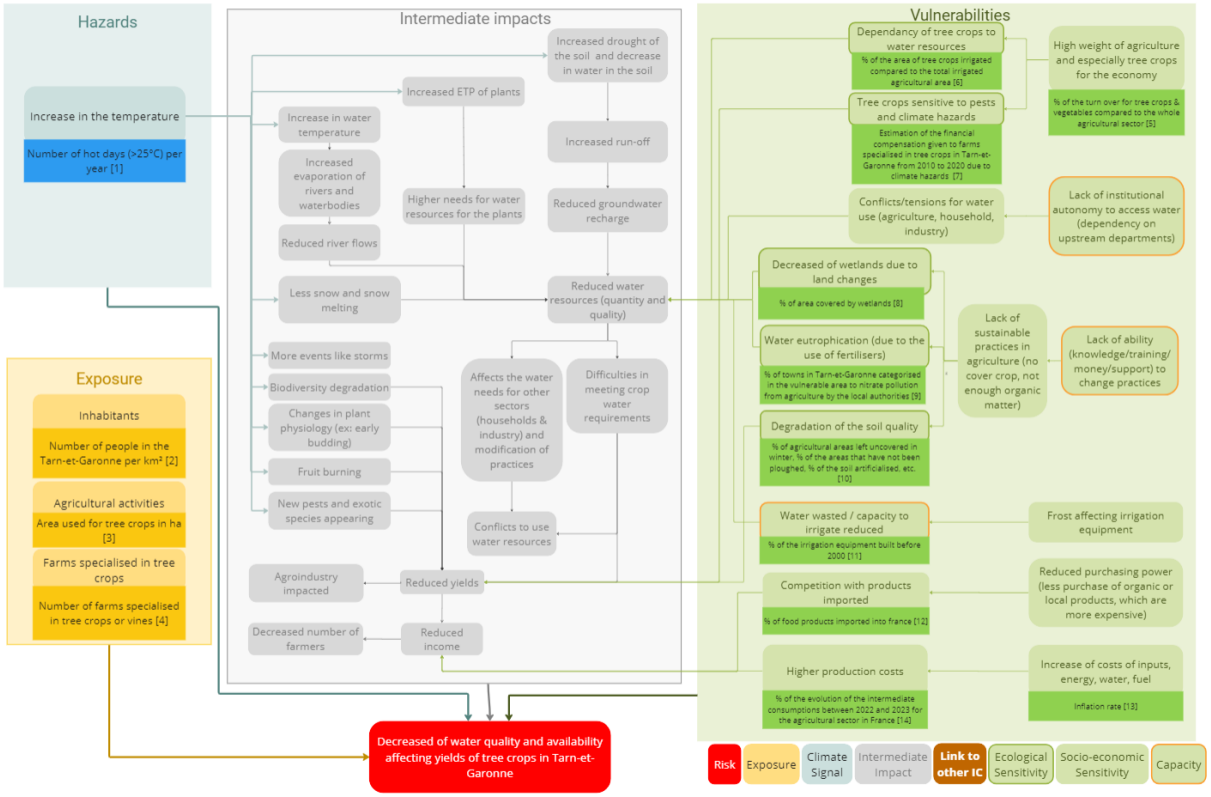

Figure 16: Impact Chain from Tarn-et-Garonne.

This impact chain below (Figure 16) is the result of merging the impact chains developed by 3 groups during the workshop held in Montauban on 23 January 2023, which brought together around ten stakeholders from the agriculture and water sectors of the case study. The effects of rising temperatures are an increase in plant and soil evapotranspiration and a reduction in river flows. These

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factors affect water resources and lead to reduced yields and incomes for farmers and other actors in the sector. The high dependence of agriculture on water resources, the lack of support for farmers to adopt environmentally friendly farming practices, and the lack of autonomy in accessing water in the case study have been identified as vulnerability factors. Rising costs and reduced purchasing power are also factors in vulnerability to climate change.

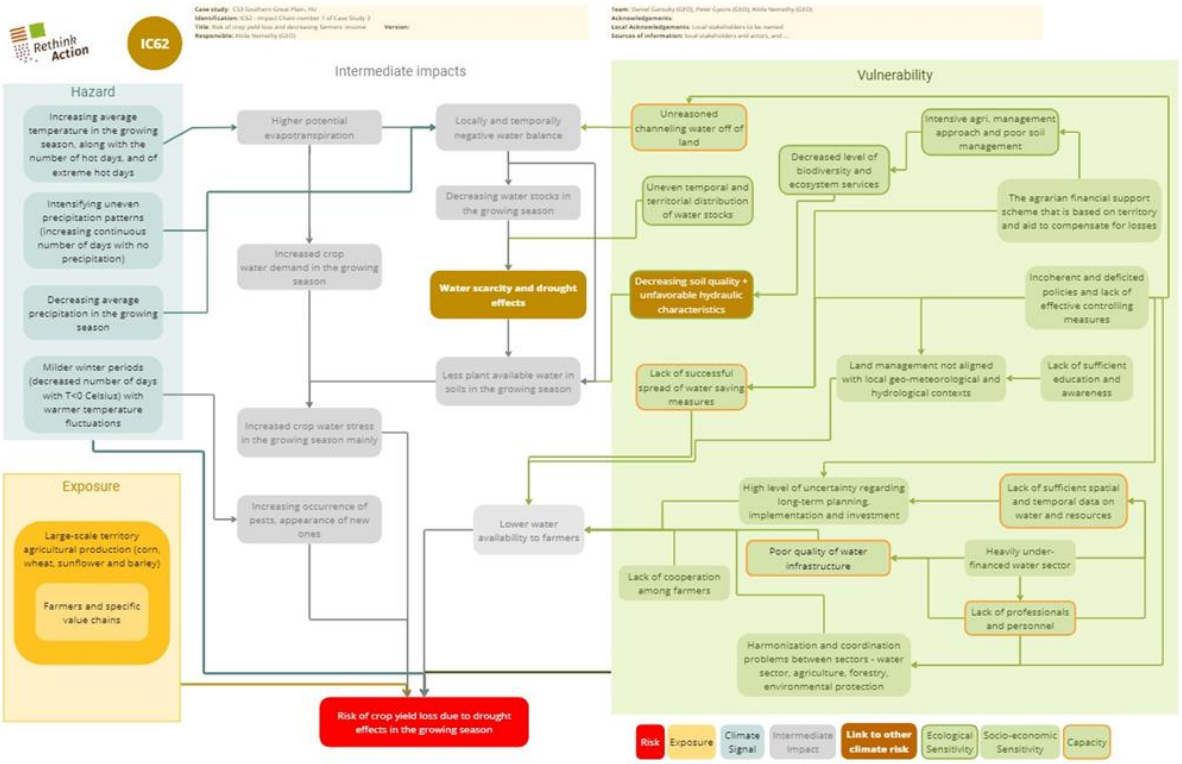

Figure 17: Impact Chain from Southern Great Plain.

Local research, scientific reports and experiences of local stakeholders pointed all in the direction that the “most serious” realization of climate change effects is the decrease of crop yields within the agricultural sector, considered as one of the most important climate risks (Figure 17). Effects of drought are gaining increasing momentum in the region, experienced by all sectors, but agriculture, considering its local and national weight, is expecting, and already experiencing great damage. It means that local actors depending on this sector see their future livelihoods rather uncertain and at high risk.

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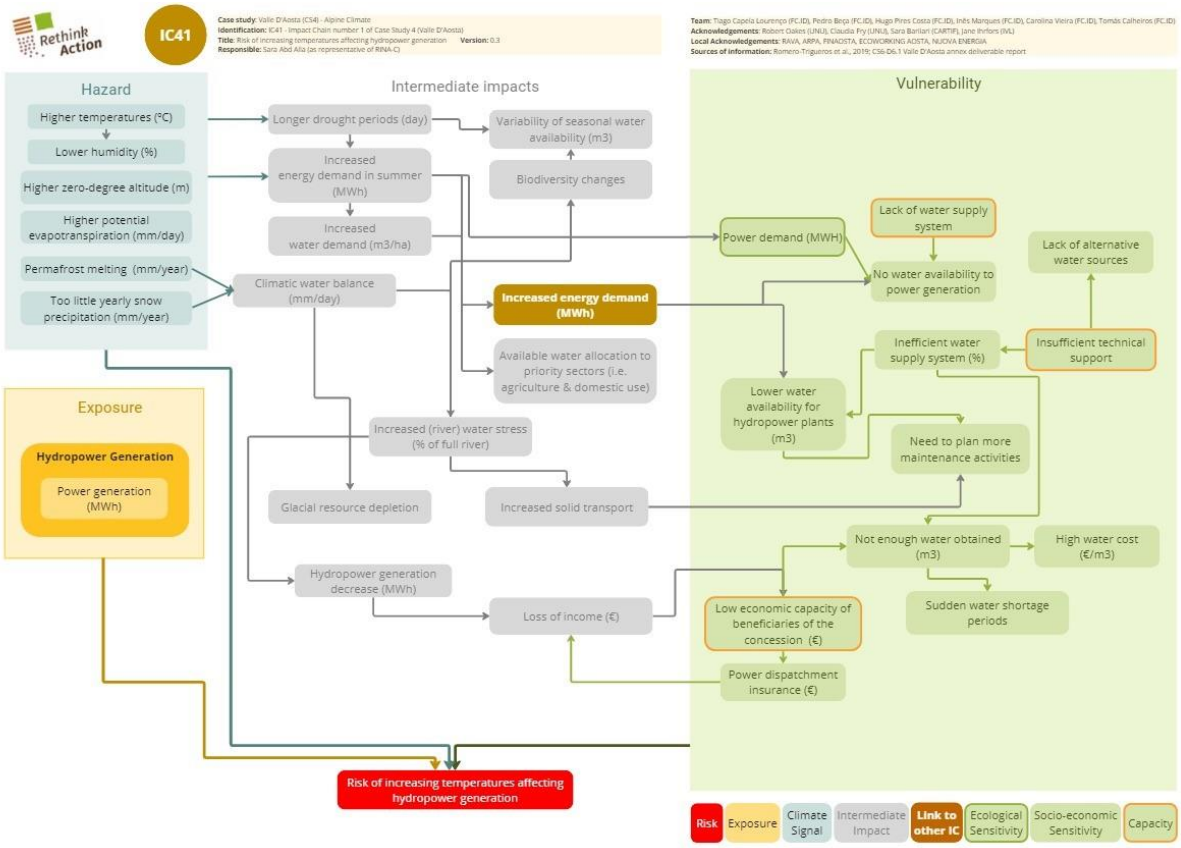

Figure 18: Impact Chain from Valle d'Aosta.

The main impact chain developed for Valle D'Aosta (Figure 18) addressed the risk of rising temperatures expected to reduce the availability of water for hydropower plants, significantly impacting their efficiency. This diminished water supply will force hydropower plants to operate less frequently and at lower capacities. Additionally, the higher temperatures will increase the frequency of maintenance required due to the strain on infrastructure.

