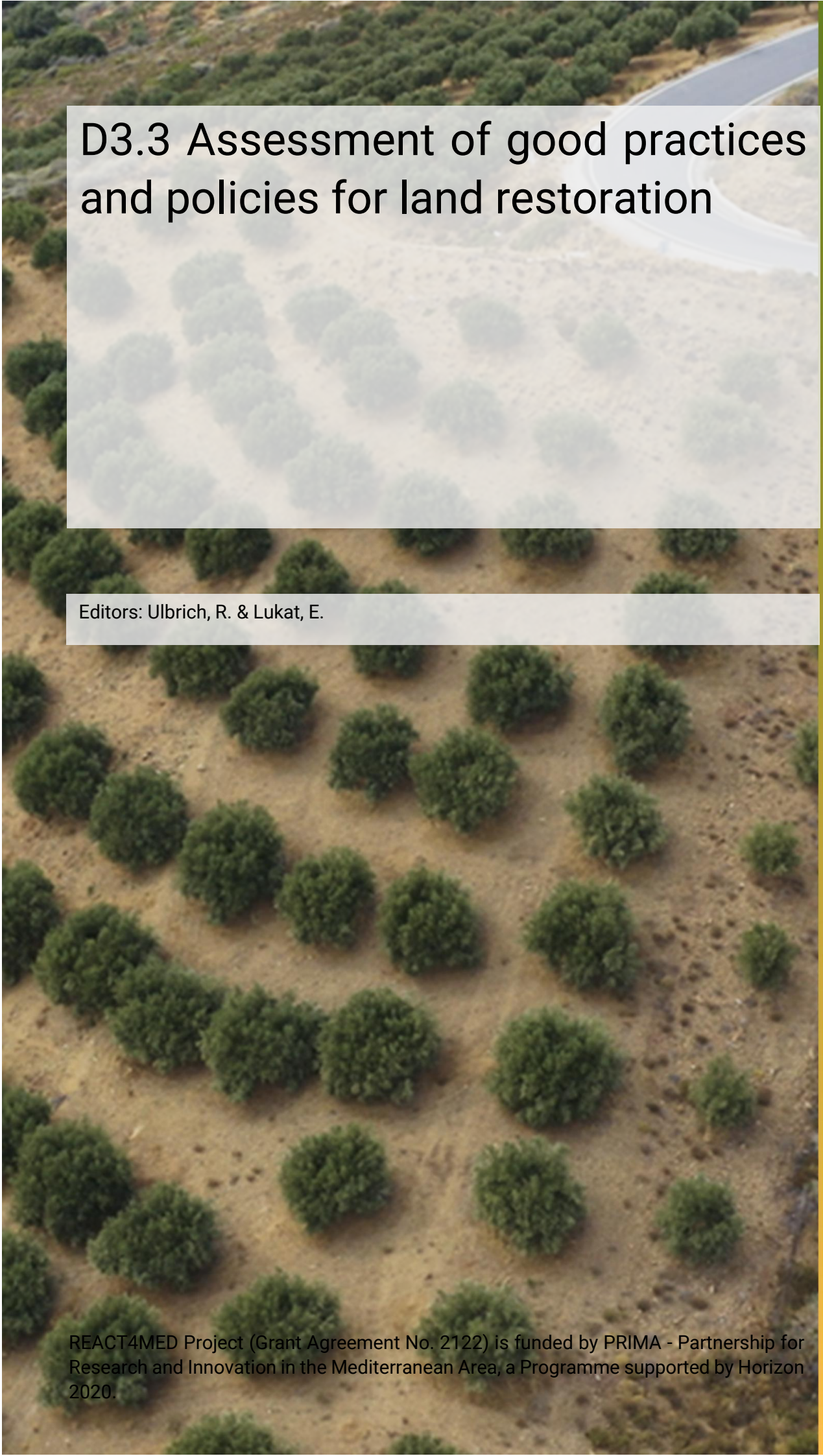

D3.3 Assessment of good practices and policies for land restoration

Editors: Ulbrich, R. & Lukat, E.

PRIMA
PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA

REACT4MED

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Table of Contents

Executive Summary

This report presents an assessment of good practices and policies for land restoration across seven pilot areas in the Mediterranean region, using a backcasting methodology to identify the major changes required, opportunities, barriers, and concrete actions needed to enable large-scale implementation and dissemination of restoration practices. The study explores context-specific restoration actions carried out in seven countries: mulching with chipped pruned branches in Spain, terracing in Cyprus, cover cropping in Israel, salinity management in Türkiye, organic farming in Italy, afforestation and silvopastoral management in Greece, and composting of crop residues in Egypt.

Following a presentation of the scientific background of the task in Chapter 2, Chapter 3 details the participatory methods used during national workshops designed to facilitate stakeholder dialogue and identify future-oriented transformation pathways. Chapter 4 synthesises and compares the resulting backcasting pathways, highlighting both the common challenges and the diverse enabling conditions across the Mediterranean contexts. The analysis reflects on key policy implications, cross-cutting leverage points for change, and the methodological insights gained from applying backcasting for sustainable land and water management in transdisciplinary research projects. Part B of the report provides the full documentation of the workshops held in each pilot area, presenting the detailed outcomes.

Overall, backcasting pathways across pilot areas demonstrate a recurring pattern: successful ecological restoration is not merely a technical fix, but a complex socio-ecological transition requiring integrated approaches. This report offers a comprehensive understanding of how participatory foresight approaches can guide the co-design of actionable strategies for sustainable land restoration, bridging scientific knowledge, stakeholder experience, and policy relevance across Mediterranean landscapes.

Part A: Backcasting to assess barriers and opportunities for up- and outscaling of soil restoration actions

1 Introduction

Although the restoration actions involved in REACT4MED are known to agricultural practitioners like farmers, extension officers and scientists working on soil and water conservation, many of them are not widely implemented. Farmers are hesitant towards implementing soil and water conservation measures even though they may agree on the environmental benefit (Cerdà et al. 2018). For advancing the transition to a sustainable agriculture and responding to the accelerating degradation of soils, the widespread implementation of soil and water restoration actions is essential. This is where task 3.4 of the REACT4MED project is positioned. Its aim is to assess barriers to and opportunities for the implementation or uptake of good practices as well as to assess capacities, governance, socio-economic conditions, investment opportunities, or economic instruments needed for upscaling and outscaling of best practices.

The task contributes to:

- Assessment of barriers to and opportunities for the implementation or uptake of good practices by both practitioners and decision-makers
- Identification of steps and actions to overcome barriers and to use opportunities leading towards the positive visions
- Identify necessary stakeholders and create ownership for the identified actions and therewith up- and outscaling of good practices
- Identification of factors (such as capacities, governance, socio-economic conditions, economic instruments that facilitate public and private investments and cultural aspects) needed for up- and outscaling of good practices
- Stakeholder awareness and mutual learning regarding future actions as well as opinions of other stakeholders

After the description of the scientific background in Chapter 2, we provide a detailed description of the methods utilised in the workshops carried out in seven pilot areas in Chapter 3. In Chapter 4, we summarise and compare the resulting backcasting pathways emerging from the workshops, draw conclusions and offer some reflections on the results and the methodology. Part B of this report depicts the full documentation of the workshops in all participating pilot areas.

2 Scientific background

Restoration actions are often times agricultural practices that have been applied since generations (Jiménez Álvarez et al. 2021). Yet, in times of agricultural intensification, their use has decreased and the knowledge underlying its application faded into the background or is lost altogether (Emmerson et al. 2016). Current practices often rely on assumptions driven by economic maximisation, pushing ecological and social considerations to the background. Based on the current state of mind in many agricultural communities, the future is an extrapolation of today's state of practice. In this case, an assessment of barriers and opportunities of restoration actions would be an academic exercise with little value to agricultural communities. At the same time, when analysing barriers and opportunities to upscaling restoration actions by using today's state of mind, resulting actions will be path-dependent and therefore will reproduce economic maximisation and a neglect of environmental integrity and quality of life. Consequently, such an approach will not be able to support the up and out-scaling of sustainable restoration actions.

While the continuation of conventional agricultural practices will exacerbate the environmental and social situation in rural areas and will eventually also affect the economic well-being, a transformation of agricultural practices that rebalance economy, ecology and society will lead to a more desirable future. Therefore, if the widespread implementation of restoration actions in rural areas is to be meaningful for practitioners, we need to emphasise the value of the future they aim to create. With a compelling vision of a desirable future - one that clearly demonstrates to farmers how implementing restoration actions not only yields ecological benefits, but also strengthens their livelihoods and contributes to a sustainable and prosperous agriculture in the long term - genuine engagement and a willingness to adapt their farming practices can emerge. Focusing on a normative future image that contains the widespread implementation of restoration actions builds a starting point from which innovative solutions may be thought of, avoiding path-dependent solutions that general forecasting techniques result in (Quist 2007). When focusing on a desirable future, the analysis of barriers and opportunities to the widespread implementation of restoration actions will hence lead to more sustainable development pathways than a regular analysis could provide.

A method that embodies this way of thinking is participatory backcasting. Vergragt and Quist (2011) define it as "generating a desirable future, and then looking backwards from that future to the present in order to strategise and to plan how it could be achieved" ((Vergragt and Quist 2011) p. 747). Backcasting is a method that is especially useful when dealing with persistent and complex challenges that require long-term system transformation (Quist et al. 2013), which is needed for the up- and outscaling of restoration actions.

In the literature, various application cases have been reported (Quist 2007; Quist et al. 2013; van der Voorn et al. 2023) and several methodologies distinguished. Table 1 summarises a selection of different approaches. As described in the literature, all studies presented in the table use a desirable, hence normative vision as starting point for the backcasting.

Based on the literature research, we created a suitable approach that was applied in the third workshops of the Ecosystem Restoration Living Labs. The approach aims to create transformational knowledge of participating stakeholders. Transformational knowledge is important for stakeholders to understand how to transition from one state to another while it

builds on the understanding of the system and the knowledge of the transition target (Schneider et al. 2019; Pohl and Hirsch Hadorn 2007), which were developed in the previous workshops (for details on these workshop see Lukat and Ulbrich 2025).

