D5.1. Sustainability and Exploitation Plan 1

MOUNT RESILIENCE

Co-funded by the European Union

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor CINEA can be held responsible for them.
This work has received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI).

Deliverable Information Sheet

Version	Final
Grant Agreement Number	101112876
Project Acronym	MountResilience
Project Title	Accelerating transformative climate adaptation for higher resilience in European mountain regions
Project Call	HORIZON-MISS-2022-CLIMA-01
Project Duration	54 months
Deliverable Number	5.1
Deliverable Title	Sustainability and Exploitation Plan 1
Deliverable Type	R – document, report
Deliverable Dissemination Level	PU - Public
Work Package	WP5
Lead Partner	META
Authors	Francesca Natali, Lorenzo Valeriani
Contributing Partners	All partners
Reviewers	Stefano Sala – UMIL, Armando Alves – INOVA+
Official Due Date	29th of February 2024
Delivery Date	28th of February 2024

List of Acronyms

IP	Intellectual Property
KERs	Key Exploitable Results
WP	Work Package
USP	Unique Selling Point
UVP	Unique Value Proposition
DMOs	Destination Management Organizations

List of Tables

List of Figures

Keywords list

- Exploitation.
- Key Exploitable Results (KERs).
- Impact.
- Lean approach.
- Use of results.

Disclaimer

Table of Contents

Executive summary

1.1. Purpose of the document

This document describes the exploitation strategy to be adopted and activities to be performed within MountResilience to ensure the KERs identified alongside the project lifetime are used and will generate the expected impact.

It presents:

- *the problem-based approach for securing the use of MountResilience results;*
- *the main tools to use during the exploitation process all over the project;*
- *the use model for each selected result, its unique value proposition, the early adopters, and the problems it is solving;*
- *the plan for the IP management at consortium level.*

1.2. Structure of the document

Chapter 2 presents the definition of exploitation and the main terms which are linked to it, which will be used during MountResilience lifetime.

Chapter 3 outlines the approach used by the Consortium for exploiting the results generated and the main activities which will be implemented to allow partners to properly use the results and generate the expected impact.

Chapter 4 summarizes the main exploitation activities undertaken in the first six months of the project by the consortium partners.

Annexes present in detail:

- *the description of the tools which will be used for running and implementing the exploitation activities;*
- *the first version of the simplified characterization tables filled by all the results owners.*

1.3. Future updates

This document is to be considered as a first version highlighting the main path to be followed while implementing the exploitation strategy. The plan will be revised and updated two times (M36 and M52) during MountResilience lifetime to fine-tune and align the strategy with the updates coming from the development of the results and the linked feedback from the interaction with users/customers. A final version of the Exploitation plan will be delivered in M52.

Introduction

To guarantee the success of the MountResilience project, a strong exploitation and dissemination strategy is vital throughout its entire lifetime (and beyond), by encouraging all categories of stakeholders to actively participate and adopt MountResilience Key Exploitable Results (KERs) contributing to its success."

1.4. Exploitation

Exploitation is a value-driven process that can have different meanings:

- *generating revenues if there are customers available to pay for a new KER;*
- *fulfilling an existing gap;*
- *increasing organizations'/communities' distinctive skill*
- *setting and improving processes, quality of life, products, services, policies, standards, etc.*

Exploitation means to USE a research result (this use can be commercial, societal, political, or for improving public knowledge and action) or to FACILITATE USE by others (e.g., through making results available).

It can be done:

- *directly by MountResilience partners for:*
  - *setting background in further research activities (low TRLs);*
  - *developing and selling a product or process (high TRLs);*
  - *providing services (consultancy – contract research);*
  - *using results in standardisation activities;*
  - *contributing to new standards.*
- *indirectly by third parties through:*
  - *transfer of results;*
  - *licensing;*
  - *spin-offs.*

1.5. Dissemination

Dissemination is about the disclosure of the results towards selected target groups of potential adopters by appropriate means, other than resulting from protecting or exploiting the results, including by scientific publications in any medium.

The objective is to transfer knowledge and results with the aim to enable others to use and take up results, thus maximising the impact of EU-funded research.

The focus is to describe and ensure results are available for others to use.

The “target group” is the audience that may be interested in the potential use of the results (e.g.: the scientific community, industrial partners, policymakers, etc.).

Dissemination	Exploitation
Describing and **making available results** so that they can be used. Inform a potential target group of users about a result that is ready for use.	**Making use of results**, for scientific, societal or economic purposes
Audiences that may make use of the results	Groups and entities that are making concrete use of results

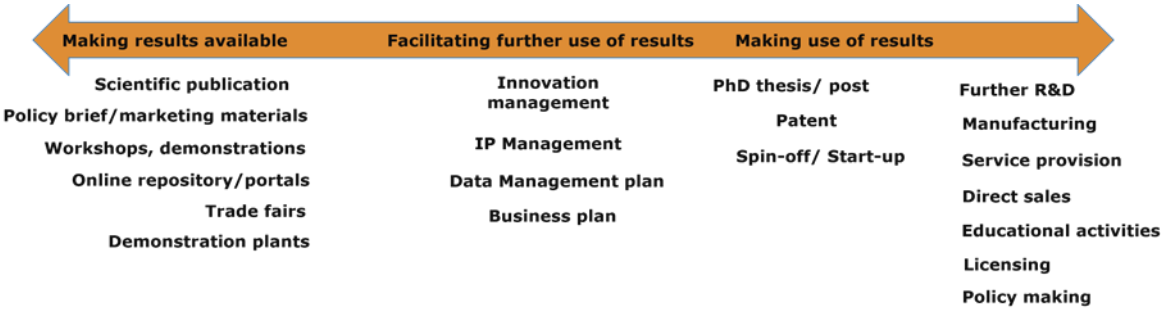

Figure 1 - Dissemination and Exploitation overview

1.6. Key Exploitable Results

According to the Horizon Europe text (https://ec.europa.eu/newsroom/informatics/items/689551), a result is defined as: "*Any tangible or intangible output of the action, such as data, knowledge and information whatever their form or nature, whether or not they can be protected, that is generated in the action as well as any attached rights, including intellectual property rights*".

A Key Exploitable Result (KER) is an identified main interesting result responding to specific needs, to the demand of a well-defined group of “customers” (as defined above) which has been selected and prioritised due to its high potential to be "exploited" – meaning to make use and derive benefits - downstream the value chain of a product, process or solution, or act as an important input to policy, further research or education.

To select and prioritise the results, we used the following criteria:

- *degree of innovation*
- *exploitability*
- *impact*

A result can be:

- *a product or process*
- *a new service*
- *a new standard*
- *new training courses*
- *input for a new project*
- *a new policy*
- *etc.*

A synthesis view of the main results from the project proposal is provided in the table below.

#	KER	Responsible partner/regional demonstrator
1	PPGIS system	Lapland, FI
2	Adaptation support tools	Lapland, FI
3	Platform for Climate, Energy and Circularity	Tirol, AT
4	New tourism NbS	Tirol, AT
5	Datahub	Tirol, AT
6	Decision-support-tool for irrigation management	Piemonte, IT
7	App for irrigation evaluation	Piemonte, IT
8	Technologies for field scanning	Râu Sadului, RO
9	Solutions for restoring mountain meadows	Râu Sadului, RO
10	Co-creation method for GI strategy development	Gabrovo, BG
11	Rainwater harvesting infrastructure for irrigation of green areas	Gabrovo, BG
12	EWMS for climate event monitoring	Gabrovo, BG
13	Erdjyagora digital platform for co-creation and decision making on CCA	Valais, CH
14	New financial instruments	FEBEA

15	Policy recommendations	FEBEA

Table 1 - Proposal's KERs list

2. Our approach

The approach identified assumes that the use of a result is at the base for generating outcomes and enabling impact. A demand-led (problem-driven) approach will be defined to address the needs/problems of the target groups. Consortium partners will be guided in understanding opportunities (including how to access funds after the project ends) and challenges, and in planning and securing use after the project ends. IP management and ownership-related issues will be addressed once the KERs' use model will be clear and whole partners aware of their use.

The methodology used for implementing the above-mentioned approach is based on:

- *Exploitation workshops: these are group sessions in which the partners involved in the exploitation activities will be debriefed around specific tools.*
- *One-to-one sessions: these are sessions organized by the Exploitation Partner at the KER level to support the partners in reviewing the tools used and support them in path the right direction for the exploitation.*

For what concerns the flow of the exploitation activities planned, below the list of the main steps to be undertaken for reaching the impact:

1. *KERs identification.*
2. *KERs characterization.*
3. *KERs Lean Canvas definition.*
4. *KERs pitch definition.*
5. *KERs roadmap definition.*

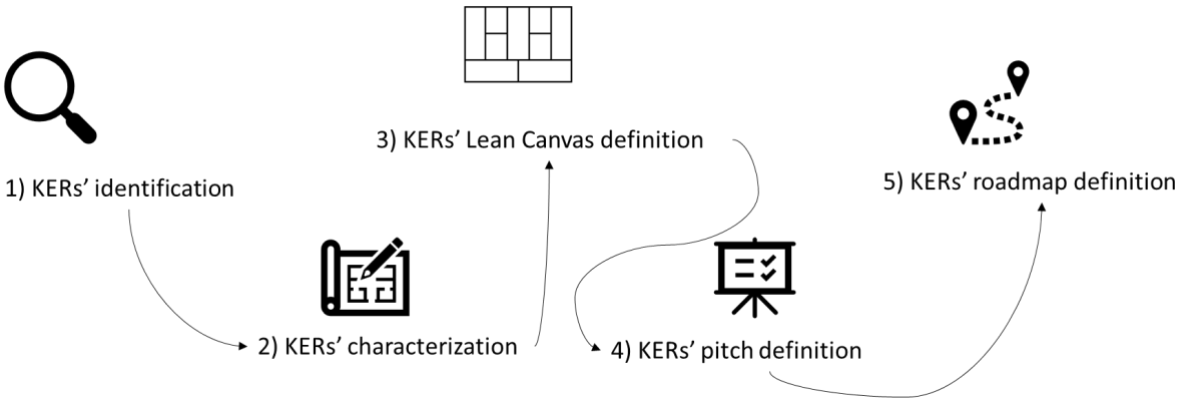

Figure 2 - Exploitation activities' flow

2.1. KERs identification.

As first step the consortium partners will identify, starting from the list in the proposal, the KERs they want to exploit. This activity will be performed alongside MountResilience lifetime as it can happen that partners will "discover" new results they are keen to exploit. It is important that each partner proactively share with the Exploitation Manager (META Group) if any new KERs will be identified.

As the project is based on a big consortium where multiple partners can contribute for the development of a KER, it is important to define from the very beginning the exploitation intentions for each KER (which is crucial for IP management around result).

Defining exploitation intentions, meaning partners (both regional demo ones and the replicating regions) committing themselves to make sure R&D results are used, is a key task for all EU-funded projects and the first step to mobilise economic, societal, and scientific impact. Exploitation intentions require that partners describe how they intend to use, after the end of the project, the novel solutions developed thanks to the project itself, as shown in the table below.

Exploitation intentions will be collected using the following table:

Partner name	**Key Exploitable Result (KER)**	**Your interest** (exploitation intention of this KER, intended market/customers)	**Your organization contribution to the generation of this KER** (what was/is/will be your input?)	**Role of each organisation** with regards to the KER and according to **the Grant and Consortium Agreement**

Table 2 - Exploitation intentions' table example

2.2. KERs characterization

For each KER, a full characterisation will take place after the identification and validation of a KER list. Partners will be asked to use the characterization table which is presented in detail in the annex 5.1.2. The characterisation process will take into consideration the following aspect for all the KERs validated by the partners:

KER N° – NAME OF THE KER (KER owner/s) – (to be repeated for each KER)

2.2.1. Problem

Describe the problem you are addressing (the problem your potential users have). Potential users are the people, companies, organisations, etc. that you expect will use the result (and generate an impact). They are your "Customers". It is important to identify and describe the problem your customers have and that you are going to address and validate them together with your "customers" (problem/customer fit). Identifying a problem or a set of problems is key to make sure results are used and that the envisaged impact is achieved.

2.2.2. Alternative solution

Describe how your "customer" has solved the problem so far. Alternative solutions are linked to the problem. Having a picture of the weaknesses and strengths of the alternative solutions will help you to compare and to quantify the added value of your solution and to have insight into how the alternative solutions are delivered (who is providing them and at which conditions).