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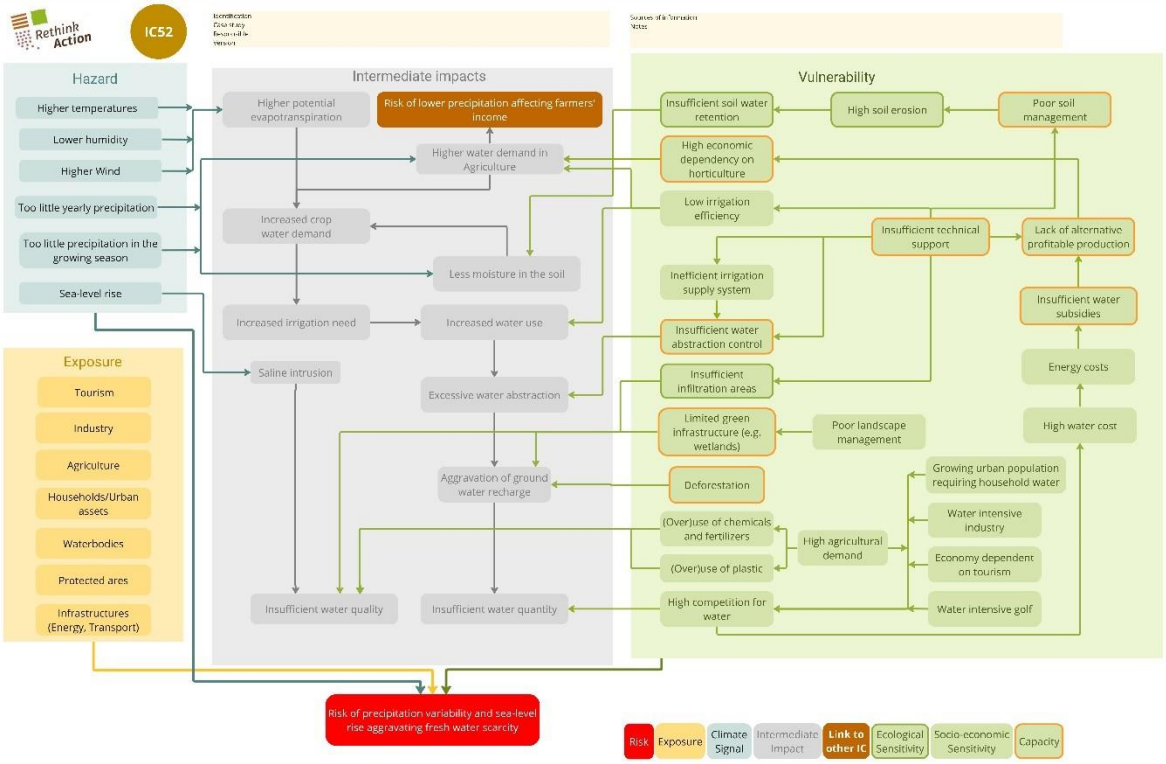

Figure 19: Impact Chain from Almería.

The primary risk in focus of the Impact Chain was related to water scarcity. This was informed by the literature review completed as part of the work on this case study and interaction with the local stakeholders, with whom we engaged in previously held stakeholder consultations. This resulted in the development of three Impact Chains in total. Even though the other two ICs deal with substantial risks (namely risk to farmers' livelihoods and reduced health outcomes for labour migrants), we found the risk surrounding water scarcity to be more central, as it exhibits causal impacts that feed into the other two risks. A sketch of the aforementioned Impact Chains produced can be found above in Figure 19. The two complementary Impact Chains can also be found within the Annex Report for Almeria. The Impact Chains from the stakeholders provides new angles of investigation that we would have been unaware of without the contextual experience within Almería, such as the importance of the Almerían family model and values. In subsequent stakeholder engagements, we endeavor to better understand exactly how this plays a role within the wider context of water management and sustainable land use, as this may shape some of the findings and ultimate recommendations given for this case study.

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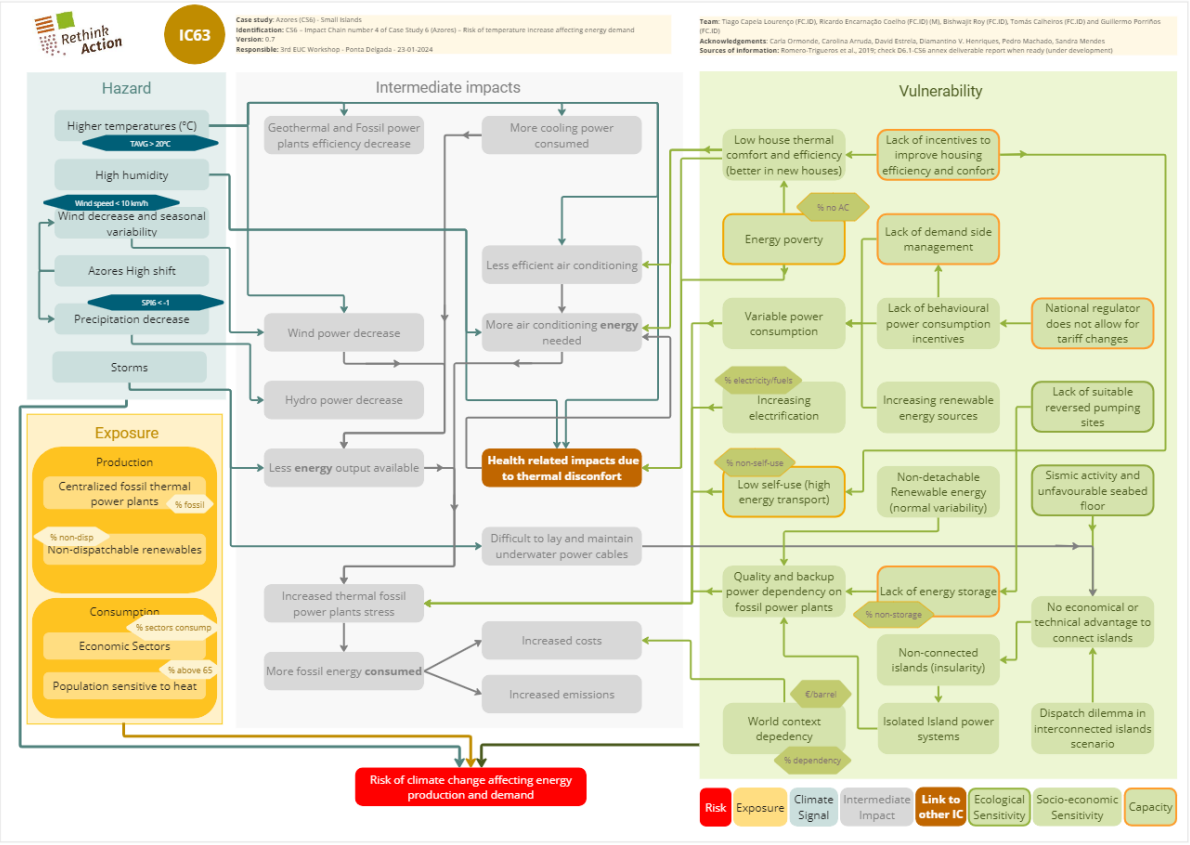

Figure 20: Impact Chain from Azores.

Three impact chains for Azores were co-developed with the involvement of the local stakeholders in the January 2024 workshop:

- Agriculture - Risk of precipitation variability affecting crop yield stability
- Tourism - Risk of loss of attractiveness due to climate change
- Energy - Risk of energy production and demand affected by climate change

Stakeholders identified the risk components in the Impact Chains template, but they partially completed the links between the different elements. The established links were later completed by resorting to the workshop notes and literature sources. The developed impact chains and the selected quantification variables are explained in Annex VI of Deliverable 6.1.

In Figure 20 we can observe an Impact Chain example for the energy sector. Following a desk-based risk analysis stakeholders were proposed to analyse the risk of climate change affecting energy demand. The co-development process led to include the production side and aspects related to energy poverty. Some of the links between the different the hazards and intermediate impacts were made by the stakeholders.

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2.3.4.2 LAMS Prioritization (Deliverable 6.2)

To identify adaptation capacity of the case studies, the stakeholders ranked and identified the most important resources and impacts on resources for each case study. To gauge the importance stakeholders place on these factors, during the workshop, stakeholders were asked to assign rankings on a scale of 1 to 10 based on how significant they deem the impact of a LAMS and resources needed (Figure 13 and 14). Through this assessment, we gained insights into how stakeholders prioritize different LAMS in terms of their desired impact and resources. This assessment showed that the majority of stakeholders prefer LAMS with a positive effect on water resources and land, with a strong emphasis on ensuring impacts on water, soil, biodiversity, and human health.

The outcomes from each of the case studies were synthesized by IVL to inform Deliverable 6.2. This included aggregating and visualizing the ranking of resources and impacts (Figure 21) as well as an overall ranking of the three most important resources and impact according to the broader RethinkAction End-User Community (Table 4).

Figure 21: Ranking Resources and Impacts of LAMS Based on Workshop Outcomes.

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Table 4: Three Most Important Resources and Impacts According to RethinkAction Stakeholders.

Category	**Resource**
Natural	Water
Natural	Land
Social	Public / community engagement
Category	**Impact**
Environmental	Water resources (quality and quantity)
Social	Health
Environmental	Soil quality and natural resources related to the soil and underground

2.4 EUC Workshop IV

2.4.1 Decision to Postpone the Workshop

Due to the lack of availability of local stakeholders because of the summer vacation period in Europe as well as the postponement of the previous workshop and concerns to not oversaturate local stakeholders, the decision was reached by CARTIF in agreement with the Case Study Leaders and ICLEI to delay the fourth engagement (originally scheduled for M33 to instead take place in M36-M37 of the project timeline. Therefore, this engagement is still underway and will be reported on in detail in the third and final engagement report (Deliverable 2.6). However, based on the two workshops that have already been succesfully completed in Table 5 below, the average number of participants and organizations is higher than the average for the previous workshop.

Table 5: Attendance of Workshop IV.

Case Study (Case Study Leader)	Workshop Date	Number of Participants	Format
Almeria, Spain (UNU-EHS)	TBC	TBC	Online
Tarn-et-Garonne, France (INRAE)	TBC	TBC	TBC
Azores Archipelago, Portugal (FC.ID)	23/09/2024	17 (13 organizations)	Online
Valle d'Aosta, Italy (RINA-C)	TBC	TBC	Online
Gotland Region, Sweden (IVL)	23/09/2024	12 (8 organizations)	In-Person
Southern Great Plain, Hungary (GEO)	TBC	TBC	TBC
Current average no. of participants and organizations		14.5 (10.5 organizations)	

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2.4.2 Workshop Content and Agenda

The content of the workshop was developed by FC.ID as the leader The content of the workshop was developed by FC.ID as the leader of Task 6.3 *Matchmaking of land use-based solutions with case studies* in collaboration with CARTIF as project coordinator to develop a simplified methodology to integrate the implementation of packages of solutions into the Platform considering the results from the consultation.