Table 1: Methodological steps of backcasting as decribed in the different studies.

Quist (2013)	Kok et al. (2011)	Quist and Leising (2016)	Johnson and Breil (2015)
WHAT are the needed changes? • technological changes, • cultural and behavioral changes, • structural changes (institutions, rules, and the organization of the socio-technical system under study) **HOW** can the changes be brought about? • overall strategy or mechanism, which could drive the change **WHO** could or should contribute to realizing the vision and what activities should they do? • "Who would oppose the required changes and how can this opposition be dealt with?" Possible: **drivers and barriers** for the proposed changes	• indicate the **obstacles** to be overcome and the **opportunities** to be taken to realize these changes; • define **milestones** and **interim objectives** that need to be achieved to realise the end-point; • identify (policy) **actions** and specify **actors** involved that help develop or take advantage of opportunities and help avoid or neutralize obstacles; • identify **highways of change** and **robust elements** in these strategies (possibly after the workshop by the PA team)	• **Reflection** on vision: • What are important assumptions or conditions for this vision? • How do people life their everyday life in this vision? • What is the role of other actor groups? • What is the role of citizen initiatives? • Backcasting session according to **what-how-who** questions (see Quist 2013) • Pathways and follow-up: • Timeline of **activities** distinguishing short term (5 years), midterm (15 years), and long-term (25 years) and responsible **actors**	• Consider context-scenario specific **obstacles** and **opportunities** in reaching the endpoint • Identify **milestones** or interim projects that would signify progress in reaching the endpoint • Define **actions** that must be taken to get to the endpoint • Validate the **robustness** of actions in the case of other background scenarios playing out

3 Material and methods: Assessment in practice

The approach applied comprises a reflection on the vision that was prepared in the second ERLL workshops, a backcasting session that combines an analysis of what, how, who and a timeline of activities for the short and medium to long term both similar to Quist and Leising (2016), and a reflection of the activities by all participants. Furthermore, the activities were preceded by an analysis of the socio-economic costs and benefits of the restoration actions (Lukat and Ulbrich 2025) that already activated the thinking towards the restoration actions.

The methodology was applied in an online workshop with all teams of the eight Pilot Areas who would conduct the workshops. The online workshop had the purpose of training the participants about the methodology and to discuss the suitability of it for the different Pilot Areas. After the workshop, the methodology was adapted.

The Pilot Area Teams were advised to include stakeholders who are able to think about the upscaling (i.e., facilitating the desired effects through policy interventions) and those who could assist with outscaling (i.e., the replication and dissemination of the restoration action in the field) of restoration actions:

- Upscaling: farmers, farm advisers, supply chain organisations (suppliers, retailers, cooperatives etc.), scientists
- Outscaling: policy makers, education, NGOs and consumer groups, scientists

In the following, the sessions are described (text already published in Lukat and Ulbrich 2025).

3.1 Reflection on vision

Purpose	• Familiarise the participants with the vision that they have developed in the previous workshop. • Adapt the vision where participants see fit, so that the participants feel comfortable with it and see their viewpoints represented. The final version should represent a common vision that every participant aspires to work towards. • Develop a common understanding from which the backcasting exercise starts.
Preparation and materials	• Based on the visions that were developed in the 2nd ERLL workshop, a summary vision is prepared by PALs beforehand. This summary vision focuses on what the visions in their PA have in common. Even though the focus can be on agriculture and related aspects, elements from all dimensions (agriculture, society, economy, policy, education and science) should be included. • Material: One poster/power point slide each with the vision and the discussion questions readable to everyone, paper and pens for participants to rake notes. **Important**: The problem situation as well as the vision summary should be sent to participants upfront (for instance with the invitation or together with the preparatory details).

Steps	• The facilitator presents the vision summary to the participants on power point or a large poster.
	• The facilitator encourages the participants to form groups of three people.
	• In the groups, the participants should exchange for 15 min on the following questions:
	  ○ What is your intuitive response: how does this vision make you feel?
	  ○ What do you like about it?
	  ○ What do you dislike about it?
	  ○ Is something missing?
	• After the 15 min, the facilitator brings the groups attention back into the plenary. Now, the common goal is to adapt the vision, so that everyone can work with it in the next step. The vision should still be desirable and ambitious. For this, the facilitator asks: "Regarding the vision summary, is something missing?"
	The answers are collected on a flipchart or the slide that shows the vision.
	• After collecting the feedback, the facilitator asks: "Is this vision representing a future that you would like to work towards?"
	If doubts are raised, they should be taken into account as far as possible. The vision should be adapted to represent a vision that every participant aspires to work towards.
	
	Reminder: Don't go into a discussion of barriers and problems. Identification of barriers and opportunities to this vision comes in the next step.

Output / Outcome	• An adapted version of the vision, that everyone is looking forward to work towards. It should be ambitious and desirable.
Role of participants	Being open minded about a desirable vision of the future of agriculture and decide whether the proposed vision is something they can agree upon. Contribute their wishes to the common vision.
Role of facilitators	Guiding the participants so that they can be open minded and think the desirable future. Guide the discussion away from topics such as feasibility and barriers (this will come in the next step). Synthesise a common vision that everyone agrees upon.

3.2 Up- and Outscaling: The backcasting method

Purpose	• Identify major changes, barriers and opportunities as well as actions and actors to up- and outscaling of restoration actions by both practitioners and decision-makers • Identify necessary stakeholders and create ownership for the identified actions and therewith up- and outscaling of good practices among participants

	• Identification of factors (such as capacities, governance, socio-economic conditions, economic instruments that facilitate public and private investments and cultural aspects) needed for up- and outscaling of good practices
About backcasting	Backcasting is useful when dealing with persistent and complex challenges that require long-term system transformation (Quist et al. 2013). Vergragt and Quist (2011, p. 747) define it as "generating a desirable future, and then looking backwards from that future to the present in order to strategise and to plan how it could be achieved". "Looking back" from the future, the approach allows participants to reflect on important changes (milestones) that were necessary to come closer to the desired future. Starting with these necessary changes, actions and actors are identified and barriers and opportunities are discussed. This is done looking at different societal sectors (agriculture, society, economy, markets, policies) while identifying requirements such as new knowledge and technologies, novel actor constellations, etc. (Quist and Leising 2016). Participants will create a map of steps (actions) and actors required in the short- and medium- to long-term.

Preparation and materials	• Presentation in the plenary of the Power point slides: Up- and outscaling of [restoration action]
	• Adapted vision from previous step either on power point or a flipchart paper
	• Material: Large poster (A0 or 2 A0s) for each group of six people (see templates below), large pens, moderation cards or sticky notes in different colours to illustrate different categories:
	  ○ Major changes
	  ○ Barriers
	  ○ Opportunities
	  ○ Actions and respective actors

Steps	The moderator briefly presents the exercise to identify potential for up- and outscaling of the restoration action (using the backcasting method). Participants are split in two kinds of groups that address different topics (max. of six participants, there can be several groups for each topic): 1. **Outscaling**: How can [restoration action] be widely taken up by farmers and land managers? Stakeholders: farmers, farm advisers, land managers and supply chain organisations (suppliers, retailers, cooperatives etc.), administration, scientists 2. **Upscaling**: How can we create beneficial conditions and policies in society for the uptake of [restoration action] and our desirable future of agriculture Stakeholders: policy makers, education, NGOs and consumer groups, scientists

	Each group sits at a table and has a poster with the graph and timeline on it. To the right, the updated vision should be visible. The moderator explains that starting from the vision, the participants now look back the pathway, how this vision was accomplished, based on the following steps: • Step 1: Defining milestones = major changes needed to achieve vision • Step 2: Identify barriers that needed to be overcome and opportunities that could be used • Step 3: Identify actions and respective actors or actor constellations To stimulate the debate and to draw on participants' knowledge, participants can be encouraged to consider different societally domains such as agriculture, society, policy, markets, environment. Also, participants can be encouraged to think about changes and actions that happen in the short- (5 years), medium- to long-term (10-20 years). The moderator writes down the information on the respective moderation cards and orders them on the graph. It is advised to start with major changes and then add relating barriers, opportunities and activities and actors. **If there are activities, it is important to name the respective actor(s).** Participants can be encouraged to think about actions, in which they can be involved. In the following, the steps are described with guiding useful questions: Step 1: Thinking back to the present: **identification of major changes** It is 2043 (in 2028?, between 2028 and 2043?), what has been reached and how do you notice the change regarding: Group 1 • the restoration action? • the local community? • the local markets and economy? • the local environment? Group 2 (depending on your stakeholders you may pick one of the options) • (agricultural) policy? • education and research? • the relation between society and agriculture? • Optional: the environment? • Optional: economy in country? Step 2: Identification of barriers and opportunities • What have been barriers on the way to reaching this milestone? • Which opportunities presented themselves?

	• (in case of many ideas) What were the most important barriers/opportunities? Step 3: Identification of actions and actors or actor constellations • What is needed to reach the milestones by overcoming obstacles and using opportunities? • Everyone asks him/herself (including the researchers) what can I do? • Who is in charge of the actions Additional information: Possible prompts for the facilitator of the group to keep discussion going: Think about… • New knowledge • Financial arrangements • New technologies • New political or economic frameworks • Significant changes in actor configuration • Cultural and formal conventions • Changes in routines, rules, culture, infrastructure…
Output / Outcome	Graph illustrating information on conditions (major changes, barriers and opportunities as well as actions and actors) for successful implementation of restoration action on two levels: 1. Outscaling: Practitioners input focussed on information regarding a spreading of the restoration action to other suitable sites 2. Upscaling: Decision makers input focussed on information regarding the implications for policies facilitating the uptake of the restoration action and to make the desirable future achievable • Participants are more aware of their agency (capacity to enact change), steps, activities and necessary coalitions to out- and upscale the restoration action and reach a desirable future
Role of participants	Contribute their knowledge and insights on the necessary conditions. Think proactively how positive change can be accomplished.
Role of facilitators	Guide the process in a structured and stepwise manner, so that participants can think freely about the different categories over the timeline. Instruct and remind participants to strategically think backwards from the desirable vision rather than projecting steps from the status quo.