2.2.3. Unique Selling Point USP - Unique Value Proposition UVP

Describe the competitive advantages and the innovative aspects. What does your solution do better, what are the benefits considering what your user/customer wants, how does your solution solve his/her problem better than alternative solutions, and what distinguishes the KER from the competition/current solutions?

The UVP needs to be consistent with the problem/current solution description. Please be focused on the uniqueness of your solution, and present what distinguishes you compared to the current solutions. Check the UVP with early adopters and collect/provide facts and data from the testing phase of your project to provide sound information on the magnitude of the value that your solution is offering and to allow comparisons with the alternative solutions. Please, be focused on the description of added value in solving problems compared to alternative solutions.

2.2.4. Description

Describe in a few lines your result and/or solution (i.e., product, service, process, standard, course, policy recommendation, publication, etc.). Use simple wording, avoid acronyms, and make sure you explain how your UVP is delivered, once validated.

2.2.5. Target market

Describe the market in which your product/service will be used and compete by answering the following questions:

- *What is the target market?*
- *Who are the customer segments?*

To finalise the exploitation plan and prepare the use of the KER, a clear identification of the target market is needed, with its segmentation. It should include both a qualitative and quantitative description in terms of size, values, trends, and features. Please consider that geography matters in terms of the market that you want to serve. The market needs to be consistent with the use model and the solution itself.

2.2.6. Early Adopters

Early adopters are the “customers” you are willing to address first. They are usually the ones that feel the problem harder than all the others (they are not the project partners).

To develop the exploitation model, it is important to look at early adopters and how to go from early adopters to the “early majority”. Note that innovators are the ones that “use” the “alfa” version (2,5%, often partners in the R&D project); early adopters are the customers ready to “use” the “beta” version (13,5%). New initiatives fail because they are not able to reach early adopters.

You should be as much precise as you can. Being the early adopters the first ones you would like to reach out with your innovative solution it will be important to be able to connect with them. Make sure your early adopters are consistent with the target market (customers). Please, also add some consideration on how you will reach them out having in mind that they are the first you will contact to bring the result to use.

2.2.7. Competitors

Who are your "competitors" (note: they are the ones offering "alternative solutions”)? What are their strengths and weaknesses compared to yours?

“Competitors” may be different if you envisage licensing as use model rather than directly providing a service or producing and selling a device. This item will be further discussed during the exploitation process in order to have a direct comparison with competing solutions. Discuss what are their strengths and weakness compared to the proposed solution.

2.2.8. Use model

Discussion is to be started in the initial stages. Explain what is your “use model”, how the KER will be put into use (made available to "customers" to generate an impact). Examples of use models: manufacturing of a new product, provision of a service, direct industrial use, technology transfer, license agreement, contract research, publications, standards, etc.

Use model, target market, and customers need to be consistent. In the case of licensing, consider that are several different types of licensing agreements that could be used. Discuss the different options with colleagues from the legal department involved in licensing deals. Delivering a service entails the presence of a “competent” organisation with procedures, insurance, and certifications ready to offer the services according to the expectations of the potential customers.

2.2.9. Timing

Discussion is to be started in the initial stages. What is the time to market? How long it will take, from the end of the project for the result to be fully usable? Consider it in relation to the use model.

2.2.10. Actions

Briefly describe actions planned to be executed 3-6 months after the end of the project. Make sure you do not just focus on technical activities (realisation of a prototype, software interface, etc.) but also consider the finalisation of a business plan, the protection of intellectual property, and the collection of authorisations. In other words, all that will be needed to start implementing your exploitation plan. Please, for each action you mention, provide a clear and viable timing.

2.2.11. Roles

Roles of partners involved in the actions defined above.

2.2.12. Milestones

List the milestones and KPIs to be used for monitoring the implementation of the actions listed above. Please, add a timeline.

2.2.13. Costs

This section refers to cost estimation to implement planned activities (1 year, 3 years). Provide information on the costs/investments needed to bridge the end of the project to the next steps planned and increase TRL or go to market (you may invest in a patent, in the realisation of a prototype, etc.).

2.2.14. Revenues

This section refers to projected revenues and eventual profits once the KER will be used (1 and 3 years after use). Consider revenues you will expect to collect by licensing or thanks to service provision or sale of devices. Revenues generate the cash flow that will make the use of the result sustainable over time (provide an estimation concerning the first year and what is expected after 3 years, if possible). It is recommended that you estimate the revenues according to your early adopters and potential customers and include the information in the draft exploitation plan.

2.2.15. Other sources of coverage

This section refers to resources needed to bridge the investment needed to increase TRL and ensure the result is used. Financial resources to cover costs incurred before collecting the first revenues (during the “time to market” – see costs) and their sources. Sources can be partners` own budgets, other project grants, national/regional incentives, risk capital, loans, etc. Make sure to obtain them at the right time.

2.2.16. IP management

This section is about background, foreground and IP ownership.

For the full characterization, partners will map all the risk related to the use and the adoption of MountResilience KERs will be taken into consideration using the following table. Different typologies of risk (risk factors) will be investigated, such as: partnership, market, financial, environmental. This list is merely by example and will be customised according to the needs of the specific KER.

In the Annex 5.1.4 you will find a detailed description for the risk matrix.

KER Risk Assessment Map							
	Description of Risks	**Degree of criticality of the risk related to the final achievement of this Key Exploitable Result. Please rate from 1 to 10 (1 low- 10 high)**	**Probability of risk happening Please rate from 1 to 10 (1 low - 10 high)**	**Risk Grade**	**Potential intervention**	**Estimated Feasibility/Success of Intervention Please rate from 1 to 10 (1 low- 10 high)**	**Conclusion**
	Partnership Risk Factors						
1							Not Filled
	Market Risk Factors						
2							Not Filled
	Financial/Management Risk Factors						
3							Not Filled
4							Not Filled

	Environmental/Regulation/Safety risks:						
5							Not Filled

Table 3 - Risks' map example

After completing the matrix, a priority map will be completed, in order to visualise the "urgency" for action to secure the avoidance of a possible risk insurgence. Partners will use the following structure:

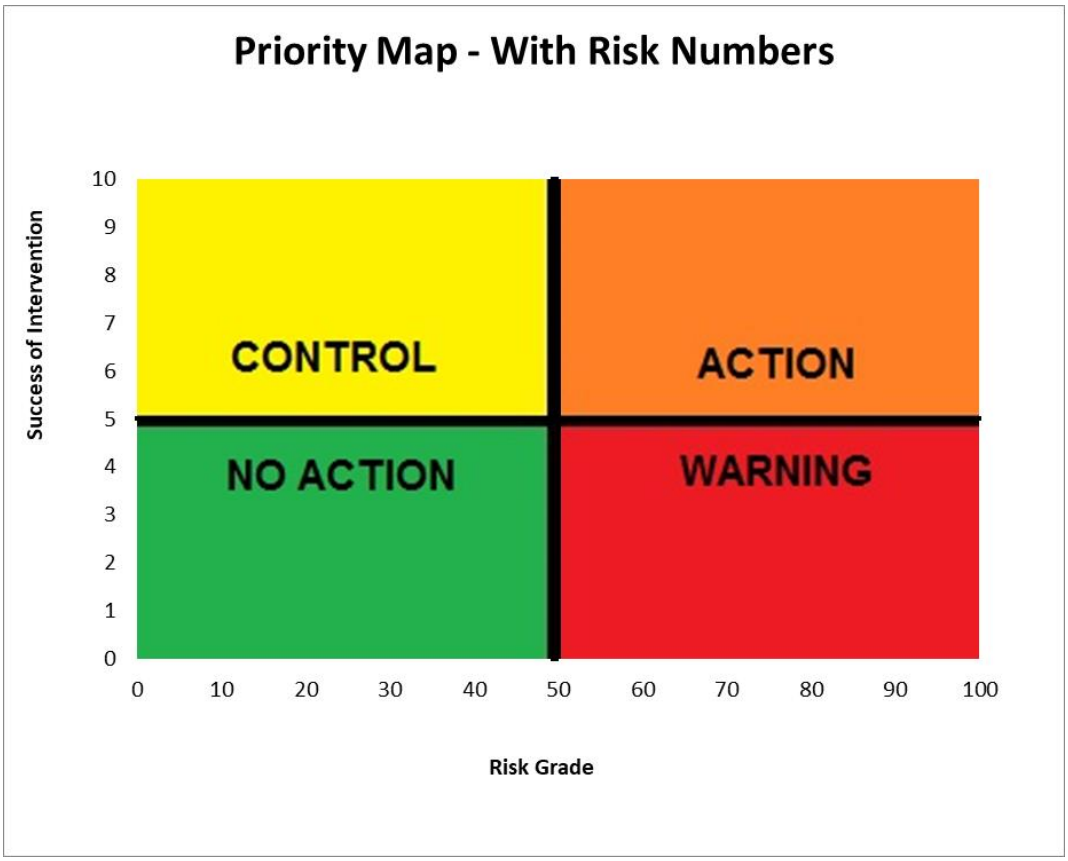

Figure 3 - Priority map example

2.3. KERs Lean Canvas definition

After having properly characterized KERs, partners will prepare a Lean Canvas (please refer to the Annex 5.1.6 for a detailed description) which is the main tool of the problem driven approach. For preparing the Exploitation Plan of a R&D result and define the use mode, it is useful to work with the Lean Canvas. The Lean Canvas is an adaptation of Business Model Canvas by Alexander Osterwalder which Ash Maurya2 created in the Lean Startup spirit (Fast, Concise and Effective startup). Lean focuses on problems, solutions, key metrics and competitive advantages.

The canvas is a good tool to focus on the exploitation model and start collecting information for the exploitation plan. Among the different type of canvas, the lean business model canvas, by Ash Maurya, is the most suited for R&D projects. It is a powerful tool to be used by the partners to further develop the characterization of their KERs, prepare the materials to be discussed at consortium meetings and draft the exploitation/business plan for a KER.

The lean canvas helps to fine-tune and develop the exploitation strategy for a KER having in mind four questions:

- *Who is my "customer"?*
- *What is "her/his" problem?*
- *How does "She/he" solve the problem now?*
- *Is our solution more efficient than the current one?*

For each KER a first version of Lean Canvas will be prepared based on the last version of the Characterization table. Once the first version is ready, partners will start to engage with potential users/customers (through dissemination activities) for collecting feedback and moving forward in the exploitation pathway.

2.4. KERs pitch definition

To proper support the engagement of early adopters/users of each KER, partners will be asked to prepare a pitch deck (series of slides). This presentation will be used by partners with the goal of pushing users to adopt the results and thus reaching the expected impact. The pitch is a first level of communication which is pretty important to test main hypothesis in the Lean Canvas and receive feedback from users/investors/etc.

Please refer to Annex 5.1.7 for a detailed description of the pitch deck structure.

2.5. KER roadmap definition

As the exploitation is an activity which partners are mandatory also to run after the end of the project, it is important that they identify a roadmap for the exploitation activities to be delivered once MountResilience is over. The classical scenario is that almost all KERs are not able to reach the impact expected as before it happens it takes time. Thus, partners will be asked to fill in the tail of MountResilience the exploitation roadmap for each KER. The roadmap is a tool designed to help the consortium to identify and plan activities to be performed after the end of the project. The highest risk a consortium faces is not being able to implement the exploitation and dissemination plan and increase the TRL level or go to market, due to lack of resources. The exploitation roadmap is designed to address this risk, mitigate it and pave to way toward use and a stronger impact.

Please refer to Annex 5.1.3 for a detailed description of the roadmap.

2.6. IP Strategy

The partners have defined the rules on ownership and IP management in the consortium agreement. An IP audit (patent landscaping IP evaluation, market intelligence, etc.) will be performed for each KER, involving the partner responsible for the KER in one-to-one interaction, involving the partners responsible for the relevant KER and META. This activity will define IP-related unfair advantages and risks related to the use model/responsibility for IP protection.

The PMB (Project Management Board) will discuss the outcomes of the IP management activities and will propose/agree on the ownership of the results and the next steps needed to ensure the use of the KER and the protection of the related IP.

2.7. Governance

The Exploitation process will be managed by an Exploitation Team led by then Exploitation Manager (META as WP5 task leader) who is in charge of coordinating the exploitation team overviewing the exploitation activities to address use and prepare the use for each KER.

The Exploitation Team will be composed of the following representatives:

- *Francesca Natali (Exploitation Manager) – META*
- *Lorenzo Valeriani (Exploitation Manager) - META*
- *One representative from each Regional Demonstrators (6 in total)*
- *One representative from FEBEA*

Decision-making on exploitation will be fully connected with the whole project governance, cooperating with the Coordinator, the Advisory Board (AB), Project Management Board (PMB), General Assembly (GA) and the Exploitation Team (ET) to boost MountResilience impact by looking across and over the implementation of the project.