2.4.3 Workshop Outcomes & Application in the Project

To be recorded in full detail in the next report on engagement activities (Deliverable 2.6) following the successful completion of all six workshops. For this workshop, Case Study Leaders have had the opportunity to provide either an in-person or online workshop depending on the preference and availability of local stakeholders. This format also enables sufficient time to collect, analyze and present the outcomes of the consultation in deliverable D6.3 (due by October 31st).

As the Integrated Assessment Platform is the core objective of RethinkAction, in this workshop, users will link the package of potential solutions (LAMS) to their local context providing relevant data to create rules for the implementation of guided packages of solutions in the platform. To achieve this, the workshop will be 160 minutes long. Following a brief introduction to the project, participants will divide into breakout rooms according to sectors. Within these groups, they will evaluate LAMS based on objectives to establish a package of solutions. The LAMS will be prioritized according to the objectives and the pre-established set of criteria. A Miro board will be used to facilitate this process of prioritization while an Excel file is created to achieve the implementation of a package of solutions.

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No/Negative Low Medium High

Purpose of the activity:
Evaluate the importance in your CS of the objectives proposed in the table below. To do that, move the sticky notes to the table cells to assign a level of feasibility, which could be either No/Negative contribution (purple), Low (yellow), Medium (green) or High (blue).
The moderator will then create a final rank by aggregating your answers with the ones of your group's members.

Objectives	Evaluation	Final Rank
Save water resources		
Mitigate climate change effects		
Adapt to climate change impacts		
Sustainable consumption and production of natural resources		
Conservation, restoration and sustainable use of ecosystems		
Sustainable economic growth		
Ensure reliable and sustainable energy		
Ensure food security		

Figure 22: Example of Ranking of LAMS by Objectives.

The Excel file will then be shared by the moderators of the workshop to collaboratively and visually rank the LAMS according to their local priorities.

LAMS ID	LAMS Name [Land use-based Adaptation and Mitigation Solution]	Short description	Primary policy sector	Policy sector table/room	Contribution of each LAMS to objectives: Save water resources	Mitigate climate change effects	Adapt to climate change impacts	Sustainable consumption and production of natural	Conservation, restoration and sustainable use of ecosystems	Sustainable economic growth	Ensure reliable and sustainable energy	Ensure food security	Warnings
13	Offshore wind and ocean renewable energy plants	Electricity from ocean resources like offshore	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
14	Spatial planning for the sustainable deployment of energy on land	Finantial tools that promote renewable energy development near consumption, avoiding infrastructure near sensitive ecosystems and	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
15	Photovoltaic plants	Generation of electricity from solar energy	Energy	Energy	1	1	1	1	1	3	1	1	LAMS contributes to all objectives
16	Wind power plants	Generation of electricity from wind, through the	Energy	Energy	1	1	1	2	1	1	1	1	LAMS contributes to all objectives
17	Hydroelectric power plants	Generation of electricity from the hydraulic	Energy	Energy	1	1	3	1	1	1	1	1	LAMS contributes to all objectives
18	Renewable energy (biogas) from agricultural	Biogas from liquid or solid residues (plant	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
19	Renewable energy produced from forest biomass	Promote sust. forest biomass manag. to	Energy	Energy	1	1	1	1	3	1	1	1	LAMS contributes to all objectives
20	Renewable energy produced from annual/perennial energy crops	Enhance renewable energy production from forests through sustainable biomass	Energy	Energy	1	1	1	1	1	1	2	1	LAMS contributes to all objectives
21	Agrovoltaic farms	Solar-panels combined with agriculture in	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
48	Wind and solar repowering	Upgrading or retrofitting renewable energy	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
49	Floating solar photovoltaic panels in water	Mounting conventional solar modules on	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
50	Solar panels in rooftops/buildings	Generating electricity from solar energy by	Energy	Energy	1	1	2	1	1	3	1	1	LAMS contributes to all objectives
51	Fostering energy self-consumption	Using one's own renewable electricity generated	Energy	Energy	2	1	1	1	1	1	1	1	LAMS contributes to all objectives
57	Improved energy storage capacity	Boost renewable energy utilization and reduces	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
59	Land management of solar photovoltaic systems land	The land management of the area below and around the PV panels	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
					16	15	18	16	17	19	16	15	
					1	2	3	4	5	6	7	8	

Figure 23: LAMS Evaluation Table.

To conclude the workshop, participants will score the prioritized LAMS according to the ease of planning and implementation. They will also have the opportunity to suggest any LAMS that were not included in the pre-populated list but that would be a priority in their local context. In the discussion, participants will be encouraged to identify barriers and drivers and these will be captured by the moderators in the Excel sheet.

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2.5 Presentation of RethinkAction Platform to NEVERMORE researchers

On the 27th of September 2024, the first release of the RethinkAction platform was presented to a panel of experts from the NEVERMORE project. The presentation was attended by 16 researchers working on similar topics related to adaptation and mitigation to climate change. During the presentation of the platform carried out by CARTIF and scheduled for one hour, the experts had the opportunity to evaluate the functionalities implemented up to date and understand the synergies with the activities that will be developed in the NEVERMORE project. In addition, the experts of the NEVERMORE project have access to the platform and a form has been enabled for them to report their feedback on the platform. In the session, it was also possible to discuss key aspects in the implementation of this type of solutions and platforms, collecting opinions of experts that can be of great relevance to build a tool that is of interest to the scientific community.

3 Ongoing and Next Steps

3.1 First Technical Workshop with the Expert Advisory Board

The core Expert Advisory Board now includes five invited experts from the following institutions:

- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.
- University of the Azores.
- University of Bonn.
- Wageningen University.
- University of Lisbon.

A specialized workshop to be delivered by CARTIF in collaboration with ICLEI and consortium partners is planned to gather specific feedback on the RethinkAction platform from the Expert Advisory Board members. To this end, the first release of the platform launched at M36 will be used to collect feedback on the developments and potential improvements.

The steps identified in the previous report have been completed, including the formation of the Advisory Board as a community of invited experts engaged in the RethinkAction project. It is exclusive to researchers in fields related to the project, such as environmental science, planning, or engineering. An initial email invitation was developed to recruit potential experts. The recruitment process has been completed, with experts committing 3 to 8 hours per quarter year until the end of 2025. The invitation outlined benefits such as participation in workshops and events, providing technical feedback,

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contributing to scientific papers, involvement in project interviews, and networking opportunities. The process of approaching experts began in April 2024, with an initial list of 20 experts contacted. Additional experts will be contacted subsequently, and recruited members will be encouraged to suggest colleagues who might be interested in joining. Final points regarding the processing and storage of personal data and the use of images, videos, and other contributions have been clarified and integrated into the Advisory Board sign-up process. The formation and engagement of the Expert Advisory Board have progressed as planned and will continue as an ongoing activity. The specialized workshop will further leverage the expertise of the board members to provide valuable feedback on the RethinkAction platform.

3.2 Delivering Ongoing and Upcoming Workshops

3.2.1 Workshop IV

Workshops still need to be delivered in the Almeria (Spain), Tarn-et-Garonne (France), Valle d'Aosta (Italy) and Southern Great Plain (Hungary) case studies. These are planned to be completed and reported by 11 October 2024.

3.2.2 Workshops V and VI

The fifth workshops are scheduled according to the workplan and Grant Agreement to take place in M39 of the project (December 2024). The final (sixth) workshop is scheduled to take place in M43 (April 2025). Due to the postponement of the previous two workshops in the series for reasons documented in this report, the upcoming workshops may also be postponed to ensure that they are aligned with the progress of the project deliverables and that they are not too close to the previous workshops to avoid stakeholder fatigue.

The topic of the fifth workshops will be informed by Task 7.6 *Demonstration campaign and monitoring for TRL7 validation.* The content and agenda will be designed by RINA-C in collaboration with CARTIF as coordinator and the main developer of the RethinkAction Integrated Assessment Platform.

The sixth workshop will be informed by three different tasks and the consortium partners responsible for the task will collaboratively design the content and agenda:

- 6.5 Evaluation of local solutions to provide recommendations (FC.ID)
- 7.6 Demonstration campaign and monitoring for TRL7 validation (RINA-C)
- 8.4 Open call to uptake RethinkAction platform in early replicators (ICLEI)

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3.3 Using the EUC to Build the Early Replicators Community

The RethinkAction project has successfully engaged a diverse End User Community, including a substantial percentage of participants from outside the case study areas. As we move forward, our focus will be on replicating the RethinkAction approach and methods across broader contexts. The next steps will aim at leveraging the activities with the End User Community to ensure the effective dissemination and implementation of the project's results.

3.3.1 Framework Development for Replication

The initial step in our future actions involves developing a robust framework for replicating the RethinkAction approach and methods. This will be a collaborative effort with CARTIF as the partner in charge of defining the replication strategy, and will be a significant component of the activities under Work Package 8 (WP8). With the framework, ICLEI will evaluate the supportive landscape factors in the initially chosen cities or regions where the measure was piloted to identify the most suitable conditions for the replication in new contexts and regions, ensuring that the benefits of RethinkAction approach can be realized more widely.

3.3.2 Leveraging Data Analysis for Early Replication

Building on the ongoing data analysis, ICLEI will identify potential early replicators within our current End User Community. By analysing engagement patterns, feedback, and the specific needs and challenges faced by these users, it will be possible to pinpoint which members/ signatories are best positioned to adopt and implement the RethinkAction methods in their local contexts.

3.3.3 Engagement Through ICLEI's Channels

To further extend the reach of the RethinkAction platform, we will leverage ICLEI's extensive network. ICLEI's channels will be instrumental in identifying additional cities and regions that face challenges similar to those addressed by the RethinkAction platform. By targeting these cities, we can ensure that our approach is applied where it is most needed, addressing critical issues in climate adaptation and mitigation, sustainable land use, and urban planning.