3.3 Silent discussion to collect feedback

Purpose	• Present identified changes, steps and actors in the plenary • Collect feedbacks from actors that have been assigned activities and receive feedback on the proposed activities
Preparation and materials	• Posters from previous exercise • Large sticky notes and large pens for written feedback
Steps	1. After meeting in the plenary, the different groups present their results. Then the participants are invited to give feedback to the activities that concern them. 2. They receive sticky notes and pens and can go around to the different timelines that were created. To activities for which they are mentioned they can add information they would like to share. 3. After this silent discussion to receive feedback by participants that were not involved in creating the timeline, the groups are asked, whether and what they would like to do with these agendas of activities they have discussed.
Output / Outcome	Written feedback yielding additional information by actors that are affected by the proposed activities.
Role of participants	Feedback with additional information on activities that concern them. Participants of the groups giving an indication how they like to proceed with the gathered information.
Role of facilitators	Showing participants that their insights on the proposed activities matter. Giving participants opportunities to formulate the possible next steps they would like to take drawing on the network that was created during the ERLL.

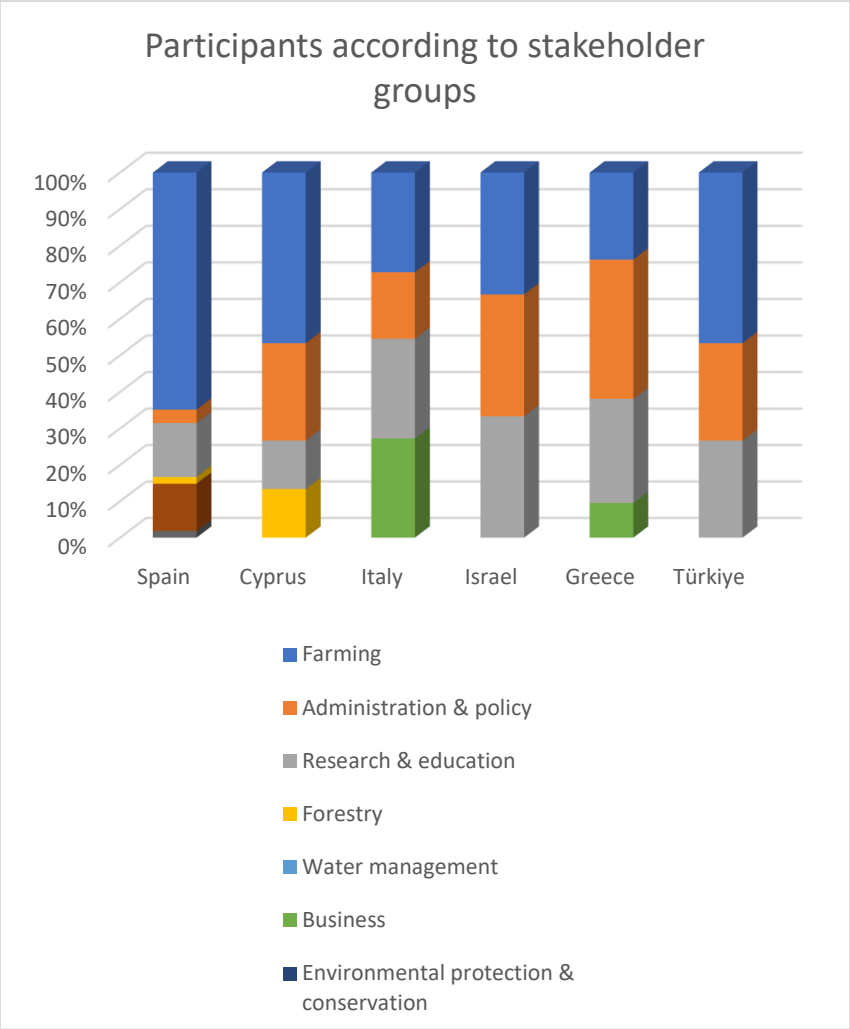
4 Results of backcasting workshops in the pilot areas

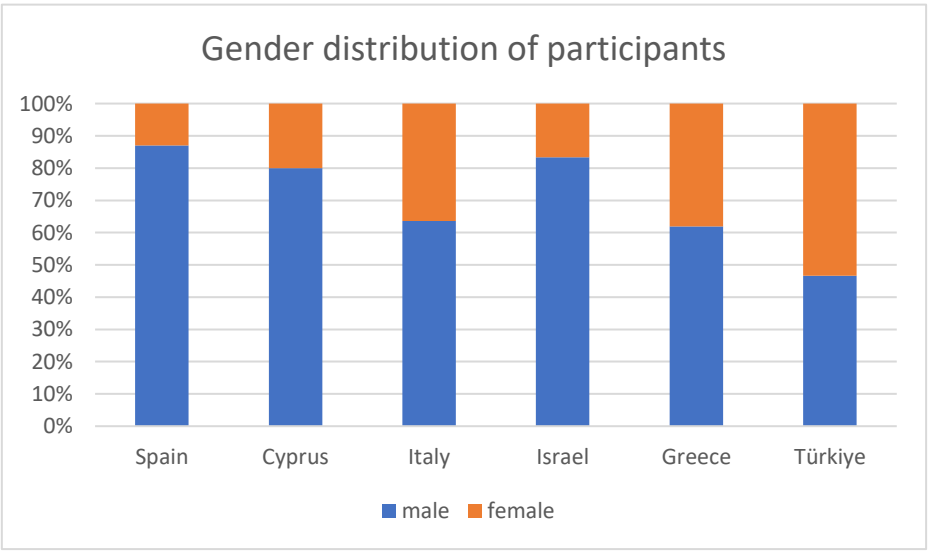
4.1 Implementation details

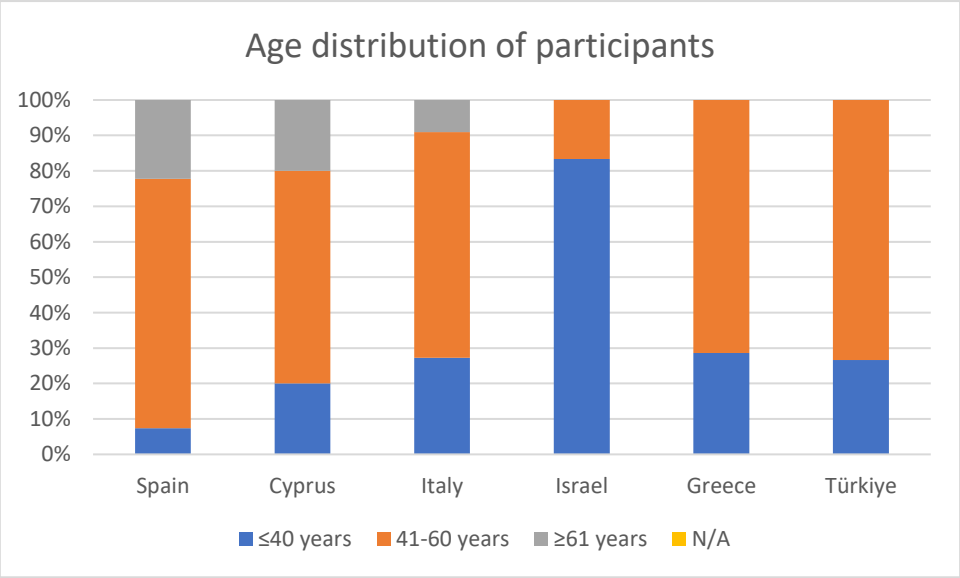
Pilot area	Time	Location	Participants (incl. moderators)	Formats/Deviations
Spain	23-25.07.2024	Region of Valencia, Spain	54	3-day event including several field trips to plantations both rainfed and irrigated and discussion rounds.
Greece	27.09.2024	Archanes, Crete	21	3-hour workshop alongside the RETASTE conference
Cyprus	03.12.2024	Pinolo restaurant, Nicosia, Cyprus	16	half-day workshop alongside the event "Vines Above the Clouds"
Italy	06.12.2024	CIHEAM Bari	11	4-hour workshop
Egypt	27.02.2025	guest house of a local farmer, Fanos Village, Tamia, Al Fayoum	33	-
Israel	Interviews conducted Feb–Mar 2025	online	6 (excl. moderators)	Due to the political instability and respective safety concerns, no workshops could be organised. Instead, online interviews were held to replace the second and third workshop.
Turkey	06.05.2025	UTAEM İzmir, Türkiye	15 (excl. moderators)	3-hour workshop

4.2 Stakeholder characteristics per pilot area

In the following, we present the distribution of participants of the Living Lab workshops in the different pilot areas according to their assigned stakeholder group, age and gender. The participants in each ERLL represented a spectrum of stakeholder groups relevant to the agricultural restoration action in each ERLL, providing a specific mix of practical, institutional, academic, and economic perspectives. To varying extends, individuals from farming, administration and policy, research and education, and business took part in the workshops. With the exception of the workshop in Türkiye the major share of participants was male. The predominate age range of participants was between 41 and 60 years old, with the exception being Israel. Here, due to the ongoing conflict in the region, only a few people could be interviewed, which on average were of a younger age. Information on the stakeholder distribution in the workshop in Egypt were not available at the time the deliverable was published.


Participants according to stakeholder groups
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Spain
Cyprus
Italy
Israel
Greece
Türkiye
Farming
Administration & policy
Research & education
Forestry
Water management
Business
Environmental protection & conservation


Gender distribution of participants
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Spain
Cyprus
Italy
Israel
Greece
Türkiye
male
female



4.3 Overview of results

Bethlehem of Galilee, Israel

Levers to using cover crops in agriculture in Israel transcend sectoral limits. These include a reorientation of agricultural practice towards a greater consideration of soil health and sustainability, as well as adaptation to the challenges of climate change.

However, significant barriers exist across various societal dimensions, hindering the implementation of these changes. Within the agricultural sector, the small size of many holdings and the resulting difficulty of mechanisation are obstacles. The perception that cover crops are labour-intensive and costly, along with farmers' concerns about yield reductions, present further hurdles. Mistrust of the political system and a weak agricultural monitoring system exacerbate these problems. Strong lobbies within conventional farming also impede progress.