3. Planning of the exploitation activities

It is important to define since the start the timing of each step of the approach mentioned in the previous chapter. For this reason, META, as Exploitation Partner, identified a specific roadmap for executing all the exploitation activities.

In particular:

- *One to one session: these will be periodical online bilateral sessions between META and the partners involved in each KER. The focus of the meetings will depend on the step which is covered in that moment at consortium level for the exploitation activities. In the meeting, META will support partners in review the tools and properly address the exploitation pathway identified.*
- *Workshops: these meetings will be held physically as « side-event » of the Project meetings. There will be 5 workshops:*
    - ***1st workshop** already held during the kick-off; the focus was to debrief partners around exploitation.*
    - ***2nd workshop**: to be held during the1st project meeting in April 2024; the focus will be to introduce the key concepts (KERs, impact, etc.) to align all consortium partners for the same level of preparation around exploitation activities. In this workshop there will be introduced the tools for starting the characterization of KERs.*
    - ***3rd workshop**: the focus will be the introduction of the Lean Canvas to allow partners to start interacting with users/early adopters for each KER.*
    - ***4th workshop**: the focus will be the introduction of the Pitch deck structure and the roadmap. On this way partners will be able to proper present the KER in an appealing way towards users/early adopters and will start to plan the exploitation activities to be run after the end of MountResilience.*

Below there is a GANTT for the exploitation activities

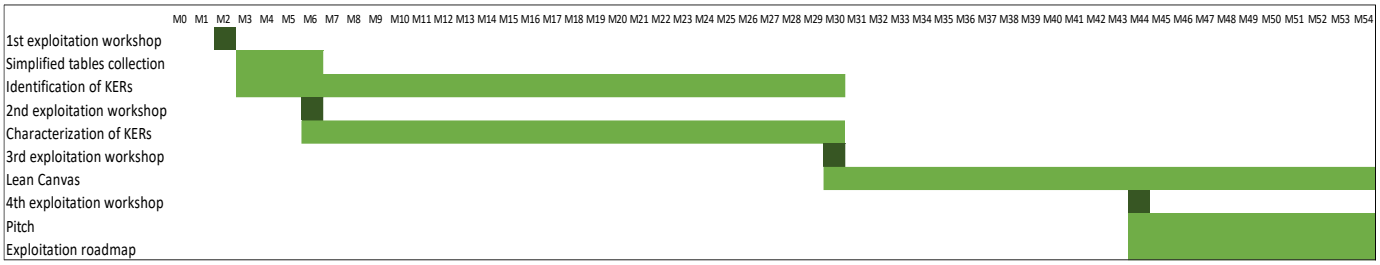

Figure 4 - Exploitation activities' GANTT

4. List of KERs identified

In the first six months of MountResilience, the consortium already started to implement exploitation activities. META, as Exploitation Partner, organized with the WP4 task leader (EUROMONTANA) an interactive session during the kick-off meeting in September 2023.

The session aimed to give a first level of understanding about the difference among communication, dissemination and exploitation. To make this exercise more interactive, partners were randomly grouped (14 groups in total) and each group worked around a specific KER from the proposal list.

Each group was asked to fill a very simplified characterisation table, as below:

Name of the result	**Written by facilitator following previous step**
Problem addressed	What problem / gap is the result addressing?
Solution / value proposition	What makes the result a solution to the problem? What is new/innovative/special?
End users	Who can use this result? Examples: businesses, regional authorities, municipalities, etc.
Ideal communication channels	Use post-its to propose conferences, tools, channels, etc. that could be appropriate to communicate the result.
Ideal dissemination channels	Use post-its to propose formats of knowledge sharing, publications, trainings, that could be appropriate for this result.
Challenge / risk / threat	Use post-its. What is going to be the main challenge for this result? Examples: need to better clarify the scope, need to better assess the replication potential, need to involve specific partners, expected difficulties in data collection, etc…

Table 4 - Simplified characterization table V1

The exercise generated a good level of interaction among the partners and generated a first level of KERs characterization.

META for the preparation of the deliverable asked to each partner to start working around KERs identification and characterization. Partners confirmed all the 14 KERs identified in the proposal and Tyrol demonstrator added two more KERs. Thus, the new KERs table is the following:

#	KER	Responsible partner/regional demonstrator
1	PPGIS system	Lapland, FI
2	Adaptation support tools	Lapland, FI
3	Platform for Climate, Energy and Circularity	Tirol, AT
4	New tourism NbS	Tirol, AT
5	Datahub	Tirol, AT
6	Decision-support-tool for irrigation management	Piemonte, IT
7	App for irrigation evaluation	Piemonte, IT
8	Technologies for field scanning	Râu Sadului, RO
9	Solutions for restoring mountain meadows	Râu Sadului, RO
10	Co-creation method for GI strategy development	Gabrovo, BG
11	Rainwater harvesting infrastructure for irrigation of green areas	Gabrovo, BG
12	EWMS for climate event monitoring	Gabrovo, BG

13	Erdjyagora digital platform for co-creation and decision making on CCA	Valais, CH
14	New financial instruments	FEBEA
15	Policy recommendations	FEBEA
16	Monitoring and Evaluation Tool	Tirol, AT
17	Prototypes of new consulting modules	Tirol, AT

Table 5 - List of KERs identified at M6

For each identified KER, partners filled a simplified version of the characterization table as below:

Name of the result	You can use the same name used in the Grant agreement.
Problem addressed	Describe the problem you are addressing (the problem your potential users have). Potential users are the people, companies, organisations, etc. that you expect will use the result (and generate an impact). They are your “Customers”.
End users («customers»)	Who can use this result? Examples: people, businesses, regional authorities, municipalities, etc.
Alternative solutions	Describe how your “customer” has solved the problem so far. How are the end users/customers solving the problem/s you presented above? Which are the solutions they are using?
Value proposition	Describe the competitive advantages, the innovative aspects. What does your solution do better, what are the benefits considering what your user/customer wants, how does your solution solve his/her problem

	better than alternative solutions, what distinguishes the KER from the competition / current solutions?
Solution	Describe in a few lines your result and/or solution (i.e., product, service, process, standard, course, policy recommendation, publication, etc.). Use simple wording, avoid acronyms, make sure you explain how your UVP is delivered.
Channels	Present how you intend to reach the end users/customers you presented above. Examples: conferences, web, social media, etc.
Use model	How the result will be put in use (made available to "customers" to generate an impact). Examples of use models: manufacturing of a new product, provision of a service, direct industrial use, technology transfer, license agreement, contract research, policy recommendation, new standards, etc. Note training is a service.

Table 6 - Simplified characterization table V1

In Annex 5.2 you can find the filled tables for each identified KER.

5. Annex

5.1. Exploitation toolkit

This annex presents the Exploitation toolset which includes main templates and material which will be shared amongst the partners during the project lifetime to properly identify and select Key Exploitable Results to be used after the end of the project. This toolset will become familiar to the whole partnership which will use and update it at consortium meeting when a specific exploitation workshop will be organised by the exploitation partner starting M8. The toolset is released in English, and it is ready for adaptation, printing, or further use.

The Exploitation tool set is enabling exploitation activities that will be performed during the project and beyond. The toolset will be available on the Microsoft SharePoint with all kinds of resources that all project partners can use for exploitation activities.

The Exploitation Toolset consists of the following material:

- *Exploitation intentions*
- *Characterisation Table*
- *Exploitation Roadmap*
- *Risk matrix and priority map*
- *Value Proposition Canvas*
- *Lean Canvas*
- *Pitch structure*

5.1.1. Exploitation intentions

The following table is a key tool for the first phase of the exploitation process, helping the partnership, starting from the Key Exploitable Results (KERs) presented at proposal level, for validating a KER list and start reasoning on the exploitation route for securing the use of the KER after the end of the project. It will be crucial also to gather interest to exploitation from the partners and planning the ESS with them.

Exploitable Results (Potential KERs)*	Suggested KER NAME	Main Developer	Main Exploiter	Exploitation Intentions			Early Adopters	Time to Market/Use
				Direct Use	Indirect Use	Notes		

Table 7 - Exploitation intensions table instructions

5.1.2. Characterisation Table

The Characterisation table is designed to start the collection of information that will be then reviewed and further integrated during the project life. Partners in charge of the Key Exploitable Result (KER) should fill in the content and discuss it with the ones involved in the finalisation of the KER including the partners that will oversee the testing phase.

KER name	Input from the consortium
Problem	*Describe the problem you are addressing (the problem your potential users have).* *Potential users are the people, companies, organisations, etc. that you expect will use the result (and generate an impact). They are your "Customers".*
Alternative solution	*Describe how your "customer" has solved the problem so far.*
Unique Selling Point USP - Unique Value Proposition UVP	*Describe the competitive advantages, the innovative aspects. What does your solution do better, what are the benefits considering what your user/customer wants, how does your solution solve his/her problem better than alternative solutions, what distinguishes the KER from the competition / current solutions?*
Description	*Describe in a few lines your result and/or solution (i.e., product, service, process, standard, course, policy recommendation, publication, etc.). Use simple wording, avoid acronyms, make sure you explain how your UVP is delivered.*
"Market" – *Target market*	*Describe the market in which your product/service will be used/can "compete", answering the following questions:* *- What is the target market?* *- Who are the customer segments?*
"Market" – *Early Adopters*	*Early adopters are the "customers" you are willing to address first. They are usually the ones that feel the problem harder than all the others (they are not the project partners).*

"Market" - Competitors	*Who are your "competitors" (note: they are the ones offering "alternative solutions")?* *What are their strengths and weaknesses comparing to you?*
Go to Market – Use model	*Explain what is your "use model", how the KER will be put in use (made available to "customers" to generate an impact). Examples of use models: manufacturing of a new product, provision of a service, direct industrial use, technology transfer, license agreement, contract research, publications, standards, etc.* *Note training is a service.*
Go to Market - Timing	*What is the time to market?*
Go to Market – IPR Background	*What is the Background (type/ partner)?* *Provide information considering also what already agreed in the Consortium Agreement, in Annex I.*
Go to Market – IPR Foreground	*What is the Foreground (type/ partner)?* *Provide information considering also what is already agreed in the Consortium Agreement.*

Table 8 - Characterization table instructions

5.1.3. Exploitation Roadmap

The Exploitation Roadmap is a tool designed to help the consortium to identify and plan activities to be performed after the end of the project. The highest risk a consortium faces is not being able to implement the exploitation and dissemination plan and increase the TRL level or go to market, due to lack of resources. The exploitation roadmap is designed to address this risk, mitigate it and pave to way toward use and a stronger impact.

Table 9 - Exploitation roadmap instructions

Exploitation roadmap	
Actions	*Briefly describe actions planned to be executed 3-6 months after the end of the project.*
Roles	*Roles of partners involved in the actions defined above.*
Milestones	*List the milestones and KPIs to be used for monitoring the implementation of the actions listed above. Add timeline.*
Financials Costs	*Cost estimation to implement planned activities (1 year, 3 years).*
Revenues	*Projected revenues and eventual profits once the KER will be used (1 and 3 years after use)*
Other sources of coverage	*Resources needed to bridge the investment needed to increase TRL and ensure the result is used.*
Impact in 3-year time	*Describe impact in terms of growth/benefits for the society.* *Impact is the objective of H2020. Impact should mobilise measurable changes in terms of growth/benefits for the society (i.e. jobs created, investments mobilized, turnover generated).*

5.1.4. Risk Assessment and Priority Map

The Risk Assessment and Priority Map is a tool which aims at organizing different types of risks related to the exploitation process and to define specific recovery actions. For each risk, a degree of criticality and the probability related to the risk happening will be evaluated. The effectiveness of recovery action will be also assessed providing the level of criticality related to each risk which will be displayed in the Priority Map.