3.4 Future Actions Timeline

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			Objectives to be addressed in the local workshops					
			May-22	Nov-22	Nov-23	Jun-24	Dec-24	Apr-25
			M8 workshops	M14 workshops	M26 workshops	M33 workshops	M39 workshops	M43 workshops
Task								
T2.5	End-users requirements extraction	CARTIF	Already passed					
T4.1	Review of Land use-based Adaptation and Mitigation Solutions	CMCC	Already passed					
T4.3	Analysis of synergies and trade-offs and definition of the KPI-driven evaluation framework of LAMS	INRAE		Already passed				
T7.1	Common ICT framework design and platform architecture specification	CARTIF		Already passed				
T6.1	Analysis of climate change impacts, risks and vulnerabilities at local scale	FC.ID			Already passed			
T6.2	Analysis of land-based adaptation and mitigation capacities at local scale	IVL			Already passed			

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			Objectives to be addressed in the local workshops					
			May-22	Nov-22	Nov-23	Jun-24	Dec-24	Apr-25
			M8 workshops	M14 workshops	M26 workshops	M33 workshops	M39 workshops	M43 workshops
T6.3	Matchmaking of land use-based solutions with case studies	FC.ID				In progress		
T7.6	Demonstration campaign and monitoring for TRL7 validation	RINA-C					Forthcoming	
T6.5	Evaluation of local solutions to provide recommendations	FC.ID						Forthcoming
T7.6	Demonstration campaign and monitoring for TRL7 validation	RINA-C						Forthcoming
T8.4	Open call to uptake RethinkAction platform in early replicators	ICLEI						Forthcoming

Figure 24: Gantt Chart of Future Planned Interactions.

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4 Conclusions

The second phase of engagement in the RethinkAction project has included a 58% increase in registrants for the End-User Community to 101 members. This increase has been achieved through a combination of active outreach by the Case Study Leaders, support by ICLEI through desktop research, showcasing of the RethinkAction project at international events and the inclusion of a call to sign-up at the in-person workshops. Within the 101 registrants, 47 are from outside of the case study regions (although some are based within the same country but in a different city). This provides a solid foundation for encouraging early adaptation of the RethinkAction platform in other contexts. Within the case studies, the number of attendees of workshops has increased significantly and the distribution of sectors has improved from a dominant concentration of academic stakeholders in the previous engagement report. One concern to be prioritized is the lack of representation from the Italian case study. Through regular engagement between CARTIF, ICLEI and the Case Study Leader, RINA-C, a plan to improve this through a concentrated effort to reach out to local stakeholders is being initiated. Additionally, a core team has been recruited to the Expert Advisory Board for the project and they will engage in the first dedicated technical workshop within 2024.

Workshop III produced a significant amount of data that directly informed D6.1 and D6.2. The use of Impact Chains proved an effective methodology for capturing local knowledge to inform a detailed assessment of climate risks within the region. The cards and ranking system developed to assess the LAMS allowed users to provide clear feedback and initiated discussion in the in-person workshops. Workshop IV which is currently being delivered across the case studies has been successful so far with an overall increase in attendance from the two case studies in which it has already been delivered. The immediate ongoing steps in engagement will be to ensure the successful delivery of the workshops in a timely manner so that the outcomes can inform deliverable D6.3. Following this, the priorities will be to:

- Successfully deliver the fifth and sixth workshops for the project.
- Successfully plan and deliver a targeted technical workshop for the Expert Advisory Board.
- Improve the representation of stakeholders from Valle d'Aosta.
- Analyze the sign-up data to inform the recruitment of early replicators.

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5 References

[1] Hagenlocher, M., Schneiderbauer, S., Sebesvari, Z., Bertram, M., Renner, K., Renaud, F., Wiley, H. and Zebisch, M., 2018. Climate Risk Assessment for Ecosystem-based Adaptation–A guidebook for planners and practitioners.

[2] Petutschnig, L., Rome, E., Lückerath, D., Milde, K., Gerger Swartling, Å., Aall, C., Meyer, M., Jordá, G., Gobert, J., Englund, M., André, K., Bour, M., Attoh, E. M. N. A. N., Dale, B., Renner, K., Cauchy, A., Reuschel, S., Rudolf, F., Agulles, M., Melo-Aguilar, C., Zebisch, M., and Kienberger, S., 2023. Research advancements for impact chain based climate risk and vulnerability assessments. Frontiers in Climate, 5. DOI: 10.3389/fclim.2023.1095631.

[3] GIZ and EURAC, 2017. Risk Supplement to the Vulnerability Sourcebook. Guidance on how to apply the Vulnerability Sourcebook's approach with the new IPCC AR5 concept of climate risk. Bonn: GIZ.

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6 Appendix

6.1 Guide for Workshop III

Instructions for the design of Impact Chains

1. Before we begin

When designing the Impact Chians (ICs), you may want to use the developed examples from Azores (main example) and Almeria as a guide. We found that developing ICs with other people is more fruitful and we encourage you to challenge other Case Study leader partners to review your Impact Chains.

We suggest using Miro to create your IC, as this makes online collaboration easier, and you can create boxes and link them using arrows. However other programs such as PowerPoint[1] would also work, particularly if the design of the IC will be done in person. It is also possible to use a whiteboard and sticky notes with arrows for a more physical and interactive development, though this would require more preparation time.

We advise you to sign up for a *free Miro account* or to use your existing account to access these Miro boards that we will refer to. Please find the template for Impact Chains in Miro *here*. This link takes you to our main example of an IC of the Azores with the title "Risk of precipitation variability affecting farmers' income" (IC62). This template is the most advanced IC developed until the moment, and we ask that you use this design as your template, by following these steps:

1. Click on the frame of this IC62 or manually select all of its contents, and then copy.
2. To create your own Miro board for your Impact Chains

a. Start by going to the upper left corner of your screen and pressing the Miro icon. This will take you to your boards.

b. Create a new board, rename it to Impact Chains and then put a short name for your case study

c. Paste the Azores IC main example in a suitable area of the board once

d. It is suggested you paste it a second time. The first copy will serve as an easy-access template and the second copy is where you will sketch your first Impact Chain.

Going back to the template *here,* please note that other Impact Chains examples are also available. They represent variations of the same Impact Chain, in one case still regarding Azores (CS6) and another one regarding Almería (CS5). Please mind that they are works in progress. Other Impact Chians will be put

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here in the future. We will provide email updates about this. Links to the CS miro boards are provided, you are invited to participate and comment but please do not change the contents.

Final tip before we begin, there is a way to tame the Miro board arrows, we can provide support about that.

2. Introduction

The Impact Chain adopts the risk propeller approach which defines risk as comprised of hazard, exposure and vulnerability (which in turn is subdivided into sensitivity and adaptive capacity). These three components of risk interact through intermediate impacts. Each element within the system is represented by a rectangular box, called a **factor** (this is important to remember), while the arrows show the causal relationship between the different elements. Each of the three components of risk *and* intermediate factors should link to the risk (as shown by arrows). This is because the components of risk contribute to risk on their own, but they also condition the risk through intermediate stages as the risk propagates through the system in question. Please observe Figure 25 extracted from our main source of methods, the guidebook from Hagenlocher et al. (2018), which shows what is outlined above. Please observe the structure and key elements of an Impact Chain according to this guidebook.

Figure 5: Structure and key elements of an impact chain (Source: GIZ and EURAC 2017)

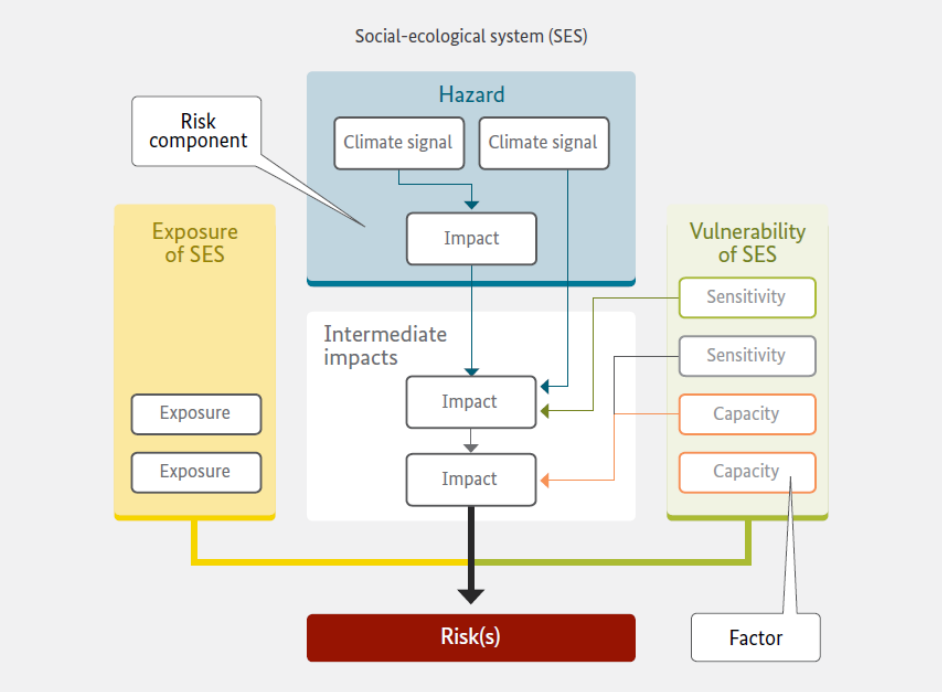

Figure 25: Structure and key elements of an Impact Chain (Hagenlocher et al., 2018).

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Please note that in the Azores and Almeria IC, unlike the one from Hagenlocher et al., (2018), the link to another IC is marked in a unique color. For both the Azores and Almeria the link is made with "Water Scarcity" IC which will be developed in the future. Please add this component in your IC as well, if you deem it relevant.

Before explaining the process of the development of the IC components, it is helpful to have an understanding of the risk context of our example.

Azores example: In the case of the Azores, "Risk of precipitation variability affecting farmers' income" is the central risk in question to which pastures and fodder are exposed. The climate-related hazards which trigger the risk are a combination of higher temperatures, higher winds and too little water in the form of less humidity, less yearly rain and less rain in the growing season. These hazards occur in the context of a local economy dependent on livestock. The industry is insufficiently supported with subsidies, technical support and, poor soil management and irrigation. The combination of structural factors and climate change means that there can be insufficient water available for farmers. This happens at the same time as pastures and fodder crops are demanding more water because of climate change. Furthermore, because farmers cannot obtain all the water that they need, we will end up with increased water stress, reduced crop yields (or even crop loss) and ultimately loss of income for farmers. This is both for the case of rainfed crops and irrigated crops with a deficit strategy. We will cite this example when it is appropriate.

The scenario where the farmer uses all necessary water to have a fully irrigated crop (no irrigation deficit) is described in the additional examples area of the Miro board in IC63 ("Risk of precipitation variability aggravating water scarcity").

Note: Before getting started, you may want to revisit your CSX-D6.1 where you or your colleagues have previously defined the main climate risks of your case study and performed supporting tasks such as a literature review. This will support you along the way and will be useful in the first step of this process: Defining the Risk.

3. Defining the Risk

The first step is to consider the risk to be investigated.

This needs to be quite specific, and some thought should be given to ensure the risk is:

i. Appropriate to the case study and project

ii. Be part of your problem statement and affect the most vulnerable sectors

iii. Specific and not overlapping with another risk

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When formulating the risk, for clarity and pragmatism, remember to include the hazard that leads to the risk. For example, define the risk as "Risk of precipitation patterns variability affecting farmers' yearly income" rather than "Farmers' yearly income". This ensures that the IC (and your work on it) remains focused, as it is necessary to delimit the system which is being represented.