Within the community and markets, a lack of consumer awareness regarding the benefits of organically produced food and the strong price-sensitivity of consumers make the marketing of sustainably produced products more challenging. The failure to recognise the value of soil health and restoration benefits also contributes to this issue. Also the loss of the connection of farmers and consumers is seen as a barrier. Here, the positive effects of organic agriculture and re-linking agriculture to society, e.g., through schools and media, is seen as necessary actions.

Challenges also exist at the policy level, with current subsidy schemes primarily promoting productivity rather than sustainability.

Simultaneously, opportunities have been identified that could support the introduction of cover crops. Growing interest in climate-smart agriculture and EU sustainability targets provide a favourable framework. The increase in local markets with a demand for healthy and sustainable food, and rising food prices, create incentives for farmers. Increased environmental awareness and the growing popularity of farm visits can also boost consumer interest. Importantly, existing local infrastructure (schools, social media, etc.) offers channels for communication and community engagement. Furthermore, a growing number of people seek village life for its attractiveness and improved quality of life.

To leverage these opportunities and overcome the barriers, the following actions are recommended:

- **Promoting knowledge transfer:** Establishing farmer education programmes on ecological farming methods through universities and extension services. Conducting awareness campaigns to raise awareness of the benefits of healthy soil (by government and NGOs).
- **Implementing media campaigns and school visits to farms:** Leveraging consumer organisations, the Ministry of Education (MoEd), and local government to increase awareness and understanding of farming practices.
- **Creating awareness of the quality of life in rural areas:** Promoting the benefits of rural communities and fostering a positive image of rural lifestyles.
- **Strengthening market development:** Training retailers in sustainable marketing, promoting fair price and value-based market systems, and supporting direct marketing initiatives (farmers' markets, co-operatives).
- **Adapting subsidy policies:** Reforming subsidies to integrate sustainability goals and introducing performance-based subsidies that reward ecological benefits (by government, universities, NGOs), and establishing an effective agricultural monitoring system, and promoting research into cover crop cultivation in Israel.
- **Supporting smallholders:** Promoting the adaptation of small farmers to new farming methods.

The successful introduction of cover crops in Israel requires a coordinated effort from various stakeholders, from farmers and consumers to policy-makers. Implementing the above measures, informed by sensitive analysis and evaluation to determine appropriate short-, medium-, and long-term steps, can make a significant contribution to maintaining the farming sector as an integral part of the Israeli economy and society while safeguarding the environmental resources upon which it relies.

Canyoles river basin, Spain

Significant changes are required across society, markets, farming practices, and policy to foster a widespread adoption of mulching with chipped pruned branches in Spain. A crucial leverage point is perceived in reshaping the public image of farmers and agriculture. Currently, farmers often face a negative perception and, critically, feel undervalued for the vital service they provide – food production – with consumer demand frequently prioritising low prices instead of acknowledging the true costs of food production. This necessitates a fundamental shift in how farmers are perceived, not only by the public but also within agricultural policy.

Moving forward, policy should increasingly emphasise and provide information on product qualities rather than solely focusing on mass production. There lies a chance in a growing consumer demand for high-quality produce and a willingness to pay a premium for it. Alongside this, the promotion of organic agriculture and the recognition of the invaluable ecosystem services provided by farmers – improved soil fertility, clean water, and preservation of the cultural landscape – are expected to bolster farmer support for practices like mulching that safeguard functioning agroecosystems. The emergence of a new generation of farmers, equipped with greater access to information and a stronger inclination towards sustainable practices, offers a significant opportunity. However, overcoming the frustration of older farmers, accustomed to conventional chemical farming methods, will be vital. Crucially, policy should prioritise financial incentives and support mechanisms to facilitate this transition.

The degradation of rural communities presents a parallel challenge, requiring proactive support for the emergence of new, vibrant rural areas. A promising trend is the growing interest

of younger generations in relocating to the countryside, attracted by its quality of life compared to large cities. Capitalising on this requires strategic infrastructural and community-building projects to re-establish essential structures in rural areas, benefiting from the increasing power of local urban markets as potential economic drivers.

Education is paramount, both for farmers and consumers. Farmers require education on the benefits of soil health, biodiversity, and the effective implementation of practices like organic farming. Simultaneously, consumers need a renewed understanding of the true value of food – its origins, production methods, and impact on the environment. Strengthening local markets and reconnecting farmers with consumers will be key, allowing consumers to learn first-hand about the value of high-quality, regionally-sourced food.

Significant barriers to change include governmental bureaucracy and the challenges farmers face adapting to new practices, particularly regarding pesticide use. The potential for new pests, exacerbated by climate change, could drive an increase in pesticide use, undermining efforts. The affordability of equipment for restoration actions also presents a challenge for small-scale farms, requiring targeted financial support and potentially cooperative purchasing schemes. Policy interventions should specifically address these equity concerns by offering subsidies for restoration projects specifically for smaller farms.

Finally, a central recommendation is that policy should leverage subsidies to directly support ecosystem services and organic agriculture, providing fair and good prices for high-quality products. This holistic approach, valuing farmers as valued members of society and fostering a higher quality of life for them, is essential to achieving lasting and sustainable change. Furthermore, active promotion of the value of soils is crucial.

Heraklion, Greece

On Crete, Greece, afforestation with native trees (especially carob) and silvopastoral agriculture faces immediate challenges stemming from socio-economic obstacles and a lack of specialist knowledge and experience. A significant barrier also lies in limited market access due to a lack of product recognition and promotion, coupled with limited production volume. The immediate major change required is the restoration of soil health and protection from erosion.

To address these, short-term actions focus on developing neighbouring areas and settlements, reducing livestock and agricultural areas to mitigate income loss, and fostering new prospects for agricultural production to retain young people and stem migration. Simultaneously, exploring agritourism and alternative grazing in woodland areas can reduce unemployment and boost agricultural income.

A crucial short-term step involves restoring unused land and introducing new products, highlighting local varieties, and actively pursuing market access.

Looking ahead to the medium-to-long term, significant changes in biodiversity, particularly in flora and fauna, are anticipated, alongside the continuing threat of climate change. A critical long-term barrier is the lack of funding for maintaining infrastructure such as terraces with dry stone walls, and rainwater harvesting systems. To capitalise on opportunities, a management model for mountainous areas incorporating land use plans is vital.

Further long-term actions involve conducting specialist studies for terrace creation, utilising local flora, enriching aquifers through sustainable water collection methods, and creating alternative income sources. Ultimately, success depends on the coordinated efforts of the

private sector, regional and municipal authorities, unions, agricultural cooperatives, and the responsible Ministry in driving policy and action.

Lower Gediz river basin, Türkiye

Tackling salinity and improving agricultural productivity in the lower Gediz basin in Turkey requires an integrated approach with leverage points identified in knowledge sharing, coordinated action, and investment in technology and sustainable practices. A key theme that emerged is the need to move beyond purely technical solutions to include social and economic considerations, with strong farmer involvement and public support.

Progress is currently hindered by a number of significant barriers. The substantial high initial investment costs associated with implementing necessary infrastructure especially for small-scale farmers, such as effective drainage systems and innovative technologies, pose a major obstacle. This is compounded by a widespread lack of knowledge amongst farmers regarding best practices in salinity management and optimal crop rotation techniques. Further complicating matters are existing infrastructure gaps – deficiencies in both technical resources and a skilled workforce – alongside a limited technical expertise in emerging fields like digital agriculture and smart irrigation.

Beyond these tangible hurdles, deeper societal challenges exist, such as a lack of interest in agricultural careers, particularly amongst young people and women. Systemic issues, such as a demonstrable gap of communication and coordination between key agencies like DSI (General Directorate of State Hydraulic Works) and the Ministry of Agriculture, further impede effective action. Finally, concerns surrounding potential water quality risks and the absence of clear regulations governing water reuse present environmental and legal complexities.

However, also several significant opportunities exist to drive positive change. Crucially, increased government support and funding can unlock vital investment in both infrastructure and targeted research. Complementary funding streams can be secured through engagement with EU projects and private sector involvement, leveraging external expertise and financial resources. Equally important is a renewed focus on knowledge sharing, fostering collaboration between farmers, universities, and through comprehensive training programs to disseminate best practices.

Recognising the potential for economic benefit, developing new market opportunities through the branding and marketing of locally sourced, particularly salt-tolerant, agricultural products offers a powerful incentive for sustainable practices. The strategic adoption of technology – integrating digital agriculture, smart irrigation, and renewable energy sources – will enhance efficiency and resource management. Furthermore, accessing climate adaptation funds and establishing robust municipal partnerships will enable the implementation of essential water harvesting and sustainable land management strategies.

To effectively capitalise on these opportunities, focused effort should be directed towards several key leverage points. Prioritising farmer training and knowledge transfer is fundamental, equipping agricultural workers with the skills required for long-term sustainability. Strengthening inter-agency coordination will streamline efforts and ensure a unified approach. Offering strategic financial incentives, such as grants and subsidies, can drive the adoption of integrated salinity control measures. Simultaneously, proactive technology integration – deploying sensors and data-driven monitoring systems – will optimise resource management. Building robust networks for farmer-to-farmer learning and, crucially, actively fostering youth and women's participation through targeted support initiatives, are essential for securing a resilient and sustainable agricultural future for Turkey.

Short-term (next 5 years): Progress will be gradual. Early successes are vital.

- Establish pilot fields to showcase best practices in drainage system design and leaching water application.
- Launch farmer training programmes, focusing on salinity management and effective crop rotation. Facilitate farmer-to-farmer knowledge transfer.
- Provide targeted financial incentives, such as grants and subsidies, for those adopting integrated salinity control.
- Start systematic monitoring of soil salinity and water efficiency in selected plots.
-

Mid-term (10 years): Networks and new technologies will drive the transformation.

- Scale up the most effective practices across the Lower Gediz Basin.
- Strengthen coordination among key local actors—DSİ, agricultural directorates, and municipalities—for integrated salinity and irrigation planning.
- Create networks for farmer-to-farmer demonstration and peer learning.
- Integrate water-saving technologies and renewable energy—like solar-powered sensors—into field operations.