KER Risk Assessment Map

	Description of Risks	Degree of criticality of the risk related to the final achievement of this Key Exploitable Result. Please rate from 1 to 10 (1 low - 10 high)	Probability of risk happening Please rate from 1 to 10 (1 low - 10 high)	Risk Grade	Potential intervention	Estimated Feasibility/Success of Intervention Please rate from 1 to 10 (1 low- 10 high)	Conclusion
	Partnership Risk Factors						
1				0			Not Filled
2				0			Not Filled
3				0			Not Filled
4				0			Not Filled
5				0			Not Filled
	Technological Risk Factors						
6				0			Not Filled
7				0			Not Filled
8				0			Not Filled
9				0			Not Filled
10				0			Not Filled
	Market Risk Factors						
11				0			Not Filled
12				0			Not Filled
13				0			Not Filled
14				0			Not Filled
15				0			Not Filled
	IPR/Legal Risk Factors						
16				0			Not Filled
17				0			Not Filled
18				0			Not Filled
19				0			Not Filled
20				0			Not Filled
	Financial/Management Risk Factors						
21				0			Not Filled
22				0			Not Filled
23				0			Not Filled
24				0			Not Filled
25				0			Not Filled
	Environmental/Regulation/Safety risks:						
26				0			Not Filled
27				0			Not Filled
28				0			Not Filled
29				0			Not Filled
30				0			Not Filled

Figure 5 - Risks map and priority map instructions

5.1.5. Value Proposition Canvas

When using the Lean Canvas, the most important part to be addressed by the team working on use of a R&D result is the Value Proposition, i.e. the benefits "customers" can expect from the novel solution. To facilitate this process and clarify customer needs & how to create value for them we will use the Value Proposition Canvas (VPC). The Value Proposition Canvas helps in understanding target customers to avoid one of the most common mistakes when developing an innovation: building something that nobody wants. A. Osterwalder introduced this concept in his book Value Proposition Design. The VPC stimulates teams to ask better questions: what does the early adopter really aspire to do that they cannot do now? The VPC is based on 2 concepts: the Value Map: the set of values provided by the novel solution to respond to the needs of the “customers”; the Customer Profile: the set of customer characteristics that the novel solution assumes.

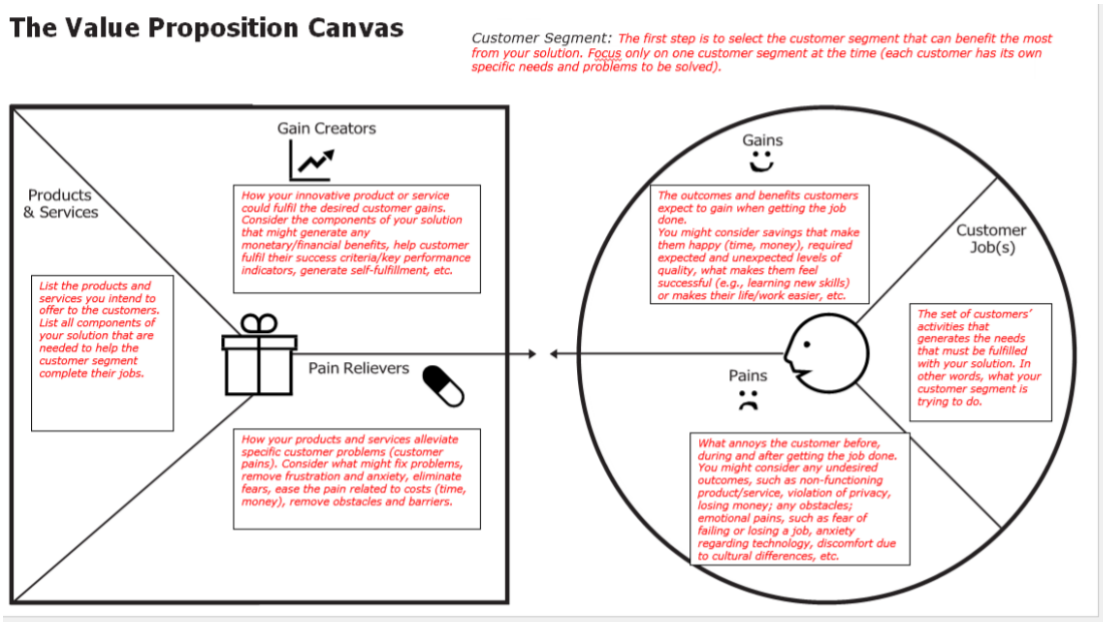

Figure 6 - Value Proposition Canvas template

5.1.6. Lean Canvas

To contribute to the exploitation strategy and to dissemination activities, it is important to further focus on the problems the novel solutions are addressing, who are the ones who feel this problem the most (the users of the solution, the target group of dissemination activities, our “customers”), the unique value proposition and to identify how to reach customers/users out (use mode and distribution channels). It is also important to identify the costs of providing our target groups with a novel solution for how to monitor progress and how to cover costs incurred (sustainability). The Lean Canvas is a tool that can help in these crucial activities. The Lean Canvas is an adaptation of Business Model Canvas by Alexander Osterwalder which Ash Maurya created in the Lean Startup spirit (Fast, Concise and Effective startup). It focuses on problems, solutions, key metrics and competitive advantages. Among the different type of canvas, the lean business model canvas, by Ash Maurya, is the most suited for R&D projects. It is a powerful tool to be used by consortia to further develop the characterization of the KERs, prepare the materials to be discussed at consortium meetings and draft the exploitation/business plan for a KER.

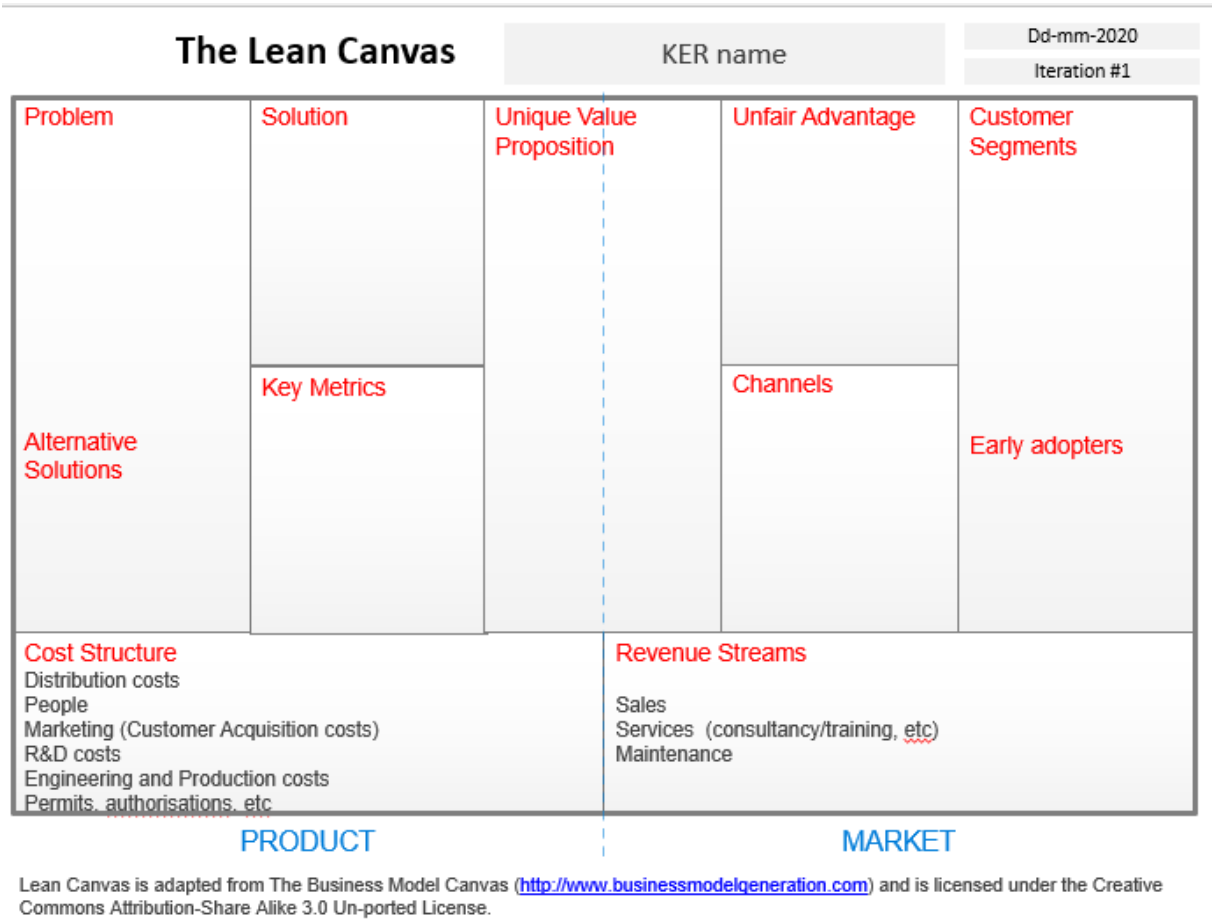

Figure 7 - Lean Canvas template

5.1.7. Pitch Structure

This simple structure will be used as a baseline for approaching investors. The idea is to prepare max 10 slides (3 minutes pitch) to:

- *Make a third person understand our proposition (solution):*
  - *"Why" and "what" not "how" (no science or technology)*
  - *No European project jargons*
- *Explain our "business" model*
- *Convince the audience that what is offered is what is asked for*

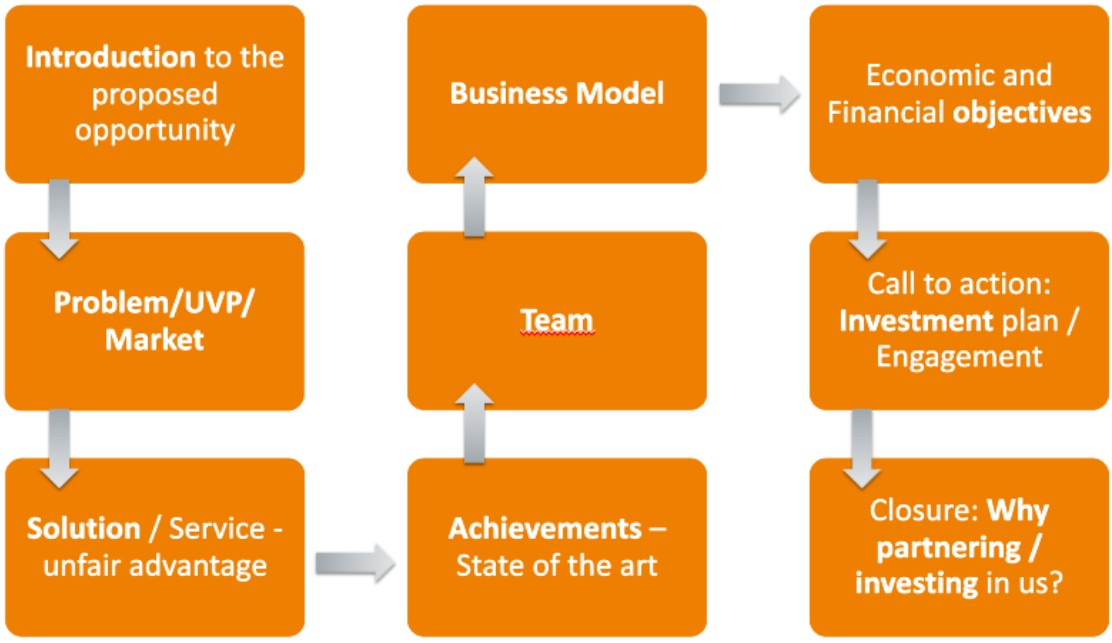

Figure 8 - Pitch structure

5.2. Simplified characterization tables

In this annex there are all the simplified characterization tables filled by partners for the 17 KERs identified at this stage from MountResilience consortium.

5.2.1. PPGIS system

Name of the result	PPGIS
Problem it is solving	Identifying the impacts of climate change and responding to them in land and nature use requires the knowledge and experience of all citizens. Local and indigenous knowledge should be considered as valuable as so-called expert knowledge. This kind of spatially located knowledge can be captured by the Public Participation Geographic Information System (PPGIS). Changes caused by climate change can be localised on a map using the system. PPGIS results should be used in local decision making and in companies and businesses to adapt their actions to the impacts of climate change. It would work best if it were developed into a system that is constantly updated and provides up-to-date data.
End users (« customers »)	Municipalities, regional authorities, businesses, all land and nature users (as well locals as visitors).
Alternative solutions	Citizen observations have not been collected systematically so far. Informal information sharing has taken place, and social and traditional media have provided warnings, e.g. of changing ice conditions or other changes in nature.
Value proposition	PPGIS can provide spatially accurate information about changes that would otherwise not have been observed, as the authorities do not have the resources to make observations in remote areas. These observations are crucial for the safety of various activities (tourism, recreation, herding). There is no competition as such systems do not yet exist.