Note: In practice, we have found that the risk can and does evolve through the process of the design of the IC. Therefore, it is likely that you refine a design until you reach a final iteration that satisfies you.

4. Structuring your IC

You may find it useful to design your first IC using the examples from the Azores. ICs for Almería and Gotland (to be added soon) were informed by the Azores and may also be useful for cross reference. Each of these ICs addresses a similar risk – "precipitation variation affecting farmers' income" – which may be generalisable across case studies. If you compare the ICs, you will see that there are certain commonalities:

i. The risk is the broadly same

ii. The hazards are similar – most importantly too little/irregular rain

iii. The exposed elements are similar – farm produce and farmers

iv. The socio-economic context is different, but with commonalities – both ICs recognise the role of paradigms of development and problems with institutional support

However, the exact context of the ecological and socio-economic vulnerabilities and how they develop and manifest in intermediate factors are different – we expect that this will be the case for your case study even if you share the same risk. While the Azores, Almeria and Gotland ICs all recognise the impacts that too little precipitation and farming practices have on water scarcity, the mechanism through which this occurs is different and contextual, as you would expect.

Note: while we mention factors that relate to water scarcity in the Azores and Almeria, we intend to develop a separate water scarcity Impact Chain (as indicated in the legend). That IC will have all the factors that are relevant for this risk that goes beyond the use of water in agriculture. For this reason, it is *not* necessary to fully explore water scarcity in the current ICs.

5. Order of design

- Once the risk has been decided upon, the IC needs to be developed. It is based upon the components of the risk propeller, with hazard, exposure and vulnerability feeding into "Intermediate Impacts". The official advice is, after identifying the risk, better to start from

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"Intermediate Impacts" as the central component of the IC. In practice, where you start from can be a personal choice. It might be more logical for you to consider the hazard to start with, on the other hand, it might make sense to think about the vulnerability context which sets the scene for the risk. For this reason, we do not emphasise an order for the next steps, but we also found it useful to start with the intermediate impacts. To avoid double counting, a factor should be allocated to one risk component only.

Note: in the Azores example and in Gotland we give each factor a unit of measurement when possible. We find that this may lead to less confusion about the meaning of each factor. In the case of "Higher potential evapotranspiration" we identified the unit of mm/day, but this can have other temporal units such as per year, as is the case with precipitation.

6. Intermediate impacts

i. Intermediate impacts are the way in which the risk components interact and propagate within the system to eventually lead to the risk. We found it useful to think of intermediate impacts as "something which/what happens to the exposed component(s)". In this way it is possible to differentiate them from "vulnerability".

ii. Intermediate Impact factors can be direct physical impacts of a hazard or vulnerability. An example of a physical impact of a hazard would be "Higher evapotranspiration" as an impact of "higher temperatures" and "too little precipitation". Impacts can also be social in nature, i.e. concerning the indirect consequences on, or for society. An example could be the "Increased use of water" as a consequence of an "inefficient irrigation system" and "Increased crop water demand".

iii. Note that the wording of these factors is important. The guidebook states: "For all hazards and intermediate impact factors, we recommend a wording that implies a critical state, e.g., 'too much precipitation' rather than 'precipitation'. ". We also found this form of wording useful for factors in within the vulnerability component.

iv. It should be noted that Intermediate impacts are not always connected directly to a hazard or vulnerability but can be indirectly connected through a chain of events. You will eventually build a chain of intermediate impacts that stem from either Hazards, Vulnerability or both.

Note: In the guidebook, links are made from vulnerability to intermediate impacts to but not the other way around. However, if it makes sense to your case study you may introduce arrows going from intermediate to as well impacts vulnerability, as was done in the case of the Azores.

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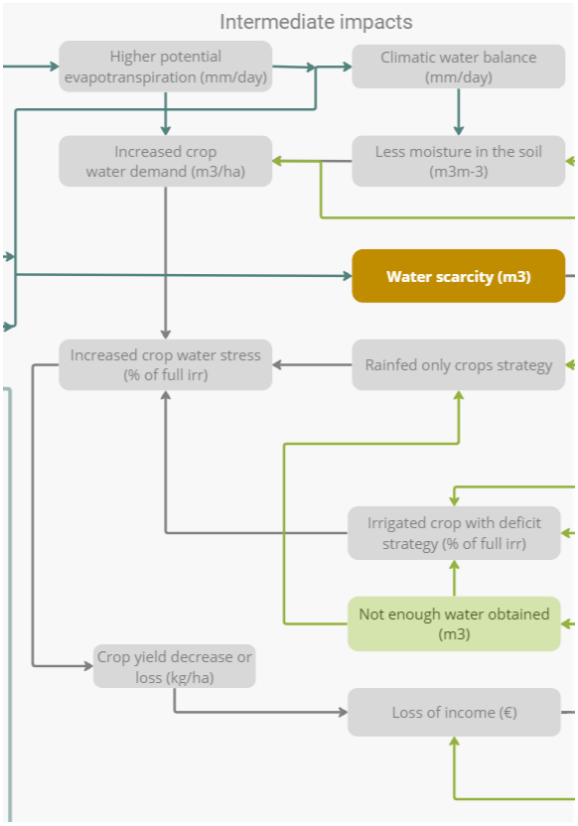
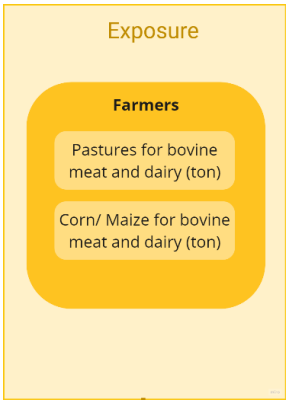


Azores example: *"The combination of structural factors and climate change means that there can be insufficient water available for farmers. At the same time as pastures and fodder crop are demanding more water. (…) we will end up with having increased water stress, reduced crop yields (or even crop loss) and loss of income for farmers. This is both for the case of rainfed crops and irrigated crops with a deficit strategy."*

7. Exposure

This is perhaps the simplest part of the IC. It needs to include a limited number of elements within the system which are exposed (i.e. can be impacted). These could include, inter alia, products, services, land, resources or people. In practice, if we are considering the agricultural sector, if the risk is "physical", the exposed elements are agricultural products or their means of production. If this risk also relates to the livelihoods of those involved in agriculture, then people should also be included.



Azores example: *"Risk of precipitation variability affecting farmers' income" is the central risk in question to which farmers are exposed through pastures for bovine meat and dairy and the fodder to support the industry are exposed.*

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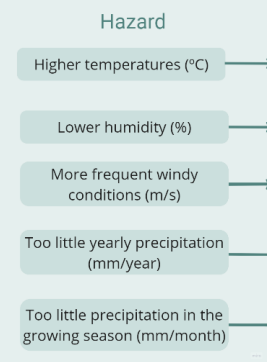
8. Hazard

Hazards refer to the climate signals to the risk system. In this context, they are climate related (as that is the context of the project). We try to limit hazards to weather/climate events and processes. For this reason (lack of) rainfall belongs in hazard, but dry soil would belong in intermediate risks.



Azores example: *The climate-related hazards which trigger the risk are a combination of higher temperatures, higher winds and too little water in the form of lower humidity, too little annual precipitation and too little rain in the growing season.*

9. Vulnerability

i. Vulnerability is one of the more complex elements of the IC. It provides the context through which the exposed element becomes susceptible.

ii. It is important to phrase sensitivities and capacities in a negative, rather than neutral, sense. For example, “high energy prices” rather than “energy prices” and “lack of water”, as opposed to “quantity of water”. It should be noted that these are negative situations which can occur at the same time, however, that does not necessarily need to be the case. For instance, in the case of the Azores, despite some farmers using water efficiently at the farm level, the risk may still occur due to the occurrence of other negative factors.

iii. We advise you to consider the moment in the future when you are going to discuss this Impact Chain with your stakeholders. For this reason, avoid using judgmental language such as “Insufficient farmers knowledge”, instead use “Lack of technical support in farming” to represent the same phenomena.

iv. To begin the vulnerability component, we found it useful to try to place the more overarching political, economic and social structures in the right-hand side of the vulnerability box. We call these structural factors. They explain the wider societal context in which other vulnerabilities and capacities have been created or emerged. These might relate to overarching economic goals or incumbent regimes which set the scene for the creation of the vulnerability. Structural factors can be understood as something (mainly) outside of the control of the local governance,

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either due to institutional limitation, such as the legal statute or the ability to influence markets, politics, societal beliefs, cultural values and private interests. Again, we advise you not to use judgemental language. For instance, "Exploitative horticulture driven by profit maximisation" could be replaced with "Dependency on horticulture driven by economic development model".

v. As the vulnerability spreads left towards the intermediate impacts box, factors will tend to be termed as "socio-economic sensitivity" or "ecological sensitivity". The division between the two can be difficult. For this reason, we suggest leaving the categorisation of "socio-economic" and "ecological" to the end, priority should be given to identifying key sensitivities rather than categorising them. Our current division tends to be related to socio-economic sensitivity being the trigger which results in an ecological sensitivity.

vi. In identifying vulnerabilities, you should also identify capacities. Again we advise you to do this at the end. We define capacities as factors of the system which can reduce or prevent vulnerabilities through policy/practice interventions. In this sense, and for simplicity we focus only on human capacities and therefore not the capacity of an ecosystem to respond to a changing climate.

vii. We assume that capacities that are structural factors are difficult to improve upon, albeit not impossible. For example, "Lack of National Land use policy" will probably be difficult to change but "Lack of enforcement of regulations" can be termed a capacity as the power to change is held by the actors (including our stakeholders/EUC) in the case study region.

viii. It can be hard to differentiate between socioeconomic sensitivities and capacities. In general, capacities refer to the (in)ability of humans to respond to the impacts of a hazard, like the ability to protect crops from floods, using dykes, ditches and water pumps. The (adaptative) capacity will act upon the sensitive factors by decreasing their sensitivity (e.g., "Switch to submergence tolerant variety crops"), protecting them from harm's way (e.g., dykes) or removing the exposed and sensitive factor altogether (e.g., "remove farms from inundation areas").

ix. Capacities can also relate to governance, like the "Lack of water and wetland management capacity" (see example 1 in the Miro board "Impact Chains template").

x. Socioeconomic sensitivities refer to socioeconomic elements that lead to impacts, even if in a sequenced fashion. "Unsuitable use of flood plains", will link to "Reduced natural retention capacity", which will ultimately lead to intermediate impacts

Note: avoid using the word capacity when referring to socioeconomic sensitivities).