Long-term (20 years): Sustainability will become the new standard

- Transition towards resilient farming systems, with routine salinity monitoring, rotation scheduling, and advanced water management.
- Develop new value chains for salt-tolerant crops and build strong regional branding.
- Reinforce rural economies with sustainable agriculture, innovative technologies, and ecosystem services.
- Improve the ecological health of soils and water bodies, securing long-term productivity and biodiversity.

As next steps the following activities were formulated:

- Set up pilot fields in key saline areas as learning models for broader use.
- Expect local governments and water authorities to update policies in line with real field conditions.
- Use agricultural chambers and cooperatives to spread practical know-how through peer learning and demonstration days.
- Involve universities and research centres in long-term monitoring and impact assessment.
- Regularly revisit and adapt financial planning, especially as costs for materials and energy shift over time.

Stornara and Tara, Italy

The path towards organic farming in the Stornara and Tara region in South Italy faces several hurdles. Initially, a notable barrier is low digital literacy among farmers, coupled with an inability and sometimes incorrect use of modern technologies. This is compounded by a lack of qualified personnel – technicians and workers – and limited market access for certain products. Financial constraints are also prevalent, manifesting as high initial investment costs for sustainable practices, a lack of guarantees for young farmers seeking funds, and limited financial resources for rural tourism development. Political obstacles exist as well, including a potential lack of political will to increase transparency and reduce bureaucracy. At the same

time there is a need for greater environmental awareness within the political class. Furthermore, there is a barrier of limited participation from young farmers due to time constraints. Despite advancements, there is a potential for job displacement in the long run due to reduced labour needs from technological advancements within organic farming.

However, opportunities exist to overcome these challenges, and significant benefits accompany a shift towards organic farming. There is growing awareness of the need for technical assistance, a potential for crop orientation towards local conditions and market demands, and the easy accessibility of innovative AI technologies. Rural tourism presents opportunities to valorise organic farming through networks and highlight natural attractions, potentially unlocking financing for improvements. Organic farming specifically safeguards biodiversity, crucially enhancing soil properties and fostering healthier ecosystems, contributing to environmental sustainability by reducing reliance on chemical fertilisers and minimising soil erosion. This strengthens ecosystem resilience to climate change and ensures long-term soil fertility and agricultural viability. Importantly, integrating sustainability principles into organisational goals and operations will allow alignment with broader environmental and societal objectives, embedding environmental considerations into programme planning. Financially, organic farming can reduce labour and input costs through natural techniques, diminishing the need for intensive labour and expensive chemical inputs. This aligns with a circular economy approach, minimising waste and maximising resource use through regeneration of natural systems.

Short-term (next 5 years):

- Strengthening extension services with modern approaches, allocating funds for technical assistance, and providing access to affordable technology and training courses.
- Communication channels should be expanded – utilising social networks and involving funding entities, schools, and universities – to reach young farmers and disseminate information on rural tourism potential.
- Implementing transparent policy-making and empowering local agricultural leaders are also crucial first steps.
- Addressing the shorter shelf life of organic products necessitates faster distribution networks and careful handling, demanding attention to logistics and packaging.

Mid-to-long-term actions (10 -20 years)

- Modifying agricultural practices to improve quality and adopting sustainable farming techniques like crop rotation and intercropping.
- Precision agriculture, integrating technology and data-driven decision-making, should be prioritised to enhance soil quality, environmental health, and resource management.
- Investment in infrastructure and accessibility is needed to support rural tourism, alongside promoting local culture and traditions.
- While recognising the higher production costs of organic farming and the potential for increased consumer prices, the long-term benefits of improved soil health, reduced input costs, and ecosystem resilience justify the investment.
- Continuous training for operators, technicians, agricultural managers, and the political class will be key to fostering a future-ready, sustainable, and participatory agricultural landscape. A key focus should be on mitigating potential job losses through retraining and identifying new opportunities within the evolving organic agriculture sector.

Tamia, Egypt

The shift toward on-farm composting from crop waste in the Tamia region in Egypt begins in a setting marked by both structural and practical challenges. Farmers currently face high initial costs for shredding equipment and increased labour demands, while bureaucratic hurdles and complex subsidy procedures deter many from adopting the practice. The absence of a simple compost-quality verification system adds uncertainty, and existing agricultural policy frameworks still privilege conventional methods without providing transitional subsidies or incentives for circular practices. Moreover, the lack of locally applied research and limited public awareness mean that the restoration action remains peripheral rather than central to mainstream farming approaches.

Despite these constraints, considerable opportunities exist. Ample evidence already shows that composting enhances soil fertility, boosts water retention, and saves money in the medium term. Government ministries are beginning to recognise the promise of circular agriculture, creating a political opportunity for new programmes. Young farmers are proving to be strong advocates, viewing composting as a smart and profitable innovation. Meanwhile, consumer interest in sustainable and healthy food is steadily growing, and niche markets for "compost-grown" produce are emerging, connecting farmers more closely with conscious urban buyers. Consequently, potential for collaboration between ministries, research institutions, NGOs and farmers' cooperatives exist that can potentially facilitate the adoption of on-farm composting.

Achieving this transition requires a number of major systemic changes. Bureaucratic processes must be simplified so that farmers can access financial support without excessive paperwork. Transparent compost-quality standards and a reliable certification scheme are essential to build both producer and consumer confidence. Policymakers must integrate circular agriculture into the national agricultural strategy, providing subsidies, tax incentives and carbon credit opportunities for composting practices.

In parallel, investment in education and communication is needed to bridge the knowledge gap and link scientific insight to practical farming realities. For farmers, accessible, tangible and practical training opportunities and resources are crucial. In the short term, progress will depend on visible demonstration and practical engagement. Establishing pilot farms and offering hands-on training can provide tangible examples of composting's benefits. Simple, picture-based guidance materials can make the practice accessible to all literacy levels. Farmers' unions and cooperatives can lead the way by organising shared machinery schemes, allowing multiple farmers to access shredders and reduce costs. At policy level, a national dialogue on circular agriculture should begin, with ministries working to integrate composting into pilot subsidy programmes and to develop targeted grants or tax relief for shredder purchases. Communication campaigns through schools, grocery retailers and local media should highlight the links between compost use, food quality and environmental health, thereby fostering consumer demand for sustainably produced food.

In the medium to long term, the goal is for on-farm composting to become the norm—profitable, routine, and fully supported by policy and society. Affordable shredders, cooperative ownership models and accessible support networks will underpin the practice. Circular agriculture will have become a recognised cornerstone of national farm policy, with subsidies and legal frameworks rewarding compost use and carbon sequestration. Research and higher education institutions will act as the country's knowledge hub for sustainable farming, ensuring that composting is integrated into agricultural curricula and extension training. By

then, markets will have evolved: “compost-grown” products will carry trusted certification labels, and Egyptian consumers will take pride in supporting soil-restoring farmers.

Policy-relevant aspects form a continuous thread through this transformation. Early advocacy for simpler subsidy processes and shredder grants should mature into institutionalised policy backing for circular agriculture. International initiatives—such as the EU Green Deal and carbon farming schemes—could provide crucial funding and legitimacy. Over time, government recognition of soil restoration as a measurable ecosystem service will align national agricultural policy with global sustainability goals.

Stakeholder feedback underscores the need for practical, local evidence and hands-on support. Farmers wish to see clear demonstrations that composting improves soil and reduces costs before investing heavily. They call for grants or shared machinery to ease the burden of shredder purchases, for experiential training and demonstration farms, and for clear, visual instructions instead of overly technical manuals. They also seek stronger peer networks to share knowledge, form cooperatives, and simplify access to grants and subsidies. Crucially, they request assistance in connecting to reliable markets and consumers who recognise the added value of compost-based production through dedicated labelling and marketing.

In reflection, the journey towards widespread compost-based farming in the Tamia region is both social and institutional in nature. Success will depend on the interplay of evidence, trust and collaboration. The most important elements are therefore practical demonstration, easier access to financial and technical support, strong cooperative structures, well-informed communities, and consistent policy frameworks that reward sustainable behaviour. When aligned, these elements will create a self-reinforcing system in which circular agriculture becomes not a niche alternative but the resilient foundation of Egypt’s farming future.

Troodos Mountains, Cyprus

The workshop identified key changes necessary for implementing effective terrace systems in the Troodos mountains in Cyprus, combining modern construction techniques with traditional knowledge. This is expected to strengthen rural economies through a mix of agriculture and its benefits for tourism and local products, whilst mitigating climate change impacts and enhancing biodiversity.

However, significant barriers exist which impede progress. High implementation and maintenance costs, particularly for small-scale farmers, represent a major challenge. Limited technical expertise and a lack of training for designing and constructing hydrologically sound terraces are also notable obstacles. The shortage of workforce experienced in terrace building further complicates matters, alongside insufficient financial support for large-scale terrace restoration. Concerns regarding potential environmental impacts, such as soil compaction and erosion due to poor design, must also be addressed. Finally, limited awareness of modern terrace systems and their benefits among stakeholders hinders uptake.

Despite these challenges, a range of opportunities exist. The potential for agrotourism due to the improved landscape aesthetics offers a viable economic pathway. Opportunities exist to modernise agricultural practices and promote local branding of high-value products, particularly wine. Collaboration with research institutions, through the establishment of Living Labs and pilot farms fosters innovation.

Since mechanised terracing is a technology in development, important levers are policies and funding mechanisms, capacity building and ongoing research such as demonstration sites and guideline development, and the development of financial incentives. While government and

policymakers should provide financial incentives and establish guidelines for sustainable design as well as systematic monitoring, researchers and technical experts can conduct field demonstrations and evaluate the socio-economic and environmental impacts. For farmers, training and capacity-building programmes are required. NGOs and small specialised agrobusinesses can facilitate collaboration and raise awareness, while the private sector should be incentivised to invest in mountain farming and necessary equipment.