Solution	The project will test and adapt PPGIS to local conditions with local actors, ensuring that relevant issues are included. The aim is also to develop the analysis methods so that they are open and easy to use by anyone. Ideally, the system will then be used and maintained by the communities and organisations themselves.
Channels	In information gathering, social media has proven to be the best channel to get people to feed information into the system but traditional media, municipal information sharing and other methods will also be used. Also facilitated data gathering is possible. To share the knowledge of the possibilities of PPGIS, conferences, workshops and other events will be used.
Use model	Training for municipalities and other local users is needed. Service can then be provided by municipalities and reindeer herding and tourism promotion associations.

Table 10 - PPGIS system simplified characterization table

5.2.2. Adaptation support tools

Name of the result	Supporting tools
Problem it is solving	-The direct and indirect, physical and socio-economic and intertwined effects of CC affecting the local communities cause a need for adaptation, both for municipality and nature-based livelihoods in the area, and more broadly for the economic structure of the project area and in more general in Lapland. - Lack of Acknowledgement and awareness related to climate change, adaptation and biodiversity in municipalities and company-specifically. -In the municipality, there is currently no adaptation plan, and there is no compiled information on the risks and opportunities of climate change. Currently, knowledge about the impacts of climate change and attitudes vary greatly. -In the region (including municipalities and enterprises), there is lack of knowledge on the effects of climate change and its effects. The goal is transformative adaptation through education and learning. Through the work, the baseline will be surveyed, and monitoring and impact assessment will be planned. Currently, adaptation information at different levels has not been integrated; in the adaptation plans, national and international adaptation knowledge will be transferred to the local plan. Additionally, local traditional knowledge will be recognised in the plans.

	It is essential to adapt old practices alongside new ones.
	-Limited resources of small municipalities and enterprises in the region. Adaptation measures require investments, which can be a challenge for small municipalities. Planned phased adaptation over an extended period helps in the equitable distribution of the economic burden. The plan facilitates the integration of adaptation measures into the municipality's technical operations. The municipality must identify which adaptation measures are most important and urgent for them.
	-Limited resources: Municipalities and enterprises need support with the work related to cc. Currently, there are no existing models for adaptation plans for municipalities and our nature-based livelihoods.
	- Tourism business is operated with short notice and changes in the industry happen quickly. Adaptation planning and models will help companies on expanding the forethoughts in the changing future.
	- Tourism Companies need more detailed product management and they also might need changes in product content and/or new products.
	- Most of the travel and tourism companies operate their program services and product directly or indirectly in and out of nature. The nature with its natural animals, landscape, water areas, fells, vegetation and natural products are also used as an USP (unique selling point) in marketing of the area.

End users (« customers »)	-Municipality, other similar municipalities nationally, rescue department, schools, politicians/ municipal decision-makers. -Regional authorities, DMOs (destination management organizations) -Reindeer herding entrepreneurs, reindeer herding cooperatives, reindeer herding cooperative association, municipalities, authorities, Ministry of Agriculture and Forestry. - Travel and tourism companies in Finnish Lapland, and their employees, management and possible sub-contractors. - Travellers will be receiving this information when arriving and staying in the area, and when using the services of the travel and tourism companies.
Alternative solutions	-In the municipality so far, the approach has been either reactive or non-existent (endurance, overcoming, hoping it won't happen again), as in the case of the Atlantic salmon situation in Utsjoki. -Studies and assessments have been conducted related to reindeer hearderers cc adaptation. Drafts of adaptation plans exist at the reindeer herding cooperative level, but there are no company-specific/detailed plans.

	-Utilization of traditional knowledge, courage for an experimentation culture are essential. -Artificial snow, snow-making is being actively used where needed (mostly in southern part of Lapland with opening the winter season in November). - Also active snow gathering and storing for the skiing activities (down-hill skiing resorts, cross-country skiing tracks) and animal-based activities tracks is being done already. - Companies have been actively developing all-year-round activities, new products for summer and autumn activities and other alternative solutions, but this development is still ongoing and needed to be addressed and developed strongly in the future.
Value proposition	-The municipality receives an easily shareable document containing best practices. -Preparedness is more economically viable than reaction. A plan enables long-term preparedness and systematic planning, and also allows for the realization of potential benefits. -Gaining knowledge from the cc adaption plans, coaching and models.

	-A plan developed through engagement enhances community involvement. Through models, economic interests can also be taken into account. -Through systematic action, reactive adaptation (maladaptive) is avoided. -Adaptation model provides tools and methods that can be utilized to adapt to the changes brought about by climate change. With a ready-made model, entrepreneurs can engage in discussions and share information more widely. - Cooperation and networking with stakeholders and other areas might also bring usable examples of the adaptation plans already made for operators in the tourism sector. Based on proven examples and created plans in the project, we can modify good practices to the needs of our region.
Solution	-The information gathered will be used to produce a public, shareable template for a participatory adaptation plan, and guidelines for its creation, developed for the municipality, including a risk assessment, risk mitigation plan, and indicators to be monitored.
Channels	-Village evenings for local people and companies, questionnaires and interviews for municipality personnel, fire/ rescue department and other important stakeholders. -Communication and information sharing via web and social media. -Reindeer herding cooperatives' meetings, events, on-site gatherings -RCL and other partners webpages

	-Regional events
Use model	-Policy recommendation for municipality, -Lapland climate strategy. -The result is distributed for general use, e.g., to the Reindeer Herding Cooperative Association/Sámi reindeer herding cooperatives/business advisors. - New standards of using the information of climate change and adaptation plans and learning how to do things and services differently. -This can be examined in the context of the pasture management and utilization plan

Table 11 - Adaptation support tool simplified characterization table

5.2.3. Platform for Climate, Energy and Circularity

Problem it is solving	Issues related to sustainability transition e.g. transformative Climate Change Adaptation (CCA) span diverse sectors and thematic areas, necessitating an interdisciplinary approach. However, currently, they are often addressed in isolation, lacking coordination, and the processing of interface issues. Furthermore, customers are struggling to identify the appropriate contacts due to fragmented responsibilities. This leads to isolated, incremental, and predominantly sectoral adaptation measures.
End users (« customers »)	SMEs and other businesses, regional authorities, municipalities, policy makers
Alternative solutions	Incremental adaptation measures (strategies and actions designed to make gradual, often small-scale adjustments to existing systems and practices) that are often low regret and sectoral
Value proposition	The Tirol demo aims to enhance governance in CCA by upgrading regional decision-making and extending support to local actors. The demo region can learn from the experiences of the Tyrolean platform on climate change, energy, and circular economy. The platform already provides a centralized location that offers a comprehensive view and serves as a point of contact for customers. However, it does not serve as a point of contact for CCA
Solution	Services for CCA transecting thematic fields and economic sectors
Channels	Services on the platform website and social media
Use model	Provision of services, research and regional development projects, policy recommendations

Table 12 - Platform for Climate, Energy and Circularity simplified characterization table

5.2.4. New tourism NbS

New nature-based tourism offers	
Problem it is solving	Mountain areas, renowned for their unique ecosystems and breathtaking landscapes, face a pressing challenge as conventional tourism practices exert increasing pressure on these delicate environments. The demand for nature-based tourism experiences in mountainous regions has grown significantly, resulting in overcrowding, habitat degradation, and a heightened risk of environmental degradation. Additionally, climate change poses a threat to the stability of these ecosystems, impacting biodiversity and altering the availability of natural resources. In this context, there is an urgent need to develop innovative and sustainable nature-based tourism offerings in mountain areas. This imperative arises from the necessity to alleviate the environmental impact of existing tourism practices, enhance the resilience of mountain ecosystems to climate change, and ensure the long-term viability of nature-based tourism as a socio-economic driver.
End users (« customers »)	Regional authorities, tourism associations, destination management, municipalities
Alternative solutions	Tourism areas in mountain regions have responded to the challenges posed by conventional tourism practices and the growing demand for nature-based experiences in various ways: the introduction of guidelines, by obtaining certain labels and measures related to them, diversification etc.
Value proposition	Offers and business models for nature-based tourism distinguish themself through a commitment to environmental sustainability, offering authentic and educational experiences that connect visitors with nature. Integrating community involvement, personalized offerings, and regenerative practices, these models prioritize quality over quantity, catering to conscious travellers seeking meaningful and sustainable tourism options, setting them apart from more conventional and mass tourism approaches.
Solution	Tested prototypes and a publication on various NbS tourism offers and business models to diversify tourism.
Channels	Session at a conference (IMC2025), social media, partner networks

Use model	New tourism offers

Table 13 - New tourism NbS simplified characterization table

5.2.5. Datahub

Specific use-cases tested in the datahub.tirol	
Problem it is solving	In mountain areas, there is a specific need to address timely access to critical information on weather conditions, terrain safety, and visitor dynamics, especially when it comes to the effective mitigation of natural hazards on hiking routes or the management of visitor activities. Currently, the absence of a centralized data platform and the exchange of data between stakeholders impedes the proactive identification and mitigation of safety risks etc.
End users (« customers »)	People, regional authorities, municipalities, federal state administration
Alternative solutions	Mountain tourists have tackled safety and visitor challenges through community networks, social media, mobile apps, local guides, self-regulation or education.
Value proposition	Data and the exchange of information are crucial because the exchange of real-time weather conditions etc. facilitates collaboration among stakeholders, allowing for a comprehensive understanding of the evolving risk landscape. Additionally, it supports early warning systems, enabling swift responses to impending hazards and enhancing community preparedness. By sharing information across agencies, communities, and regions, a collective and informed approach to protection against natural hazards can be established, fostering resilience, and minimizing the impact of disasters.
Solution	Datahub.tirol is a virtual collection point for trading data and new business ideas. It allows data providers, end-users, and researchers to collaborate on creating new measures and business models based on available information.

Channels	Standortagentur Tirol website, social media, personal social networks, Austrian and Gaia data initiative
Use model	Online tool datahub.tirol

Table 14 – Datahub simplified characterization table

5.2.6. Decision-support-tool for irrigation management

Name of the result	Decision-support-tool for irrigation
Problem it is solving	Use at best the available water resources, facing water-scarce or high-demand periods, with an integrated water management supported by a quantitative indication of water availability and demand.
End users (« customers »)	Water managers, irrigation operators, regional administrators.
Alternative solutions	Water management is currently based on a wide experience and on rules-of-thumb. An objective quantitative information about water availability and demand is still defective or not tailored to irrigation managers (e.g. bulletins by the local environmental agency). Thus water is claimed to be misused or it is unproperly sourced by the final users (e.g. through groundwater pumping).
Value proposition	Our goal is to offer a quantitative and comparative information (eg. with benchmarks or average conditions) on water availability and demand at different sources. This opens the possibility to optimize water withdrawals and improve the efficiency of water distribution for irrigation. The effectiveness of the solution proposed is guaranteed by a generalized framework adapted to the specific consortium.
Solution	The proposed solution is a Decision Support Tool (DST) based on hydrological modelling of upstream catchments and of local areas, including paddy rice areas. Calibrated on existing meteorological, geomorphological and pedological data, the system will return an estimate of surface water availability and groundwater interactions tailored to the water manager needs, including uncertainty indications. The DST will be developed together with irrigation consortia, in order to better integrate the

	management problems at the consortium and farm scale, as well as using KER#7 information.
Channels	Irrigation consortia participating in the project, the regional authorities, UNCEM and ANBI (irrigation managers association). Technical publications will be prepared, and workshops will be organized with irrigation consortia and associations.
Use model	Provision of the DST in the form of a technology transfer with irrigation managers and a training on how to use it.