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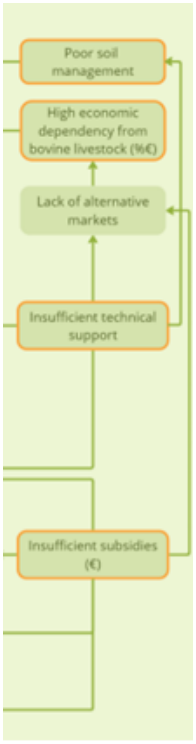
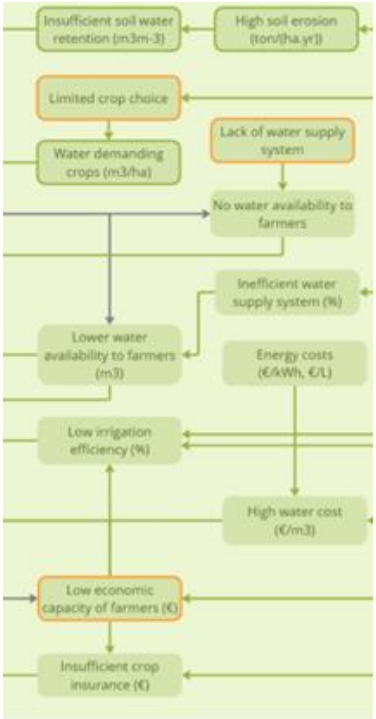


Azores example: In this image, you can see that *"(…) hazards occur in the context of a local economy dependent on livestock but in an industry which is insufficiently supported through subsidies and technical support"*. These are identified as structural vulnerability factors and are in the right-hand side of the vulnerability box. "*Together these contribute to poor soil management"* Note that boxes with an orange frame refer to capacity and boxes with a green frame refer to sensitivity.



Azores example: The combination of structural factors have further impacts on other sensitivites and capacities. Together these lead to *"(…) insufficient water available for farmers at the same time as pastures and fodder crops are demanding more water."* refer to capacity and boxes with a green frame refer to sensitivity.

10. Quantification

At a later stage in the project, components of the IC will be quantified. This will be done so for at least one of your ICs. Although you do not need to quantify at this point, it can be good to think about

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indicators for the various components of your IC. Essential Climate Variables (ECVs) and also land use and risk maps were produced by WP3[2]. Note that not every component needs to be quantified. It is sufficient to include some components that are not quantifiable, e.g., “poor landscape planning”.

11.References

Hagenlocher, M., Schneiderbauer, S., Sebesvari, Z., Bertram, M., Renner, K., Renaud, F., Wiley, H. and Zebisch, M., 2018. Climate Risk Assessment for Ecosystem-based Adaptation–A guidebook for planners and practitioners.

Frequent Asked Questions (FAQ)

1. What are the objectives of sketching the impact chains?

a. Systematize, build upon and clarify the result of the climate risks analysis, including the risk components (hazard, exposure and vulnerability) and the intermediate impacts

i. This a summary of the analysis already produced by CSL for CSX-D6.1

b. In line with the stakeholder engagement strategy, ICs will be discussed with stakeholders/EUC in the next consultation act (M26 | NOV 2023)

i. They will provide feedback on the ICs , and make suggestions on adjustments.

c. The sketched IC will inform the local Systems Dynamics modelers about how the risk manifests and propogates in the case study. With this information they will learn about the risks and how their components and relevant factors interact facilitating modeling.

d. To able to build at least one quantified Impact Chain

i. This will further inform the local Systems Dynamics modeling

ii. Create maps and tables for CSX-D6.1 and the platform

e. Form the substantive basis for a scientific journal publication

2. Are the Impact Chains going to be included in the local Systems Dynamics models?

a. Probably yes but with caveats:

i. There needs to be data availabe in order to run the model

ii. For this reason, quantified Impact Chains are more likely to be included in the SD model, but this is to be confirmed

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b. At a minimum, the ICs will inform the SD modellers about how the risks work in each case study. This is what is stated by the GA. Our mission is to inform them how the risks work in each one of our case studies.

3. Will the Impact Chains be included in the platform?

a. It is not yet decided as to whether the sketched part will be included

b. The quantified part will be included and is intended to be in the form of maps

6.2 Guide for Workshop IV

Guidelines of the 4th EUC Workshop

Introduction: Link between the package of solutions and the platform

The main objective of RethinkAction is the implentation of an Integrated Assessment Platform: in this sense, activities need to provide results that could be integrated in the Platform for solving the different steps covered in the developed workflow and represented in the mockups. After the review of the baseline, each user will have the opportunity to identify a suitable package of solutions that will help to cover the priorities and objectives identified in the case study under assessment.

Using a list of objectives (integrated into a guided questionnaire), the user will be able to generate a package of solutions that could be implement in the case study, which will help them to achieve the initial objectives established to adapt or mitigate the effects of climate change. This package of solutions will be used to identify in the initial parametrization of the model, the policies that should be modified to check if the effects are aligned with the expectations. These policies will be highlighted to guide the user during the policy parametrization steps.

In the following figures (Figure 26 and Figure 27) you can see how this approach is integrated in the platform by means of the different designed mockups. It covers the objective selection, the review of a package of solutions as well as the model parametrization.

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1.- Definition of objectives and priorities

2.- Guided questionnaire with the selection

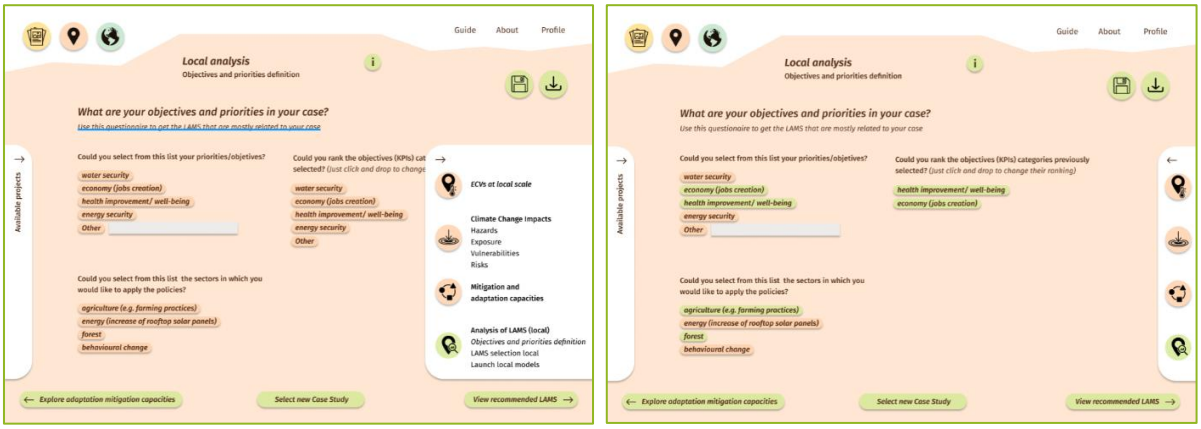

Figure 26: Platform mockups for objectives and priorities using a guided questionnaire with attributes selection.

3.- A package of solutions that fit the criteria

4.- Guide policy action implementation

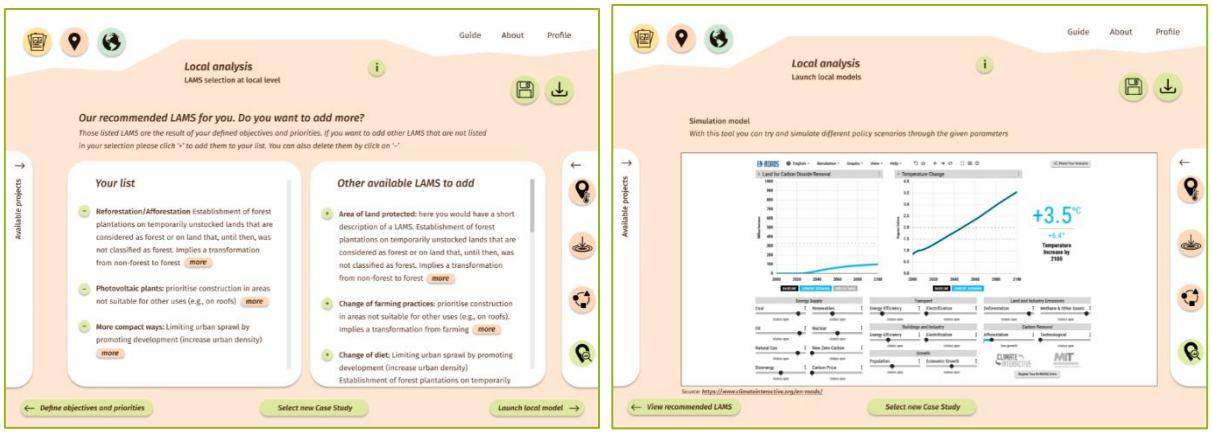

Figure 27: Mockups with a package of solutions and its implementation in the model.

Workshop activities [160 min]

The stakeholder engagement needs to take place within September either online or in-person. This provides enough time to collect, analyse and present the outcomes of the consultation in the deliverable D6.3 (final deadline on October 25th, with quality review on October 11th).

In the consultation, the following steps should be included:

1. **Introduction** [15 min]

   3.1. Brief description of the project. Previous work developed with stakeholders WS3 (definition of final ICs in D6.1 (Figure 28) and LAMS prioritization in D6.2), the way this work was integrated in the project activities and how the new consultation will improve the project results.

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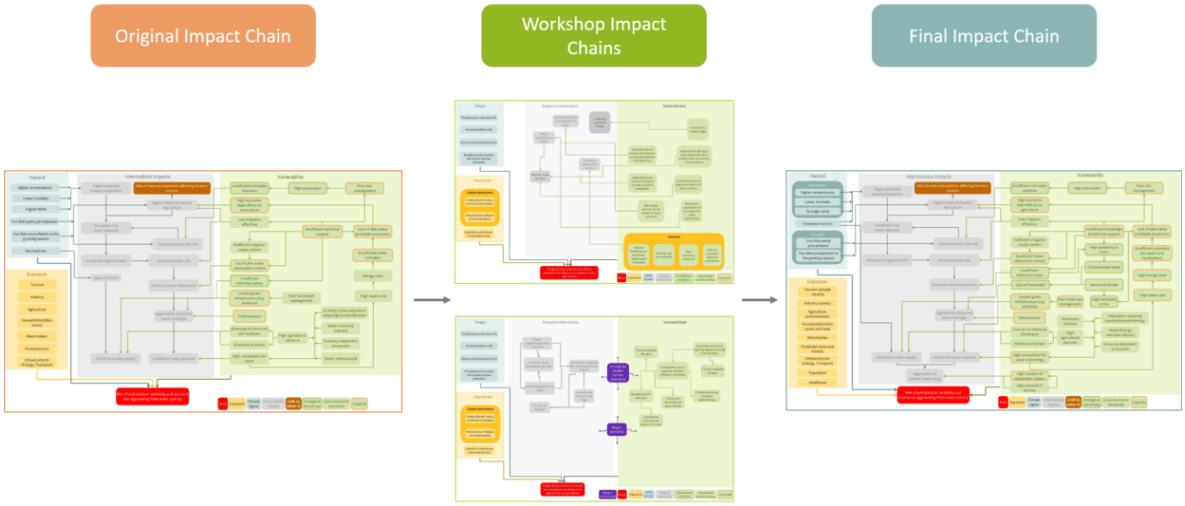

Figure 28: Impact chain workflow.