To capitalise on these opportunities and overcome the barriers, the following technical, economic as well as education and policy-related actions are recommended, structured across short-, medium-, and long-term timeframes:

Short-Term (5 years):

- Development of training programmes focused on terracing and landscape planning.
- Introduction of more targeted subsidies and grants for terrace farming and for small-scale farmers.
- Implementation of pilot sites showcasing best practices in modern/mechanised terraces.

Medium-Term (10 years):

- Wider adoption of new terracing approaches across the Troodos region, supported by (public-private) financial and technical interventions.
- Increased integration of agrotourism activities linked to improved terraced landscapes.
- Establishment of supply chains for high-quality agricultural products from terraced mountain farms.

Long-Term (20 years):

- Transition to sustainable terrace systems, combining modern designs with traditional knowledge.
- Establishment of resilient agricultural ecosystems that mitigate climate change impacts and enhance biodiversity.
- Strengthened rural economies driven by a blend of agriculture, tourism, and local branding initiatives.

Implementing the above measures, informed by sensitive analysis and evaluation to determine appropriate short-, medium-, and long-term steps, can make a significant contribution to establishing farming on terraces as an integral part of the Troodos mountains economy and society while safeguarding its unique character. This includes reducing soil erosion and improving water retention, contributing to sustainable land management, and increasing productivity and resilience in mountain agriculture.

4.4 Comparison of results

These seven case studies – Spain (mulching with chipped pruned branches), Cyprus (terracing), Israel (cover crops), Türkiye (salinity management), Italy (organic farming), Greece (afforestation/silvopastoral management) and Egypt (compositing of crop residue) – demonstrate a recurring pattern: successful ecological restoration is not merely a technical fix, but a complex socio-ecological transition requiring integrated approaches.

Specifically in Spain and Israel, the image of farming and its value to society and government depict many similarities. In contrast, in Cyprus, Türkiye and Egypt, the creation of capacities (through funding, knowledge, networks) are major changes needed in the short- and mid-term, future. In Cyprus, the challenges are more technical and applied, focussing on the development of a knowledge and education system including guidelines, assessments of best practices and training. Similarly in Turkey and Egypt, participants emphasised the need for solid evidence, knowledge and information sharing, demonstration sites, the development of guidelines and monitoring schemes, as well as hands-on training opportunities for farmers

The image of farming and the quality of produce and (un)willingness of consumers to pay surfaces across all pilot areas. The key pressure towards efficiency and cost reduction are salient across cases. This stands in stark contrast to the acknowledged need for agroecological measures and the idea of a farmer as a steward of the land. Here, the approaches differ, ranging from a focus on value added products such as wines (Cyprus) and orientation to crops that are adapted to local climatic conditions and market opportunities (Italy) to the conviction that consumers and farmers need to be reconnected (Türkiye) and consumers need to be made aware of the true costs and value of food and the value of supporting an agriculture that provides multiple ecosystem services and maintains the cultural landscape (Spain, Israel).

While the specific interventions differ and distinct contextual challenges, opportunities and actions are identified for each, underlying similarities emerge.

Despite the fact that a large share of the agricultural produce goes into export, in all cases the embeddedness of the local farming community into its unique context of traditions, societal ties and political and economic requirement is salient.

A striking similarity across all cases is the multifaceted nature of barriers. They rarely reside solely within the agricultural sector. Economic factors – high investment costs, low profitability, limited access to finance (particularly for smallholders), limited product recognition, and market failures – are pervasive. Across cases, concerns regarding the equity of modernisation of agriculture become salient. Mechanisation and technological advancements are perceived less accessible to smallholders as the investments do not stand in proportion to the farm sizes (Spain, Cyprus, Israel, Türkiye).

Furthermore, policy and institutional barriers are ubiquitous. Spain, Israel, and Italy emphasise subsidy structures that incentivise unsustainable practices (prioritising high yield over ecological health). Bureaucracy (Spain, Italy, Egypt), lack of coordination between agencies (Türkiye) and a lack of political will (Italy) hinder progress. A common thread is the need to reform policy frameworks to prioritise ecosystem services and long-term sustainability.

Social and cultural barriers also recur. All studies acknowledge a knowledge gap – both among farmers and consumers. Spain and Israel highlight a lack of appreciation for the true cost of food production and the value of ecological services. Türkiye and Italy express concern about declining interest in agriculture amongst younger generations. The entrenched practices of older farmers (Spain) and a lack of digital literacy (Italy) create resistance to change.

However, alongside these barriers, several opportunities consistently appear. Growing consumer demand for high-quality, sustainably produced food (Spain, Israel, Italy, Egypt) offers a market incentive for change. The potential for diversification into agrotourism (Cyprus, Italy, Greece) provides alternative income streams and enhances the value of restored landscapes. Technological advancements – digital agriculture, precision farming, AI (Italy,

Türkiye) – offer tools for increased efficiency and monitoring. The importance of local knowledge and the integration of traditional practices with modern techniques (Cyprus, Greece, Egypt) is also recognised.

4.5 Reflections and conclusions

A notable difference in the resolution and specificity of outcomes was observed across the pilot areas. While some workshops remained at a more general level, focusing on societal, political, and market-driven factors alongside broad action points, others delved into highly detailed solutions that can be taken step-for-step.

In some pilot areas, participants demonstrated a strong desire to drive tangible change, and the research team actively engaged in defining practical steps for advancing the discussion. This varying degree of proactive involvement appeared, among other things, contingent upon differing focus regarding the required major changes identified in the backcasting. Pilot areas where participants identified concrete obstacles within the realm of practical implementation were able to generate very specific solutions, whereas those viewing the problem as rooted in broader political or market forces focused on more systemic changes. This highlights a fundamental crux of projects dealing with complex, interwoven sustainability challenges – the need to find tangible, actionable entry points while simultaneously staying aware of more systemic root causes, rather than omitting them. In the long term, resolving these dominant systemic challenges within the complex systems in which food producers are unavoidably embedded necessitates opportunities to stay aware of these challenges while combining sectors and disciplines, developing solutions that eventually transcend traditional siloes and offer opportunities for transformational change.

In a number of backcasting pathways participants – and researchers – did commit to specific actions to progress their collaboratively developed agenda. This highlights that in order to ground the discussion in practical reality and avoid it becoming merely a theoretical exercise, participants (including researchers) should be encouraged to consider their individual contributions and what steps they can take to advance the shared agenda.

Furthermore, engagement with the chosen methodology, and the parameters within which it was applied – specifically time constraints and clarity of the process – proved decisive. The diverse contexts across the pilot areas necessitated varying degrees of preliminary engagement to facilitate a collaborative development of detailed solutions. Researchers also adopted different approaches – some maintaining a purely external, moderating role, others actively contributing their own perspectives and proposed solutions – and participants responded accordingly, ranging from more abstract engagement to deeply personal input and concrete suggestions.

This experience underscores the value of these workshops not merely as problem-solving exercises, but as learning environments. The process of exchange and participation proved pivotal in both advancing the thematic content and fostering shifts in perspectives and understandings amongst all those involved. This is visible in the evolution of the visions from one workshop to the next, as well as in the differing resolutions of the backcasting pathways, demonstrating that even with a consistent methodology, successful engagement hinges on acknowledging and adapting to the unique characteristics of each local context and the varying roles individuals adopt within the collaborative process. Here, an iterative process, that refreshes the participants minds by re-visiting the former discussion points and inviting them to add their thoughts that might have evolved in the time between workshops is

recommended. However, this comes with the cost of additional time requirements and needs to be balanced with the available capacities of both participants and researchers.

Concerning the documentation and consecutive analysis of the results, a more detailed textual description of the backcasting pathways, outlining the perceived causal relationships between elements (i.e., major changes, barriers, opportunities, and activities), would have aided interpretation. This was intuitively provided by some scientific partners and significantly facilitated understanding of the results. Consequently, we recommend that in future backcasting scenarios, such a written description of the underlying logical relationships be mandatory.

It also became apparent that applying, facilitating, documenting, and moderating this method simultaneously presents considerable challenges. Maintaining focus on the exercise's structure and purpose while actively moderating and taking notes can overstretch capacities. This was evident in pathways where the logical structure of major required change, barrier, opportunity, and action was not consistently maintained. A key resolution is to distribute the various activities – moderating, note-taking, and active researcher engagement – amongst different individuals. Attempting to fulfil three roles simultaneously is not feasible. Secondly, this exercise clearly benefits from practice in both creative future-thinking and the skills necessary to facilitate this process in others. We conclude that only through patience, ongoing capacity building, and dedicated practice can such methods become more widely applicable and truly realise their potential.

These methodical reflections highlight opportunities to refine both the method and its application – including the resources allocated to its preparation and implementation – to foster a more effective, concrete, and action-oriented engagement from everyone involved.

Part B: Full documentation of results

1 Bethlehem of Galilee, Israel

Due to the war in Gaza starting in October 2024, the interactions in the ERLL were halted and transformed to bilateral or online formats. Hence, the following results represent the outcomes of a series of interviews that Anna Brook and Ghadir Zbedat of University of Haifa conducted between February and March 2025.

1.1 Preparing the discussion: Social justice enquiry

Restoration practice: Nave Ya'ar research centre: cover crops

Main actor groups / Costs and benefits	Implementing farmer/land owner	Other farmers	General public	Government (support)
On-site benefits/costs				
Environmental benefits	Improvements in soil quality indicators like organic matter, biodiversity, and water content. However, farm operations didn't fundamentally change.	Appreciate reduced pesticide/herbicide use. Less interested in challenges or lower yields.	Support the idea of healthier food and reduced pollution.	Support environmental goals like erosion control and sustainability.
Social benefits	Less pesticide spraying; farmers feel more connected to nature and practices.	Appreciate better work conditions, especially with safer chemical handling.	Indirect benefit through cleaner environment and healthier produce.	See value in supporting worker rights and improving job conditions.
Financial benefits	New practices are more expensive and harder to implement. Lower profit due to smaller yields.	Recognize that subsidies could support this shift if available.	Unaware of the cost-benefit structure.	View it as a long-term investment in better practices and reduced externalities.
Neg. environmental effects	None observed directly, though concerns exist about increased	Concern about new pest dynamics or competition.	Unaware.	No significant concerns noted.

	biological activity (e.g., fungi, insects).			
Negative social effects	More manual labor required than before. What was once a simple tractor job now demands more steps and hands-on work. Labor availability is inconsistent and expensive.	Lower-class laborers (e.g., immigrants) may lose jobs with mechanization or seasonal changes.	Unaware.	Potential reduction in seasonal or unskilled labor demand.
Financial costs	Higher operational costs; lower profits. Farmers feel penalized for sustainability.	Aware that adoption costs are high and risky, especially for smallholders.	Unaware.	View higher short-term costs as acceptable if long-term benefits are achieved.
Off-site benefits/costs				
Environmental benefits	Major reduction in pesticide/herbicide use (up to 50%). Soil health improves. Water quality may benefit.	Mixed views—see some regional improvement, others unsure.	Appreciate greener surroundings, healthier landscape, and clean water.	Recognize ecosystem service improvements and support green policy objectives.