Table 15 - Decision-support-tool for irrigation management simplified characterization table

5.2.7. App for irrigation evaluation

Name of the result	App for irrigation evaluation (KER#7)
Problem it is solving	Decide the correct timing and the correct amount of water to be delivered to crops in a variety of cropping systems.
End users (« customers »)	Farmers, farmers' advisors, extension services
Alternative solutions	Farmers are normally using rotational irrigation therefore they do not adapt timing to crop growth and requirements. Some DSTs are already available, but they are not free, they do not include paddy rice systems, or they just focus on irrigation.
Value proposition	Our DST, that will be free of costs and user-friendly, will also include support to the decisions to be taken for other aspects of the crop management such as fertilization. This combination of various aspects will help farmers in implementing an integrated crop management, addressing both environmental and production objectives.
Solution	The solution is a Decision Support Tool in the form of a computer software and a smartphone application, integrated with available information regarding the area of interest (soils, meteorology…) and farm data (fields, crops…). It will be developed together with irrigation consortia, in order to better integrate the management problems at the consortium and farm scale.
Channels	The irrigation consortia will promote the diffusion of the tool among their member farmers. Technical papers and field days will also be organized, together with farmers' associations.
Use model	Provision of a tool (software+app) and provision of a service (training on how to use it)

Table 16 – App for irrigation evaluation simplified characterization table

5.2.8. Technologies for field scanning

Name of the result	Solutions for restoring mountain meadows
Problem it is solving	Technologies for field scanning in agriculture are solving several key problems that farmers and agricultural stakeholders encounter, including: 1. Limited Visibility: Traditional methods of field monitoring often provide limited visibility into crop health, soil conditions, and pest pressures across large agricultural landscapes. Technologies for field scanning offer a comprehensive and real-time view of field conditions, enabling farmers to make informed decisions about crop management practices. 2. Inefficient Resource Use: Inefficient use of resources such as water, fertilizers, and pesticides can lead to waste, environmental degradation, and increased production costs. Field scanning technologies help optimize resource use by providing data-driven insights into crop needs, enabling precision application and reducing overuse or underuse of inputs. 3. Pest and Disease Management: Pest infestations and disease outbreaks can significantly impact crop yields and quality if not detected and addressed promptly. Technologies for field scanning allow early detection of pests, diseases, and weed infestations, enabling targeted interventions to minimize crop damage and losses. 4. Environmental Sustainability: Conventional agricultural practices can contribute to environmental degradation through soil erosion, water pollution, and habitat destruction. Field scanning technologies support more sustainable farming practices by promoting precision agriculture, reducing chemical inputs, and minimizing environmental impacts. 5. Yield Optimization: Maximizing crop yields while maintaining quality is a primary objective for farmers. Field scanning technologies help optimize yields by identifying areas of high and low productivity within fields, enabling site-specific management practices to improve overall yield potential.

	6. Data-Driven Decision Making: Many farmers face challenges in accessing and interpreting relevant data to inform their decision-making processes. Field scanning technologies provide farmers with actionable insights derived from comprehensive field data, facilitating data-driven decision-making for improved farm management and productivity. 7. Labor Efficiency: Labor shortages and rising labor costs present significant challenges for agricultural operations. Field scanning technologies automate data collection and analysis processes, reducing the need for manual labor and enabling more efficient use of human resources on the farm. 8. Climate Variability: Climate variability and extreme weather events pose risks to agricultural production, affecting crop growth, yields, and resilience. Field scanning technologies help farmers monitor and adapt to changing environmental conditions, enabling proactive management strategies to mitigate risks associated with climate variability. Overall, technologies for field scanning in agriculture play a critical role in addressing these challenges by providing farmers with actionable insights, optimizing resource use, enhancing environmental sustainability, and improving overall farm productivity and resilience
End users (« customers »)	180.000 Farmers and 700 UAT (1.8M end-users) Municipalities, Governmental Organizations (Ministry of Agriculture and Rural Development), Universities, Agricultural Cooperatives, Entrepreneurs (agro-touristic guesthouses in mountain areas, producers of traditional products with "Mountain Product" certification), farmers, mountain population
Alternative solutions	While drones offer significant benefits for field scanning in agriculture, there are alternative solutions available, each with its own advantages and limitations. Some alternatives to using drones for field scanning in agriculture include:

	Satellite Imagery: Satellite imagery provides a broad overview of large agricultural areas and can be useful for monitoring crop health, identifying trends, and assessing overall field conditions. Satellite data can offer consistent coverage and historical comparisons, but it's expensive and may lack the resolution needed for detailed analysis at the individual plant level. Manned Aircraft: Manned aircraft equipped with specialized sensors can capture high-resolution imagery and data over agricultural fields. Compared to drones, manned aircraft can cover larger areas in a single flight and may offer higher image resolution. However, they are typically more expensive to operate and require specialized pilots and equipment. Ground-Based Sensors: Ground-based sensor networks placed throughout fields can monitor soil moisture, temperature, nutrient levels, and other parameters. These sensors can provide real-time data and insights into localized conditions, allowing for targeted irrigation, fertilization, and pest management. However, ground-based sensors have limited coverage compared to aerial platforms and may require more extensive infrastructure with relative investments in terms of funds and time. Handheld Devices: Handheld devices such as smartphones or tablets equipped with various apps and sensors can be used for on-the-go field monitoring and data collection. Farmers can use these devices to capture images, record field observations, and track crop growth stages. While handheld devices are convenient and accessible, they may lack the capabilities of dedicated aerial platforms for large-scale data collection. Unmanned Ground Vehicles (UGVs): UGVs, or ground-based robots, equipped with sensors and cameras can navigate through fields to collect data on soil conditions, crop health, and weed infestations. UGVs offer the advantage of operating closer to the ground and can access areas where drones may have limited flight capabilities. However, they may be slower and less adaptable to rough terrain compared to aerial drones.
Value proposition	

	The value proposition of using technologies such as drones for field scanning in agriculture is multifaceted and offers several benefits to farmers and agricultural businesses: Precision Agriculture: Drones equipped with various sensors like multispectral, hyperspectral, LiDAR, or thermal cameras can collect high-resolution data about crop health, soil conditions, water distribution, and pest infestation levels. This data allows for precise and targeted interventions, optimizing resource use such as water, fertilizers, and pesticides. Precision agriculture ultimately leads to higher crop yields, improved quality, and reduced environmental impact. Cost Savings: By providing detailed insights into crop health and field conditions, drones enable farmers to make informed decisions about where and when to apply resources. This targeted approach minimizes waste and reduces input costs, such as fertilizer and pesticides, resulting in significant cost savings over time. Efficiency and Time Savings: Drones can cover large areas of farmland quickly and efficiently, allowing farmers to assess crop conditions and identify issues in a fraction of the time it would take using traditional methods. This rapid data collection and analysis enable timely interventions, such as early detection of disease outbreaks or nutrient deficiencies, leading to more effective management practices and higher overall productivity. Improved Decision-Making: The data collected by drones can be processed using advanced analytics and machine learning algorithms to generate actionable insights and predictive models. By leveraging these insights, farmers can make more informed decisions about crop management, planting strategies, irrigation scheduling, and pest control, optimizing yields and maximizing profitability. Risk Mitigation and Resilience: Drones provide farmers with real-time visibility into field conditions, allowing them to proactively monitor for potential risks such as crop diseases, invasive pests, drought stress, or soil erosion. By identifying and addressing these issues early, farmers can mitigate risks and improve the resilience

	of their operations against adverse weather conditions and other environmental factors. Scalability and Accessibility: Drone technology is becoming increasingly affordable and accessible to farmers of all scales, from smallholders to large commercial operations. As the technology continues to evolve and become more user-friendly, more farmers can leverage drones to enhance their decision-making processes and improve overall farm management practices. In summary, the use of drones for field scanning in agriculture offers a compelling value proposition by enabling precision agriculture, cost savings, efficiency gains, improved decision-making, risk mitigation, and scalability, ultimately leading to more sustainable and profitable farming practices.
Solution	Technologies for field scanning in agriculture offer a range of solutions aimed at improving farm management practices, optimizing resource use, and enhancing crop productivity. These technologies will be used to provide farmers with specialized services in order to mitigate the loss of nutritive value of soils. Some of the key solutions provided by these technologies include: Variable Rate Application (VRA): Field scanning technologies support variable rate application of inputs such as fertilizers, pesticides, and irrigation water based on spatial variability within fields. By tailoring input applications to specific crop needs and field conditions, farmers can optimize resource use and improve crop yields while minimizing environmental impact.

	Mapping and Visualization: Field scanning technologies generate maps and visualizations of field data, allowing farmers to identify spatial patterns and trends in crop performance, soil properties, and environmental conditions. These maps help farmers identify areas of high and low productivity, prioritize management interventions, and track changes in field conditions over time. Integration with Farm Management Systems: Field scanning technologies integrate with farm management systems and precision agriculture platforms to streamline data collection, analysis, and decision-making processes. These integrations enable seamless transfer of data between different systems and allow farmers to access real-time information about field conditions and operations. Predictive Modeling and Forecasting: Field scanning technologies support predictive modeling and forecasting of crop yields, pest outbreaks, and environmental conditions based on historical data and current field observations. These models help farmers anticipate potential risks and plan management strategies accordingly to mitigate losses and optimize farm productivity.
Channels	The promotion of the final product, of the solution of revitalization and adaptation to climate conditions of mountain meadows will be promoted by organizing trainings with farmers, cooperatives, universities, etc., regional and national conferences, social media promotion (Instagram, Facebook, LinkedIn, radio, TV shows), web (partners' website, explanatory videos on "step by step" technology), participation in agricultural events, field presentations, symposiums.
Use model	There are several use models of technologies for field scanning in agriculture, each designed to address specific needs and challenges faced by farmers and agricultural businesses. Here are some common use models:

	1. Crop Health Monitoring and Management: Regular drone or sensor-based scans of fields to monitor crop health, detect nutrient deficiencies, pest infestations, and disease outbreaks. Zone-based Management: Dividing fields into management zones based on variability in soil type, topography, and crop health, and tailoring management practices accordingly. 2. Precision Irrigation and Water Management: Soil Moisture Monitoring: Using sensors to measure soil moisture levels across the field and optimize irrigation scheduling to minimize water usage and prevent water stress. Water Distribution Mapping: Mapping water distribution patterns to identify areas of over-irrigation or under-irrigation and adjust irrigation systems accordingly. 3. Nutrient Management and Fertilizer Application: Nutrient Mapping: Mapping soil nutrient levels and variability within fields to optimize fertilizer application rates and minimize nutrient runoff. Variable Rate Application: Adjusting fertilizer application rates based on real-time field data to match crop requirements and avoid over-application. 4. Pest and Weed Management: Pest Detection and Monitoring: Using drones or ground-based sensors to detect pest populations and monitor their movement within fields, enabling timely interventions such as targeted pesticide application or biological control methods. Weed Mapping and Control: Identifying weed hotspots and mapping weed species distribution to optimize herbicide application and implement site-specific weed control strategies.

	5. Yield Prediction and Harvest Planning: Yield Mapping: Generating yield maps based on crop performance data collected throughout the growing season to identify high-yielding areas and factors contributing to yield variability. Harvest Planning: Using predictive modeling and historical data to forecast crop yields and plan harvest operations, including equipment scheduling and labor allocation. 6. Environmental Monitoring and Compliance: Erosion Control: Monitoring soil erosion and runoff patterns to implement erosion control measures and maintain soil health. Regulatory Compliance: Collecting data on pesticide usage, water quality, and environmental impact to ensure compliance with regulations and certifications. 7. Research and Development: Field Trials and Experimentation: Conducting research trials and experimental studies to evaluate new crop varieties, agronomic practices, and technologies for improving agricultural productivity and sustainability. These use models demonstrate the diverse applications of technologies for field scanning in agriculture, ranging from crop health monitoring and precision management to environmental stewardship and research-driven innovation. By leveraging advanced sensing technologies and data analytics, farmers can make data-driven decisions to optimize crop production, minimize resource inputs, and enhance overall farm sustainability.