3.2. The progress and objectives of the project are presented through the platform. This includes ECVs, Risk and Vulnerability analysis and finally objectives and priorities, which represents the potential outcomes of the consultation allowing us to create the portfolio of solutions.

2. **Divide in breakout groups (per sector)** [10 min]

The Case Study leaders can decide to follow different division methods:

Option 1: Based on the number of participants, the stakeholders are divided in different breakout groups (minimum 3 people in each group). The groups correspond to the most important sectors that can be 2 or 3 based on the sectors reported in D6.1. This division is valid if the stakeholders are more than 5. On the contrary, if they are less than 5 people, the participants collaborate all together to the activities. In case of available additional time, at the end of the first evaluation, it would be possible to exchange sectors between the groups to have the participants assessment on all the LAMS in the most relevant sectors.

Option 2: Divide in groups based on sectors even with less than 5 people in the workshop.

3. **Evaluation of LAMS based on objectives for package of solution creation** [35 min – 45 min]

3.1. **Introduction** [10 min]

The participants of the consultation in each group prioritize the LAMS collectively using the objectives proposed:

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- Save water resources, to ensure an increase in water-use efficiency, improve water quality by minimizing pollution and untreated wastewater. This objective includes the protection of water-related ecosystems (e.g. rivers, aquifers, lakes).
- Mitigate climate change effects. The objective of mitigating climate change effects involves reducing or minimizing the negative impacts of climate change through the decrease of GHG gases emissions, the increase of carbon stocks and the promotion sustainable practices.
- Adapt to climate change impacts, allows to enhance resilience and the ability to adapt to climate-related hazards and natural disasters. It includes improvement on education and awareness-raising on the topic of climate change.
- Sustainable consumption and production of natural resources, refers to the sustainable and efficient use of natural resources, particularly through sustainable patterns of consumption and production, and the decrease of waste by implementing prevention, reduction, recycling and reuse. It is fundamental that wastes are well-managed throughout their life cycle to minimize the impact on society and environment.
- Conservation, restoration and sustainable use of ecosystems, encourages the restoration of degraded land and soil to fight desertification, and the adoption of sustainable forest management practices, to stop deforestation and restore degraded forests. It comprises the conservation of natural habitats and biodiversity in terrestrial and inland freshwater ecosystems (e.g. forests, wetlands).
- Sustainable economic growth. It increases economic productivity through diversification, technological advancements, and innovation. Moreover, it ensures full and productive employment and the creation of decent jobs for all the workers.
- Ensure reliable and sustainable energy. It is focused on increasing the share of renewable energy and enhancement of energy efficiency.
- Ensure food security, allows to achieve sustainable food production systems to fight hunger and implemention of resilient agricultural practices to improve crop productivity and production, preserve ecosystems and increase land and soil quality.

Moreover, a series of criteria is used to combine the ranking of the stakeholders with expert judgement by using synergies and trade offs values. These criteria are:

- Social acceptance of the solution, represents the relevance of the measure in the community and therefore will be promoted as a measure to fight against climate change impacts. It includes

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environmental (landscape aesthetic, noises, light dust and smells), social (public engagement, health, well-being, recreational activities) and economical aspects (income, cost avoiding and jobs creation) that affects the life of the citizens.

- Technical feasibility of the solution, is the practicality of implementing the solution, considering skills of labour required and technologies, length of time to implement the solution, labour amount and necessary level of organization for implementation.
- Implementation cost, defines the financial investment required to implement the option, including initial capital, maintenance, and operational costs (they consider both public and private funds).
- Effectiveness in achieving the goals, is the ability of the solution to achieve the intended adaptation or mitigation goals such as reduction of greenhouse gases (GHG), carbon storage/sequestration, improving quality and quantity of water resources, enhancement of soil and air quality, and decrese biodiversity loss.
- Efficiency with minimum resources, is the ability to achieve the desired results with the minimum possible resources. The resources considered include not only natural resources such as animals and plants based products, water, minerals and metals, and energy (natural fuels), but also economical resources such as public and privare funds.
- Achieve long-term sustainability, defines if the measure can last over time or is only temporal. This effect is extracted by the relevance of the solutions over long term climate change adaptation and mitigation goals such as GHG emissions, carbon storage, water quality and quantity, air and soil quality, biodiversity preservation, health, well-being and circular economy contribution.
- Requested resources for implementation, defines the amount of land needed for the implementation of the solution.

A group moderator is assigned to each group. The moderator has to explain the definition of the LAMS by using the LAMS factsheets, and the meaning of objectives and criteria (e.g. of the Miro board with the definitions in Figure 29 and Figure 30).

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Figure 29: LAMS factsheets example in Miro.

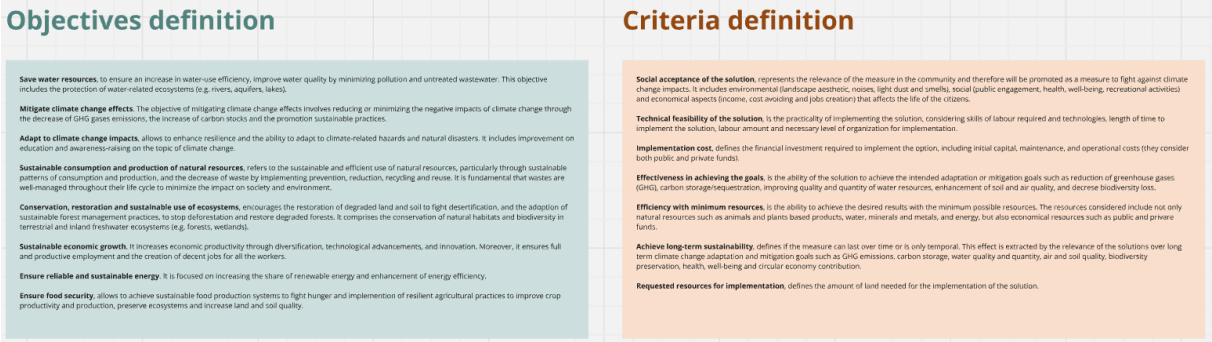

Figure 30: Objectives and Criteria definition in Miro.

3.2. Evaluation of LAMS based on objectives for package of solution creation [25 min – 35 min]

The group moderator has to facilitate the conversation within the group and help to reach a final evaluation for each LAMS in a reasonable amount of time (total time for the activity 25-35 minutes). Therefore, after the definition of LAMS, objectives and criteria, the group performs the LAMS evaluation by assigning the value No/Negative (0), Low (1), Medium (2) or High (3) contribution of each LAMS and to each objective. These values represent the level of contribution of the LAMS to cover a specific objective.

For an online consultation, there are two ways to proceed to report the evaluation:

- *Miro board*. The link of the board is shared to all the members of the groups, so that they could check autonomously the factsheets (also located in the Miro board). The sectors selected for these activities are the most relevant ones (D6.1) and the stakeholders are divided in 2/3 groups based on how many sectors are chosen.

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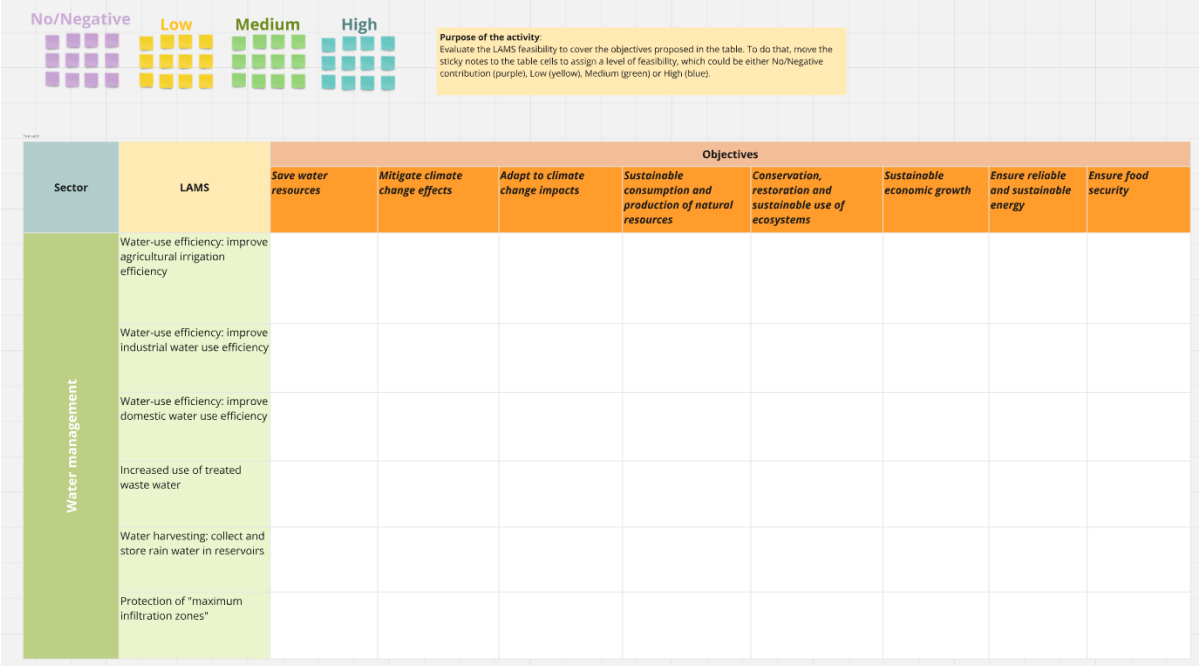
a. The stakeholders have to find the table of the assigned sector and they actively participate in the prioritization, by using a sticky note of different colors to report their opinion. The colors represents No/Negative contributions, Low, Medium and High values, and the stakeholders can put comments in the notes to validate their choises (Figure 31). Then, a discussion between the members of the group takes place to highlight inconsistencies in the evaluation (some stakeholders assigned a High value and other Low). The opinions of the participants are aggregated in real time by the group moderator and included in the Online tool excel (following methodology).



Sector	LAMS	Objectives							
		Save water resources	*Mitigate climate change effects*	*Adapt to climate change impacts*	*Sustainable consumption and production of natural resources*	*Conservation, restoration and sustainable use of ecosystems*	*Sustainable economic growth*	*Ensure reliable and sustainable energy*	*Ensure food security*
Water management	Water-use efficiency: improve agricultural irrigation efficiency								
	Water-use efficiency: improve industrial water use efficiency								
	Water-use efficiency: improve domestic water use efficiency								
	Increased use of treated waste water								
	Water harvesting: collect and store rain water in reservoirs								
	Protection of "maximum infiltration zones"								

Figure 31: Table for the LAMS evaluation in Miro.

b. The second activity is the ranking of the objectives to identify which are the most important objectives for their CS. At first, the stakeholders are asked to evaluate the objectives by using the same sticky notes as before. The No/Negative, Low, Medium and High values of importance corresponds respectively to the values 0, 1, 2 and 3 (Figure 32).The opinions of the participants are again combined in real time by the group moderator, to create a final rank and included in the Online Excel tool (following methodology).