Social benefits	Noted that cleaner fields and greener environments improve aesthetics and attract community interest.	Manual labor reduced for hard jobs like pesticide application.	Value more livable and scenic landscapes.	Highlight potential for improved rural wellbeing and reduced public health risks.
Financial benefits	Indirect stimulation of eco-friendly equipment and practices.	Some investment in new machinery/services may boost local economy.	Unaware.	Consider this a smart long-term investment and part of green growth strategies.
Neg. environmental effects	Concerning about pests thriving in no-spray zones; also harder to irrigate some plots.	Worry about wild animals, increased fungi, etc.	Unaware.	No major negative seen; believe risks can be managed.
Negative social effects	Loss of low-skill seasonal labor, often filled by immigrant workers.	Less work available for unskilled laborers.	Unaware.	Concern over rising unemployment among migrant laborers or vulnerable groups.

Financial costs	Increased cost of adopting new machinery and soil-friendly technologies.	More expensive for smallholders or marginal farms.	Unaware.	Higher costs now, but offset by expected long-term gains.

1.2 Finding common ground: Revisiting the vision

Duration: 1.5 hours for each group interview.

1.5 hours for each group for the visioning exercise (divided into two groups)- explained in 3.

Participants: 6

The vision exercise included 2 individual Zoom interviews with stakeholders from different sectors (farmers, researchers, policy-makers). Divided in a way to have similar thoughts. Each person shared their personal vision and discussed that together. Afterwards, a group synthesis session was held where participants reviewed and commented on a summary of all visions. The final group vision reflects shared elements from both interviews.

Steps explained: R4M explanation, the ERLL in Israel and the restoration actions, introduction of the different participants in the meeting (interview), discussion about the aim of restoration, divided into two groups and did the vision narrative explanation, vision exercise

Inspiring narrative: Walk through the future introduction

" Imagine walking through a vibrant agricultural landscape in 2044. The air is fresh, the soil is dark and rich with organic matter. Farmers—young and old, men and women—work fields using machines that chip and mulch branches back into the soil. Instead of smoke from burning, there's life returning to the land. Local markets are thriving, full of fresh, chemical-free produce. Schools teach about sustainable farming, and consumers buy directly from farmers they know... When you think about life in 2044, how would you like it to be? Focus on the categories when envisioning."

Answers:

- In 2044, agriculture in Israel is primarily organic and rooted in sustainable practices. The use of synthetic chemicals and pesticides has been drastically reduced, replaced by nature-based approaches that restore soil health and biodiversity. Farms rely more on the natural capacity of the land to sustain itself, with composting, cover crops and crop rotations as standard practices. Higher salaries due to increasing prices and quality food production and Inflation in Israel.
- Researchers envision a system where science supports this transformation—developing and sharing innovative techniques through field experiments, pilot programs, and collaborative platforms with farmers. Education institutions are integrated into the process, training the next generation of agroecologists and providing hands-on learning opportunities.
- Policymakers support this shift with well-structured subsidies for sustainable agriculture, simplified bureaucracy, and long-term strategies for food security and land preservation. They ensure farmers are incentivized not just for yield, but for ecological value.
- Farmers describe a future where their work is more in harmony with nature. They feel empowered through knowledge, community support, and fair market access. They farm with fewer inputs and more resilience, trusting that their land, managed well, can remain productive and healthy over time.
- Consumer groups and NGOs contribute by raising awareness, helping bridge the urban and farming life.

- Together, these visions reflect a shared aspiration for an agricultural future that is self-sustaining, low-impact, and deeply integrated with both scientific progress and community wellbeing.
- Participants expanded their vision around shifting to organic, low-input farming that relies more on the land's natural ability to sustain itself. Farmers called for fewer chemicals and better support to adopt sustainable practices and they say that the bureaucracy may be less complex than now. Researchers emphasized closer collaboration with farmers through field trials and education. Policymakers highlighted the need for simplified bureaucracy and incentives for sustainability and subsidies will support sustainability. Across all the participants, there was a shared vision of healthy soils, restored ecosystems, and a more resilient, nature-based farming system.

Once all categories are covered, the interviewer asks whether anything needs to be added.

Answer:

No comment.

Group vision

In order to create a group result, a summary of the vision of the previous interviewees was presented after the individual envisioning. The summary contained those aspects that were similarly mentioned in all the individual visions. The summary vision is presented to the interviewee.

- "What do you feel when reading this vision? Which aspects to you agree with? Which aspects do you disagree with?"
- Participants felt aligned with the overall direction of the vision. They appreciated the emphasis on sustainability, mechanization, improved soil health, and closer collaboration between research and practice. However, there were concerns about whether all farmers could adopt such practices—especially in smaller plots or conventional systems. While most agreed with promoting organic and smart farming, some stressed the need for balance: maintaining productivity while transitioning to more sustainable methods. There was agreement that public perception of agriculture must improve, and this vision supports that goal.
- The answers are incorporated in the vision summary

1.3 Identifying pathways to out- and upscaling: Backcasting

Similar to the interviews on visioning, the identified actions and milestones were developed individually and later added to a common summary.

Duration: 1.5 hours.

Participants: 6.

Steps: Introduction to backcasting → Presentation of 2044 vision → Division into two topical groups (Outscaling, Upscaling) → Individual brainstorming (actions, barriers, milestones) → Group discussion and summarizing answers → Fill backcasting table templates → Summarize group results → Reflection and final feedback.

	Short-term (5 years)				Mid-term to long-term (10-20 years)				Vision
	Major change	**Barriers**	**Opportunities**	**Actions (actors)**	**Major change**	**Barriers**	**Opportunities**	**Actions (actors)**	**Elements achieved**
RESTORATION ACTION	Gradual adoption of the restoration actions.	- Transition from traditional pesticide use - Perception that new practices are labor-intensive - Small plots hard to manage with machinery	Mechanization - Subsidies - Soil improvement - Adoption of chipped pruned branches	- A lot of work to get this succeed. - Awareness campaigns for soil benefits (Gov, NGOs)	- Start to see the plants recover because of the change of the actions. - Widespread implementation of restoration strategies in agriculture	If we don't manage to get the same amount of crops, this is a problem because people want to make as much money as possible in the long term because of financial inflation	- Organic farming growth - New crop types adapted to climate - Broader farmer acceptance	- Promote farmer education on organic practices (Univ, Extension services) - Support for smallholder adaptation	-Better soil. -We c extend c planting by few mo years to see very significant advantage.
LOCAL COMMUNITY	More hassle, more manpower because it's a new farming method	The price of the produce will be higher because less crop will be grown per unit area. However, the produce will be healthier and of	- Attract young/new farmers - Build awareness of rural lifestyles. - Nice place with green cover.	The local community don't interfere – they accept it because the Nave Ya'ar research center is in an agricultural place, but in other	More hassle, more manpower because it's a new farming method	- Weak connection between urban newcomers and rural systems	It will be nicer place for the community to see around. But in general the local community don't interfance.	- Integrate agriculture into local identity (e.g, schools, Media).	To preser an agricultu environment where cro are grov profitably, efficiently, a sustainably- without compromisi the health nearby residents—it essential carefully

		better quality.		places people are causing problems.					manage t proximity fields homes. Ma people se village livi for greenery, tranquility, and enhanc quality of li which al adds aesthetic value. Maintaining this balan ensures bett food production while safeguardin the well-bei of t community.
MARKETS	- Emerging local markets for healthier, sustainable food. -Price increase due to	Lack of consumer knowledge of the production of organic food.	Local market demand.	Farmer's markets, co-ops (Local orgs)	Fair pricing and value-based market systems	- Unstable prices for sustainable produce - Weak value recognition for restoration benefits	- Public demand for healthy, ethical food - Fair trade initiatives	- Train retailers in sustainability marketing	

	agroindustry less production.								
LOCAL ENVIRONMENT	Visible soil and biodiversity improvements in pilot plots	- Soil degradation	No comment.	Highlight positive biodiversity impacts	Landscapes restored and promoted as community/environmental assets	- Desertification - Climate stressors	Climate-resilient practices adopted	Protect agricultural land	

Group Upscaling: policy makers, education, NGOs and consumer groups, scientists

	Short-term (5 years)				Mid-term to long-term (10-20 years)				Short-term (5 years)
	Major change	**Barriers**	**Opportunities**	**Actions (actors)**	**Major change**	**Barriers**	**Opportunities**	**Actions (actors)**	**Elements achieved**
(AGRICULTURAL) POLICY	Subsidies support sustainability goals, not just yield	Farmers mistrust of policy system	Growing interest in climate-smart agriculture	Reform subsidy criteria to include restoration goals	A performance-based policy system rewards eco-benefits	Weak monitoring systems; resistance from conventional farming lobbies	Integration with EU sustainability targets	Establish a monitoring system for eco-benefits (Gov, NGOs, Universities)	Subsidies linked to sustainability; policy shift in priorities- as result of this new technique implemented.
EDUCATION AND RESEARCH	More collaboration between researchers and farmers	Lack of practical knowledge among farmers or students in	Universities eager to engage with real-world applications	Field schools and living labs (Universities, MoEd,	Research informs large-scale implementation	Research not widely disseminated to the public or farmers	Growing interest in climate-smart training	Develop accessible knowledge platforms and integrate research into	Living labs; applied research networks with farmers

		universities as it's new technique in farming.		Extension Services)				vocational education (NGOs, Research Institutes)	
RELATION BETWEEN SOCIETY AND AGRICULTURE	Public campaigns in markets raise awareness on organic local food and sustainability	Disconnection between consumers and producers; urban-rural divide	Social media, farmer markets, school programs	Media campaigns and school visits to farms (Consumer orgs, MoEd, local gov)	Consumer focus more on price rather the organic and high quality production.	More people care about the environment and how their food is produced; visiting farms is becoming more popular.			Increased trust and respect for farming professions
OPTIONAL: ECONOMY	Increasing price due to high quality producers.				Increasing price due to high quality producers.				
OPTIONAL: ENVIRONMENT									

2 Cànyoles river basin, Spain

2.1 Preparing the discussion: Social justice enquiry

Describe and explain the overall process and context of this exercise:

- How were groups formed?