Table 17 - Technologies for field scanning characterization simplified table

5.2.9. Solutions for restoring mountain meadows

Name of the result	Solutions for restoring mountain meadows
Problem it is solving	Climate change negatively influences soil trophicity levels and grass variety composition. Valuable species are disappearing and some low-quality plants are thriving. As a result, animals are fed on grass with low nutritional value. Tis will increase the cost for the farmers and will reduce the profitability of there activityes. This forces farmers to migrate to sub-mountainous areas and mountainous areas risk depopulation. This will lead to a loss of people's tradition and identity and, at the same time, will lower the quality of food products.
End users (« customers »)	180.000 Farmers and 700 UAT (1.8M end-users) Municipalities, Governmental Organizations (Ministry of Agriculture and Rural Development), Universities, Agricultural Cooperatives, Entrepreneurs (agro-touristic guesthouses in mountain areas, producers of traditional products with "Mountain Product" certification), farmers, mountain population
Alternative solutions	The alternative solution sees farmers and ranchers abandoning mountain areas for more fertile soils in the lowlands.
Value proposition	The solution to be tested will allow the identification of local problems in each farm or area and the generation of tailor-made solutions for each situation, using the **(KER 1) technological means** of automatic soil sampling, scanning and seeding of fields by means of drones equipped with NDVI sensors and HD camera. Solutions for restoring mountain meadows offer a compelling value proposition by delivering a suite of ecological, environmental, economic, and social benefits that contribute to the well-being of both natural ecosystems and human communities in mountainous regions. Here are some key value propositions of solutions for restoring mountain meadows: 1. **Biodiversity Conservation**: Restoring mountain meadows helps conserve biodiversity by providing habitat for a diverse array of plant and animal species,

	including rare and endangered species. Meadows support a variety of flora and fauna, including pollinators, birds, mammals, and amphibians, contributing to overall ecosystem health and resilience. 2. **Water Regulation and Quality**: Mountain meadows play a crucial role in regulating water flow and quality within watersheds. Restored meadows act as natural sponges, absorbing and storing water during periods of high flow, which helps reduce downstream flooding and erosion. Meadows also filter and purify water, improving water quality for downstream users and ecosystems. 3. **Carbon Sequestration and Climate Regulation**: Restored mountain meadows can sequester significant amounts of carbon dioxide from the atmosphere, helping mitigate climate change. Meadows act as carbon sinks, storing carbon in soil and plant biomass, and contributing to climate regulation by reducing greenhouse gas emissions and enhancing ecosystem resilience to climate variability. 4. **Soil Conservation and Stability**: Mountain meadows help prevent soil erosion and promote soil stability through the growth of deep-rooted vegetation and the accumulation of organic matter. Restored meadows reduce the risk of landslides, avalanches, and soil degradation, protecting infrastructure, property, and livelihoods downstream. 5. **Recreation and Tourism Opportunities**: Restored mountain meadows provide opportunities for outdoor recreation and ecotourism, attracting visitors who seek opportunities for hiking, wildlife viewing, photography, and nature appreciation. Meadows contribute to local economies by supporting tourism-related businesses, generating revenue, and creating jobs in rural communities. 6. **Cultural and Aesthetic Values**: Mountain meadows hold cultural significance for indigenous communities and local residents, serving as important cultural landscapes and traditional gathering places. Restoring meadows preserves cultural heritage, strengthens community ties, and enhances the aesthetic beauty of mountain landscapes for current and future generations to enjoy. 7. **Livelihood Support and Sustainable Agriculture**: Restored mountain meadows can support sustainable agriculture and livestock grazing practices, providing grazing lands for livestock and forage for wildlife. Meadows contribute to the livelihoods of rural communities by supporting traditional farming and ranching activities, promoting sustainable land management practices, and enhancing food security. 8. **Ecosystem Services and Resilience**: Restored mountain meadows provide a wide range of ecosystem services, including air and water purification, soil fertility, nutrient cycling, and pollination, which are essential for human well-being and ecosystem resilience. Meadows contribute to the overall health and functioning of ecosystems, supporting diverse ecological processes and interactions.

Solution	It's about delivering a **set of solutions, that will support farmers in the c**onservation and use of grasslands threatened by climate change. The set of solutions will be delivered as specialized services and trainings and consist in: • Solutions for restoring forage vegetation and biodiversity • Solutions for obtaining drought-resistant forage grass with better root system • Solutions for operational process of overseeding • Solutions for improving the nutritional value of forage • Educational training with municipalities, farmers, locals, entrepreneurs Special seeding machines will be used for flat land or gentle slopes, while drones with a seed-spreading system will be used for meadows with irregular terrain and steep slopes. Efficiency will also be increased by using drones to spread fertilizer. The use of automatic soil sampling equipment will provide an in-depth picture of the soil's nutrient quality over very large, hilly areas of land, allowing a customized technological fertilization scheme for each area. Automated soil sampling makes it more efficient to obtain results with high precision and increased efficiency.
Channels	The promotion of the final product, of the solution of revitalization and adaptation to climate conditions of mountain meadows will be promoted by organizing trainings with farmers, cooperatives, universities, etc., regional and national conferences, social media promotion (Instagram, Facebook, LinkedIn, radio, TV shows), web (partners' website, explanatory videos on "step by step" technology), participation in agricultural events, field presentations, symposiums.
Use model	The package of solutions will allow on one hand to rise awareness through conferences, events, etc around the topic of climate change and on the other by developing a consulting service but also training modules. Indeed, the partner organizations have the ability to reach different end-user segments more easily.

	- ROHEALTH, as support organization, will use the knowledge assets (KER 2) in public events as brokerage events (like BEHALTH), conferences, seminars and webinars in order to rise awareness around climate change adaptation policies towards decision-makers, but also present and future cluster members from bioeconomy sector. The results will be leveraged to get involved and promote further research project on the topic. A set of policy recommendations will be developed for regional and local authorities to foster the adoption of the results. - ICDM, as a research institution, will develop traning modules (KER 1 & 2) for high schools and universities with agricultural profiles, with the purpose of studying soils and climate change mitigation measures. ICDM also has the ability, by statute, to provide advisory services on soil condition and consequent remedial measures to different types of end users such as public agencies, municipalities, and farmers. Finally, ad hoc training for farmers will show them the consequences of - Holland Farming, as a private entity, will offer a new package of consulting services in its portfolio to medium and large-scale farmers, which can be integrated with other services dedicated to the agricultural sector. (KER 1 & 2) - Municipality of Rau Sadului, as a local authority, will be able to more easily reach small farmers under its jurisdiction. In particular, the Municipality evaluates the possibility of creating a subordinate body capable of providing this package of services at an accessible price in such a way as to promote climate resilience, the local economy is a new income to the municipal budget which can be reinvested in adaptation to climate change. (KER 1 & 2) - SFA Romania, as social finance organization, will support end-users, mainly small and medium size farmers through a integrated package of services - consulting, mentoring and financing (loans or grants) - that will allow an easier access to the package of services (KER 2) and therefore supporting the exploitation of the results. In this regards, SFA will contribute in launching new financial instruments for economic operators for CCA solutions, including green solutions and infrastructure - through the local financial institutions (ex. AFIN IFN S.A. Romania); SFA will also integrate the regional demonstrator into networks / clusters that will bring to projects partners connections and access to the market for the solution implemented within the project.

Table 18 - Solutions for restoring mountain meadows simplified characterization table

5.2.10. Co-creation method for GI strategy development

Name of the result	*GABROVO Demonstrator project 1:* *Innovative solutions for Green Infrastructure*
Problem it is solving	The Municipality of Gabrovo is located on the terraces of five rivers at the foot of the Balkan Mountain in the North Central Region of Bulgaria. Its area is 555,579 km, encompassing 134 settlements, including the city of Gabrovo, which is the administrative centre and the largest city in the province. Climate change reflects to Gabrovo GI. More than 50% of the municipal territory are forests and one-third of them are included in Nature 2000**.** There are several important protected areas in the municipal territory, such as the Central Balkan National Park and Natural Park Bulgarka. Both flora and fauna in the municipality get affected by climate-related challenges. Drying season becomes longer. Fires appear more often because of the warmer climate, and many trees died. There are loss of genetic diversity, disruption of species lifecycles, deterioration of habitats, changes in the ecosystem integrity and reduction of the provision of ecosystem service. Gabrovo is known as a Green city, awarded by Green Leaf 2021 award. As a Green city Gabrovo has big green areas and parks. Most of them are irrigated by water from the Water Supply Company. The annual costs for irrigation are large because of the big quantity and price of the consumed water. In addition there are many green territories in the city without irrigation system.
End users (« customers »)	GI in Gabrovo municipality incl.: existing flora and fauna, local community in the city and rural areas, companies in industrial zones, tourists and visitors in Gabrovo municipality, neighbouring municipalities.
Alternative solutions	Gabrovo Municipality developed and implemented Green Strategy 2017-2023 but it didn’t include enough adaptation measures against climate change.

	In 2021 Gabrovo Municipality developed SECAP till 2030, where new adaptation measures were developed and planned to be implemented. 4 GHG inventories were executed till 2023, and the last one was focused on forests and land. A New GI strategy has to be developed till 2030 in accordance with SECAP 2030.
Value proposition	A new GI Strategy will be developed, placing the focus on the sustainable use of natural resources and innovative NBS so as to adapt to CC. The new GI Strategy will focus on semi-natural spaces in Gabrovo, such as public parks and gardens, as well as green areas between residential and public buildings. The elaboration of GI Strategy will go through three main stages: Stage 1 - Mapping of the urban green environment and identification of needs for further development/improvement of the green infrastructure (expert-based), GI concept development, incl. pre-investment studies; Stage 2 - Co-development of the GI Strategy with the inclusion of representatives of all relevant stakeholders in Gabrovo, incl. citizens (social innovation), with an Action Plan with concrete measures/projects; and Stage 3 - Implementation of a pilot project (part of the new GI Strategy) focused on improving/expanding the urban green infrastructure through rainwater harvesting for maintaining urban green areas (technological innovation), complemented by tree planting and increasing of permeable green surfaces on the territory of Municipality of Gabrovo. Mapping of the urban green environment and identification of needs for further development/ improvement of the green infrastructure.
Solution	Development of new GI Strategy in order to adapt to CC. Regeneration of public spaces to create climate resilient neighbourhoods. Tree planting with adaptive to CC species and increasing of permeable green surfaces.

	Improving/ expanding the urban green infrastructure through rainwater harvesting for maintaining urban green areas. Better manage water scarcity and impacts of droughts or to better manage water flooding. Digital solutions and services. New public participation method for green strategy development. Solutions for rainwater harvesting for irrigation. Action plan with concrete measures and time schedule. Digital solutions and services.
Channels	Web, social and local media, awareness-raising events, workshops.
Use model	Development of GI strategy by taking adaptive to climate change decisions for improving green infrastructure. Public engagement and awareness raising of the general population. Capacity building of the municipal administration. Mapping of GI, feasibility study and pre-design of an innovative solution for development and implementation of a rainwater harvesting system integrating RES.

Table 19 - Co-creation method for GI strategy development simplified characterization table

5.2.11. Rainwater harvesting infrastructure for irrigation of green areas

Name of the result	*GABROVO Demonstrator project 1:* *Innovative solutions for Green Infrastructure*
Problem it is solving	The Municipality of Gabrovo is located on the terraces of five rivers at the foot of the Balkan Mountain in the North Central Region of Bulgaria. Its area is 555,579 km, encompassing 134 settlements, including the city of Gabrovo, which is the administrative centre and the largest city in the province. Climate change reflects to Gabrovo GI. More than 50% of the municipal territory are forests and one-third of them are included in Nature 2000**.** There are several important protected areas in the municipal territory, such as the Central Balkan National Park and Natural Park Bulgarka. Both flora and fauna in the municipality get affected by climate-related challenges. Drying season becomes longer. Fires appear more often because of the warmer climate, and many trees died. There are loss of genetic diversity, disruption of species lifecycles, deterioration of habitats, changes in the ecosystem integrity and reduction of the provision of ecosystem service. Gabrovo is known as a Green city, awarded by Green Leaf 2021 award. As a Green city Gabrovo has big green areas and parks. Most of them are irrigated by water from the Water Supply Company. The annual costs for irrigation are large because of the big quantity and price of the consumed water. In addition there are many green territories in the city without irrigation system.
End users (« customers »)	GI in Gabrovo municipality incl.: existing flora and fauna, local community in the city and rural areas, companies in industrial zones, tourists and visitors in Gabrovo municipality, neighbouring municipalities.
Alternative solutions	Gabrovo Municipality developed and implemented Green Strategy 2017-2023 but it didn’t include enough adaptation measures against climate change.

	In 2021 Gabrovo Municipality developed SECAP till 2030, where new adaptation measures were developed and planned to be implemented. 4 GHG inventories were executed till 2023, and the last one was focused on forests and land. A New GI strategy has to be developed till 2030 in accordance with SECAP 2030.
Value proposition	A new GI Strategy will be developed, placing the focus on the sustainable use of natural resources and innovative NBS so as to adapt to CC. The new GI Strategy will focus on semi-natural spaces in Gabrovo, such as public parks and gardens, as well as green areas between residential and public buildings. The elaboration of GI Strategy will go through three main stages: Stage 1 - Mapping of the urban green environment and identification of needs for further development/improvement of the green infrastructure (expert-based), GI concept development, incl. pre-investment studies; Stage 2 - Co-development of the GI Strategy with the inclusion of representatives of all relevant stakeholders in Gabrovo, incl. citizens (social innovation), with an Action Plan with concrete measures/projects; and Stage 3 - Implementation of a pilot project (part of the new GI Strategy) focused on improving/expanding the urban green infrastructure through rainwater harvesting for maintaining urban green areas (technological innovation), complemented by tree planting and increasing of permeable green surfaces on the territory of Municipality of Gabrovo. Mapping of the urban green environment and identification of needs for further development/ improvement of the green infrastructure.
Solution	Development of new GI Strategy in order to adapt to CC. Regeneration of public spaces to create climate resilient neighbourhoods. Tree planting with adaptive to CC species and increasing of permeable green surfaces.