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Objectives	Evaluation	Final Rank
Save water resources		
Mitigate climate change effects		
Adapt to climate change impacts		
Sustainable consumption and production of natural resources		
Conservation, restoration and sustainable use of ecosystems		
Sustainable economic growth		
Ensure reliable and sustainable energy		
Ensure food security		

Figure 32: Ranking of objectives by the stakeholders.

c. The third activity is the ranking of the criteria to identify which are the most important criteria for their CS (Figure 33). It is the same of the activity above, but this time the rank is assigned to the criteria.

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Figure 33: Ranking of the criteria by stakeholders.

d. Finally, it is possible to present the Online tool excel to show to the participants the results of their work, the package of solutions (Figure 10). They could also discuss possible changes and they can be shown through the column *Top priority (final)* by assigning values of 1 or 2 to the LAMS that they would like to have in or out of the package.

- *Excel file*. The file is shared through the screen of the moderators in each group so that the participants can see how the activities proceed. The stakeholders of the same groups are going to discuss and come up with a collective ranks and evaluation.

a. Firstly, the participants are asked to select the sector that is one of the most relevant for their CS by filtering in the *Primary Policy sector* column (e.g. in Figure 7: Energy). The sectors that the participants can choose are preselected by the CS leaders during the preparation of the

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consultation. The LAMS list used can be either shorten by the selection of specific sectors (the vulnerable ones from D6.1) or by singularly selecting the LAMS that are more relevant for their CS over the entire list of LAMS (LAMS shortlist).

b. In the table of Figure 34, the stakeholders have to evaluate the level of contribution of the measures over the objectives by assigning the values 0, 1, 2, 3, which respectively represent Not applicable/Negative, Low, Medium and High contribution to cover objectives. The default value is 0.

LAMS ID	LAMS Name [Land use-based Adaptation and Mitigation Solution]	Short description	Primary policy sector	Policy sector table/room	Contribution of each LAMS to objectives								Warnings
					Save water resources	Mitigate climate change effects	Adapt to climate change impacts	Sustainable consumption and production of natural	Conservation, restoration and sustainable use of ecosystems	Sustainable economic growth	Ensure reliable and sustainable energy	Ensure food security	
13	Offshore wind and ocean renewable energy plants	Electricity from ocean resources like offshore	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
14	Spatial planning for the sustainable deployment of energy on land	Finantial tools that promote renewable energy development near consumption, avoiding infrastructure near sensitive ecosystems and	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
15	Photovoltaic plants	Generation of electricity from solar energy	Energy	Energy	1	1	1	1	1	3	1	1	LAMS contributes to all objectives
16	Wind power plants	Generation of electricity from wind, through the	Energy	Energy	1	1	1	2	1	1	1	1	LAMS contributes to all objectives
17	Hydroelectric power plants	Generation of electricity from the hydraulic	Energy	Energy	1	1	3	1	1	1	1	1	LAMS contributes to all objectives
18	Renewable energy (biogas) from agricultural	Biogas from liquid or solid residues (plant	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
19	Renewable energy produced from forest biomass	Promote sust. forest biomass manag. to	Energy	Energy	1	1	1	1	3	1	1	1	LAMS contributes to all objectives
20	Renewable energy produced from annual/perennial energy crops	Enhance renewable energy production from forests through sustainable biomass	Energy	Energy	1	1	1	1	1	1	2	1	LAMS contributes to all objectives
21	Agrovoltaic farms	Solar-panels combined with agriculture in	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
48	Wind and solar repowering	Upgrading or retrofitting renewable energy	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
49	Floating solar photovoltaic panels in water	Mounting conventional solar modules on	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
50	Solar panels in rooftops/buildings	Generating electricity from solar energy by	Energy	Energy	1	1	2	1	1	3	1	1	LAMS contributes to all objectives
51	Fostering energy self-consumption	Using one's own renewable electricity generated	Energy	Energy	2	1	1	1	1	1	1	1	LAMS contributes to all objectives
57	Improved energy storage capacity	Boost renewable energy utilization and reduces	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
59	Land management of solar photovoltaic systems land	The land management of the area below and around the PV panels	Energy	Energy	1	1	1	1	1	1	1	1	LAMS contributes to all objectives
					16	15	18	16	17	19	16	15	
					1	2	3	4	5	6	7	8	

Figure 34: LAMS evaluation table.

4. **Ranking [5 min]**

a. The objectives are also ranked by the participants in the column *Rank* of *Contribution to Objective* sheet (Figure 8). The most relevant objectives are presented in the *Priority* column. These objectives are highlighted with a blue color in the table of the LAMS evaluation (Figure 34).

Objectives	Rank	Weights	Weighted value	Objective order	Weighted order	Priority
Save water resources	3	0,14	3,22	1	3,84	7
Mitigate climate change effects	4	0,13	2,6	2	3,45	3
Adapt to climate change impacts	2	0,15	3,45	3	3,22	1
Sustainable consumption and production of natural res	8	0,09	1,98	4		
Conservation, restoration and sustainable use of ecosy	6	0,11	2,53	5		
Sustainable economic growth	7	0,1	2,5	6		
Ensure reliable and sustainable energy	1	0,16	3,84	7		
Ensure food security	5	0,12	2,4	8		
		1	Validation value. Need to be 1.			

Figure 35: Ranking of the objectives.

b. After that, the measures with values 2 or 3 in the columns representing the most relevant objectives are not only highlighted but the value is red in the cell (Figure 35). These are also the LAMS with highlighted ID number and they are the ones selected for the next step.

c. Once moved to the *Rank priority* sheet, the participants have to rank the criteria proposed (Social acceptance, Technical feasibility, etc.) (Figure 36).

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Criteria	Rank
Social acceptance of the solution	1
Technical feasibility of the solution	2
Implementation cost	3
Effectiveness in achieving the goals	4
Efficiency with minimum resources	5
Achieve long-term sustainability	
Requested resources for implementation	

1
2
3
4
5
6
7

Figure 36: Ranking of the criteria in the ranking priorities sheet.

5. **Packages of solutions assessment** [10 min]

   d. *Package_of_solution_CARTIF* sheet includes the table (Figure 37) where the stakeholders have to filter the LAMS selected in the *Contribution to Objective* sheet (the LAMS not selected have the lowest rank by default). The values in the *Top priority (original)* column results from a combination of values from synergies and trade offs and the criteria previously ranked by the stakeholders in Figure 9. The LAMS with the "x" in their corresponding cells of the *Top priority (original)* column are the ones that are included in the package. The rank is also reported in the first column of the table, so that the participants can check which LAMS are more important. Moreover, the last column of the table (*Move to a different priority group* column in Figure 10) allows the stakeholders to express theit opinion about the package of solutions. They can choose to keep the LAMS as it is by assigning the value 0 or they can move it in or out the package by assigning respectively the values 1 and 2. The new package is shown in the column *Top priority (final)*.

Ranking	LAMS ID	LAMS Name [Land use-based Adaptation and Mitigation Solution]	Policy sector	Top priority (original)	Top priority (final)	Move to a different priority group
1	51	Fostering energy self-consumption	Energy	x	x	0
2	50	Solar panels in rooftops/buildings	Energy	x	x	0
3	17	Hydroelectric power plants	Energy	x		2
4	45	Increased use of electric vehicles	Energy			0
5	20	Renewable energy produced from annual/perenn	Energy		x	1
6	1	Agroforestry: silvoarable (trees in croplands) and s	Agriculture			0

Figure 37. Display of the LAMS to include in the package of solution and their ranking

Regarding the **consultation in-person**, a table like the one used in the Miro board can be printed and the stakeholders in each group could put post-its to evaluate the LAMS, and rank objectives and criteria. At the end of this exercise, exactly like in the Miro online format, it is possible to aggregate the evaluation of the participants to create a package by using the Online tool excel. If the consultation is held in person and there is no possibility for the group moderator to use the excel and share the information, then the package of solutions is sent by email as an excel file sheet based on the evaluation performed during

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the workshop. In both cases (online and in person) the participants have to express their opinions on the package of solutions.

6. LAMS planning and implementation [15 min]

This sheet is in the Online tool excel asks for two informations: one concerning the planning of the LAMS and another concerning the level of implementation. The scale is 0 to 4, being 0 do not know/not sure. The rest of the scale is explained in the sheet. The sheet starts in a yellow colour and turns green by sections when a reply is given. If two replies per LAMS are given to each question then the cells will turn red. The informations are filled by the moderators that collects the final answers from the discussions within the members of their groups.

[Ricardo`s form]

7. Additional LAMS [5 min]

LAMS that are not included in the catalogue can be proposed in an open response format. This question is necessary as participatory process and cocreation activities. It is an additional way to understand the need and requirements of the local context. The informations are filled by the moderators that collects the final answers from the discussions within the members of their groups in a column (Figure 38).

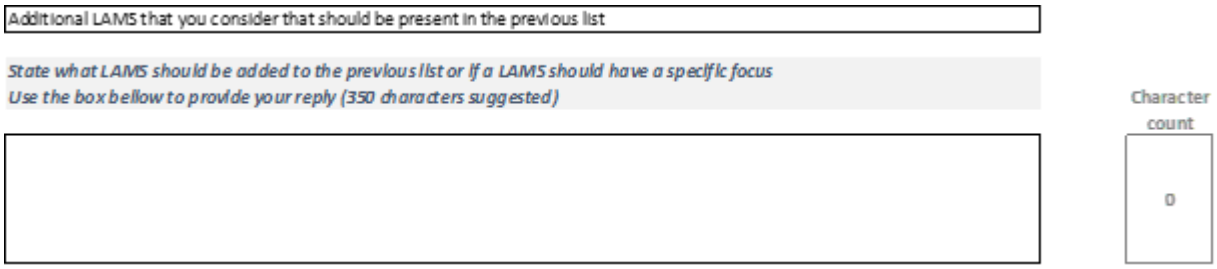

Figure 38: Box to include additional LAMS.

8. Barriers and drivers [30 min]

This section of the workshop consists in an open reply format with three rounds of discussions for barriers and another three for enablers. In the first round stakeholders are invited to share their perspective about enablers and barriers. These perspectives are then included in the excel by the moderators in two paragraphs. The moderators can put keywords only, disconnected sentences or a structured paragraph. In the second round a pre-arranged list of enablers and barriers are presented (IVL is developing this list). Stakeholders are invited to review what the moderators wrote after viewing this list. Finally a ten minute open discussion among each table about the drivers and barriers. The barriers and drivers exercise may be merged together if such materials can be adapted beforehand.

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