	Improving/ expanding the urban green infrastructure through rainwater harvesting for maintaining urban green areas. Better manage water scarcity and impacts of droughts or to better manage water flooding. Digital solutions and services. New public participation method for green strategy development. Solutions for rainwater harvesting for irrigation. Action plan with concrete measures and time schedule. Digital solutions and services.
Channels	Web, social and local media, awareness-raising events, workshops.
Use model	Development of GI strategy by taking adaptive to climate change decisions for improving green infrastructure. Public engagement and awareness raising of the general population. Capacity building of the municipal administration. Mapping of GI, feasibility study and pre-design of an innovative solution for development and implementation of a rainwater harvesting system integrating RES.

Table 20 - Rainwater harvesting infrastructure for irrigation of green areas simplified characterization table

5.2.12. EWMS for climate event monitoring

Name of the result	*GABROVO Demonstrator project 2: Early-Warning and Monitoring System (EWMS) for Risk Management*
Problem it is solving	Up to now Gabrovo Municipality doesn't have Early-Warning and Monitoring System (EWMS) for Risk Management. During the last years highly vulnerable to CC-related extreme events appear, such as droughts, floods, heat and cold waves, hurricane winds, forest fires and landslides, affecting citizens, economy as well as biodiversity, land and aquatic ecosystems, water resources, agriculture and forestry. Disaster monitoring, warning and response systems to support decision-making on CCA and risk prevention, has to be developed and implemented. It should allow data collection about natural hazards. Measures for restoration and protection of natural riverbeds should be implemented. Digital solutions and services to better predict, monitor and report on climate events, have to be developed and implemented.
End users (« customers »)	Local community in the city and rural areas, companies in industrial zones, tourists and visitors in Gabrovo municipality, existing flora and fauna within the territory of the municipality, neighbouring municipalities.
Alternative solutions	Up to the moment Gabrovo Municipality doesn't have Early-Warning and Monitoring System to predict extreme events, such as droughts, floods, heat and cold waves, hurricane winds, forest fires and landslides, affecting citizens, economy as well as biodiversity, land and aquatic ecosystems, water resources, agriculture and forestry.
Value proposition	The ambition of the Municipality of Gabrovo is to establish an effective EWMS for different natural hazards, namely floods, hurricanes and forest fires. Awareness-raising measures and public engagement will be integral elements of this pilot project. The Early-Warning and Monitoring System has to provide different functionalities for real-time data collection and data storage on a separate server. The

	data will be collected by monitoring stations, sensors, thermal imaging cameras and standardized weather station, which will be integrated in one information system with appropriate interface, allowing monitoring, control and risk management, based on more than one working stations. EWMS will allow for: real-time measurements through a number of monitoring stations, announcement of events in real-time, collaboration with the population through a mobile application for data collection/exchange and addressing inquiries in real-time (the list of functionalities is not exhaustive). The implementation will go through three stages: (i) Pre-investment studies and conceptualizing the EWMS, (ii) design of the three components of EWMS - for floods, hurricanes and forest fires, and (iii) awareness raising of the general population and capacity building of the municipal administration.
Solution	Development and implementation of an early-warning system for monitoring and reporting on natural hazards on the territory of Gabrovo municipality, which will support climate adaptation policy. Early-Warning and Monitoring System will include early-warning systems for prediction of floods, hurricanes and forest fires. That will support the protection of forest resources as well as biodiversity and ecosystems.
Channels	Web, social and local media, awareness-raising events, workshops.
Use model	Development of innovative solutions for Early-Warning and Monitoring System. Awareness raising of the general population. Capacity building of the municipal administration.

Table 21 - EWMS for climate event monitoring simplified characterization table

5.2.13. Erdjyagora digital platform for co-creation and decision making on CCA

Name of the result	Erdjyagora digital platform for co-creation and decision making on CCA
Problem it is solving	Climate change induces new situations in water supply, necessitating decisions both for daily management and long-term adaptations. Unfortunately, most of the actors do not have essential information about the situation. The Swiss demonstrator has the ambition to provide a new dynamic of decision-making, with more and better-informed actors and enhanced adoption of resultant solutions.
End users (« customers »)	Our aim is to engage all the stakeholders involved in water management, to foster decision-making but also implementation of resulting practices: industrials (including energy production), farmers, policy-makers, politicians, tourism leaders, and ordinary citizens.
Alternative solutions	Water management in the Valais region is based on age-old tradition. Many prevalent practices are based on long-term experience and rules are established at the municipal level. Over the past decades, certain actors, such as energy producers, have gained increasing influence. Although a regional vision has also been developed, its impact has been relatively modest. The awareness for new, better-informed solutions is now rising among all stakeholders.
Value proposition	Existing practices involve parameters (for instance water quantity and quality), problems and stakeholders mostly in a dissociated way. Our solution aims to provide a comprehensive approach to watershed monitoring, and to provide a common

	digital interface for all stakeholders. It will also consider decision-making methodologies to bring diverse actors together and develop solutions. Our solution focuses both on technological aspects and on human perception factors, including trust, understanding and engagement.
Solution	The proposed solution involves a system of sensors monitoring both quantitative and qualitative parameters of water in a specified watershed. It will provide a digital interface showing the core parameters and interdependencies in a way that fosters trust and engagement among all stakeholders. To facilitate implementation, a concise manual will outline decision-making tools, setups, and methodologies, enabling villages, cities, regions, etc., to adopt the proposed solution. Complementary research in applied psychology will allow effective gains of this solution to be characterized and key adoption factors to be understood.
Channels	Our network already has contact with most of the actors: BlueArk with industry and farmers, FDDM with citizens and policy-makers, Canton du Valais with policy-makers. We'll also use regional media.
Use model	The history of Swiss democracy shows that the most efficient implementation strategy is through cantonal initiatives. Cantons play a pivotal role in shaping global water policies and have the necessary critical mass to provide such tools and practices. Maintenance and further development will be done by the digital partner Apptitude. A re-packaging of the tools, the methodology and the related knowledge will also be prepared for implementation in other contexts, inspired by an open-source approach. Nevertheless, a detailed business plan will be crafted during Year 4, to

	ensure maintenance, evolution, and support for the future.

Table 22 - Erdjyagora digital platform for co-creation and decision making on CCA simplified characterization table

5.2.14. New financial instruments

Name of the result	Set of innovative financial instruments for CCA (New innovative finance opportunities to develop solutions to CCA challenges) in Tirol
Problem it is solving	Support the implementation of CCA solutions developed in the project in the demonstrator´s focus areas of tourism, buildings and settlements and digital solutions (Tirol) in cooperation with/for local enterprises, local tourism agencies, communities by providing a comprehensive overview on possible financial instruments; generate a basis for the replication in other regions through the replication lab (T3.2) and community of practice (T3.3). More details will be elaborated and provided until the end of the project..
End users (« customers »)	Businesses, local tourism agencies and municipalities in tourism regions, local/regional financial institutions, regional government of Tirol
Alternative solutions	Existing and “traditional” financing models: bank loans and credits; existing (co-)funding opportunities at the supra-national, national, regional and local level for the public and private sector

Value proposition	Access to a bigger range of potential financial instruments for (innovative) CCA projects; use of extended indicators (f.e. including social ethical and ecological criteria) for assessing the financial need of CCA projects
Solution	Analisis of financial instruments and funding opportunities; development and establishment of potential funding programs for (ecosystem-based) adaptation measures…
Channels	Workshops and conferences during the project duration; website and social media channels of MountResilience and the local project partners
Use model	Provision of information on financial services and opportunities. Details will be elaborated during the project period.

Table 23 – New financial instruments simplified characterization table

5.2.15. Policy recommendations

Name of the result	Policy recommendations
Problem it is solving	• Lack of financial solutions for stakeholders to solve the climate change (CCA) challenges; • Lack of a legislative framework at the European and national level (facilities, programs); • Lack of training, consulting and mentoring resources specific to the existing needs in the market; • Accessing financing becomes an expensive tool for beneficiaries, they are not always adapted to the access/reimbursement potential.
End users (« customers »)	**Private entities** • Business & industrial associations; • Local cooperatives & farmer community; • Tourism operators; • Agriculture business (ex., irrigation and water management); • Foundations and NGOs (ex. focused on sustainability, green strategy development); • Social enterprises and work integration social enterprises. **Public entities** • Municipalities; • Public authorities; • Regional development agencies; • Regional, national and European decision-making authorities; • The Romanian Management Authorities that manage European funds and could take over the experience of this project in future funding programs.
Alternative solutions	Until now, stakeholders have developed projects to combat climate change using the following tools and financing solutions: • private resources; • grants; • bank loans; • accessed non-exchangeable funds (European or governmental); • Guarantee schemes; • Investment funds.

Value proposition	The proposed solution is to have alternative financial and consultancy services adapted to the needs of economic operators who develop CCA-related projects. This includes new financial instruments conceived to deliver private finance for CCA solutions, including green solutions and infrastructure, and recommendations to inform national and EU-level policy-makers on policy choices benefitting EU mountain CCA. SFA Romania can offer an integrated package of services: consulting, mentoring and financing (loans or grants) for end users. It can also integrate them into networks / clusters that will bring them connections and access to the market for the solution implemented within the project.
Solution	**Financial services:** • Alternative financial services (loans) for economic operators, analysing both the financial and economic impact, as well as the impact on the environment, CCA solution, EU mountain CCA and communities; • Guarantee services (ex the guarantee instrument for the social economy offered by the European Commission through the EaSI program); • Specialised consultancy and know-how services in accessing financing for projects that contribute substantially to environmental objectives; • Support communities. **Consultancy:** • Consultancy in the preparation of the necessary documentation for obtaining financing; • Identification of partners to support the activity; • Identifying potential funding sources; • Estimating business value and access to finance. **Mentoring:** • *Strategic development and market access;* • *Fulfillment of legal operating conditions;* • *Development of human resources;* • *Participation in public procurement procedures;* • *Financial and accounting aspects;* • *Innovation and social impact & diversity at work;* • *Climate change and innovation/research.*
Channels	Communication with stakeholders (end users/customers) will be done using the following channels: • social media, website, newsletters; • events (webinars, conferences);

	• communities (European and national networks).
Use model	How: • Launching new financial instruments for economic operators for CCA solutions, including green solutions and infrastructure - through the local financial institutions (ex. AFIN IFN S.A. Romania); • Development of new guarantee instruments for enterprises to facilitate access to financing; • Business development services and networking facilities to improve investment readiness; • Public policy recommendations, including the models generated within the project in the new European funding programs managed by Romania / EU.

Table 24 – Policy recommendations simplified characterization table

5.2.16. Monitoring and Evaluation Tool

Monitoring and Evaluation Tool	
Problem it is solving	Identification and documentation of the implementation progress of the sustainability and climate strategy of the Province of the Tyrol
End users (« customers »)	regional authority – Provincial Government of the Tyrol
Alternative solutions	There is already a prototype with key indicators but also with a lot of unaddressed issues and gaps.
Value proposition	Transparency on the 1) degree of implementation of the strategy 2) effectiveness of measures and 3) counteracting measures; Face the requirements of the court of auditors in order to monitor the implementation progress of the strategy.
Solution	The monitoring and evaluation tool will on the one hand use indicators that describe the progress of measures (RESPRONDE indicators of the regional strategy) and – on the other hand select climate IMPACT indicators that describe changes like heat days etc. Both systems will correspond in order to implement counteracting measures
Channels	Meetings, workshops
Use model	New tool to be implemented in the monitoring system of the Province

5.2.17. Prototypes of new consulting modules

Prototypes of new consulting modules	
Problem it is solving	Due to climate change, the relevance of the topic of summer overheating/ summer thermal insulation in buildings and indoors is increasing in Tyrol. Various structural and technical measures can regulate the interior temperature of rooms.
End users (« customers »)	HVAC-planners, architects, homeowners, property developers, plumbers, municipalities, energy consultants
Alternative solutions	They use the knowledge they have so far… Decisions are made primarily for economic reasons
Value proposition	Different structural and technical measures to reduce summertime overheating indoors are compared independently using simulations and measurements on the building. The most energy-efficient and economical solutions are to be determined for the various building types. This is done taking into account the current energy policy categorisation.
Solution	the knowledge developed is disseminated in different ways: Information events, counselling services, brochures, funding recommendations to the federal state/municipal council
Channels	via the existing network, events, newsletter, website, social media
Use model	Training, Brochures, information material, website