The groups were formed based on the town or region origin of the participants. As we had members from different districts, we distributed the participants with members from different municipalities. Once we had some activities via different districts distribution (La Costera, La Safor, La Vall d'Albaida, La Ribera, and others such as La Marina, La Canal de Navarrés, Vall d'Aiora o L'Horta) we distributed too based on the crops they produce: citrus, vine, olive, fruits and vegetables, plus the politicians.

- How many people were in each group?

The groups were of 6, and we formed 5 to 6 groups (30 participants)

- What were the steps you took to structure the exercise?

We introduced the Soil Erosion and Degradation Research Group, the University of Valencia and the REACT4MED project via some slides and the description of the project by Artemi Cerdà. Artemi Cerdà introduced himself and Enric Terol, Ana Pérez, Antonio Giménez and Saskia Keesstra. Artemi Cerdà prepared the audience to the task they were called for. We used the excursion of the first day and some pictures to show the audience the topics we were researching.

Artemi Cerdà requested one by one to tell the audience which is their vision upon the previous explanations. Then, first round of introduction by each one with key references to the name, organization, background, position in their organization, type of farmer (partial-time, full-time, organic, chemical…….). Along the three days 7 woman and 45 man participated in the activities organized by SEDER (Soil Erosion and Degradation Research Group) for REACT4MED. The scientists involved in this meeting where 7, with 30 farmers, 2 NGO representants, 6 citizens, 2 farmers union representants, 2 government (local and regional) representants, 3 politicians, 1 manager of agronomic industry.

Artemi Cerdà, as coordinator of the meeting and moderator invites the participants to refresh their mind (their own life in agriculture and the visit to the fields the day before) and ask the participants what they have in mind when thinking about visions. Each one of them inform about what is their vision (12 mention organic farming, 10 highly mechanized agriculture, 13 abandonment of the land, 5 new buildings and soil sealing; 4 a high technological agriculture in green houses; 1 no agriculture in the near future)

The moderator starts the introductory round by giving an example of what is expected by the participants (to inform us about their view and opinion and perception of the agriculture now and in the future). Each one inform about his/her name and organizations and inform us about what they think about restoration action: 23 indicate is something that will bring our fields to the previous situations, 22 mention that is an strategy to improve the production, 5 mention that is a way to improve our life and 3 did not reply (no answer).

The main outcome of this exercise is that most of the participants think in a future, which is an improvement from the previous meeting, when most of them did not talk about the future,

and mainly focus on the past and the present and with the difficulties they had in the past to survive. Now they are capable to talk about the future and this is a huge improvement and the task of REACT4MED along the last 6 months to exchange information with the farmers and make them to think about the future. Now most of the participants see the future as highly technified mainly due to the prices and lack of workers, and also they open the door to organic farming.

Results of the exercise

(1) See below the table for costs and benefits of the restoration action and how these costs and benefits are distributed across.

(2) reflection on how benefits/ costs are distributed across actor groups and what effect this has on the community. -> Minutes of the reflection on the effect of the distribution of benefits and costs on society/community as whole

(1) Template for the social justice enquiry for each group:

Indicate selected baseline:

Please fill it in for each group

Main ac	Implementing farmer/land owner	Other farmers	General public	Government (support)

Interview to replace visioning exercise (duration: approx. 1 ½ hours per interview)

Approach: Individual interviews with stakeholders of different stakeholder groups, ages and genders. The interviews should be recorded and transcribed (clean verbatim).

Possibility 1: the individual visioning is only processed with the first interviewee. The following interviewees only comment on the summary of the first interviewee. Aspects are added or deleted, depending on the comments of the interviews.

Possibility 2: Every interviewee creates their own detailed vision and comments on the summary of the previous visons.

The results you provide are very interesting! However, we need to better understand the process of what you did. Since we are also comparing the process in the different ERLLs, we need more detailed information on how you got to these information. Thus, can you please describe more thoroughly

1. how many individual interviews did you have? From previous emails I understand you planned to do different interviews, this document looks like you had a group meeting online. Thus, please highlight which information comes from individual interviews and which comes from a group meeting and explain the formats you used (interview / group meeting) accordingly.

2. If you did both individual interviews and the group meeting, please provide a timeline/sequence, what happened when and how the information are interconnected/built upon each other here:

3. Please react to the comments below.

Structure:

tor groups Costs and benefits				
On-site benefits/costs				
Environmental benefits	Soil improvement. More biota. More water infiltrated. Act as a mulch. Bring the fields to behave as a forest.	Improve organic matter in the soil and reduce the high and low temperatures in the soil,	They do not know the effect	Improve the quality of the soil and biodiversity
Social benefits	The tasks are mechanized, easier than burnt the branches	Better quality of jobs, higher salaries as the chipping machines request from a more	They do not see any impact	Improve the rights of the workers and permanent jobs

		specialized worker.		
Financial benefits	There are subsidies that cover the expenses. No necessary labour.	The subsidies are relevant.	They do not know	At long term is more beneficial due to the long-term investment in machinery and reduction in labor costs
Neg. environmental effects	There is a lot of "dirt" as burning make the soil clean, and the plot tidy.	We see more pests	They do not know	No one
Negative social effects	Reduction of labour, less people will be	Immigrants will not have jobs when chipped pruned	They do not know	No one

	contracted.	branches are applied as they are the lower class of workers (they use their hands)		
Financial costs	It is more expensive in small fields	The increase in cost of benzine, machinery, reparations….	They do not know	It is more expensive at short time
Off-site benefits/costs				
Environmental benefits	Better regulation of the hydrological cycle, clean water in the rivers	We do not see any environmental benefit	They do not know	Improve the health of the ecosystems and agriculture land move to be managed as a forest

Social benefits	Improve the quality of the jobs as they are more qualified	The difficult works of burning branches is gone.	They do not know	Less workers but higher quality of jobs
Financial benefits	We power the industry that develops the machinery and the trade	More investment in machinery, which support other sectors	They do not know	At long term is a clever investment
Neg. environmental effects	Fungi and pests. Difficult to irrigate with flood irrigation	The arrival of wild board as a pest thanks to the chipped pruned branches and the improve in the soil biology	They do not know	No one

Negative social effects	Less workers are needed. Lower class of workers (no qualified) are not anymore necessary	Less jobs for the lower-class farmers. Immigrants.	They do not know	Reduction of the labour, and more unemployment in the immigrant's sector
Financial costs	It is more expensive	It is more expansive in small plots	They do not know	More expensive at short time.

(2) Minutes from discussion of the effect of the distribution of benefits and costs on society/community for each group:

The farmers agree that is necessary a shift into the use of chipped pruned branches and machinery to update the management of the fields. They see this as a need due to the lack of labour (mainly immigrants too) and the fate of the agriculture into the mechanization. They do not see the impact on the loss of jobs as they consider that the burning of the chipped pruned branches is done by immigrants that they will not come if there are not anymore, this task to be done in the fields. Farmers also see that the fate of the agriculture is based on subsidies and the subsidies will support them. They are getting subsides (120 € per Ha) and this is what confided them.

Farmers agreed that there is an environmental improvement of the soil and biota thanks to the use of Chipped Pruned Branches in the fields, but they found this that is degrading their reputation as the chipped pruned branches are dirt in the field. Chipped Pruned Branches increase the insects, fungi, spiders, and this is the origin of pest for many of them. In general, the organic farmers are happy with the Chipped Pruned Branches but the chemical ones they move to the use of chipped pruned branches as a mulch since they receive subsidies and is getting cheaper than burning the branches due to the increase in the labour cost. Moreover, there is not enough workers, and it is improving the situation for the owners and there is not enough immigrants to burnt the branches in the spring season. Another constrain is that the risk of forest fires increases due to climate change and land abandonment, and this makes that the period allowed to burnt branches is now shorter.

There is a general complain by the farmers that is that the fields are dirtier now with the chipped pruned branches and some of them bunt each 4 years of the wood that is not decomposed. Most of the chemical farmers do not believe in the benefits of the chipped pruned branches as a mulch as they do not understand the positive contribution of the chipped pruned branches to improve the soil quality and the biodiversity with higher infiltration rates, less soil erosion and more organic matter.

Another complain from the farmers is the amount of life (fungi mainly) and they are afraid that this will damage the crop. This is in general a view of chemical farmers.

For the citizen the opinion is that they know little about the topic, but that they prefer a more alive field. Less pesticides, fires and more live.

Organic farmers fully support the use of chipped pruned branches as a strategy to restore the organic matter, life, infiltration capacity and soil moisture of the soils, and reduce land degradation and soil erosion.

The government attendees fully support the EU policies to spread the use of chipped pruned branches.

The main concern is that small plots are not easy to manage with the machinery and this will be a constrain to adapt in some small farms the use of chipped pruned branches. The other negative view is the perception of the chipped pruned branches as a negative management.

In general, we found a more positive opinion and an increase in the use of chipped pruned branches within the farmers community, but some chemical farmers still are reluctant to use the chipped pruned branches strategy. The use of subsidies is what make them to use this restoration strategy, more than their own decision. Three of the farmers inform us that they were against the use of chipped pruned branches, but they applied this strategy due to the subsidies and that now they are in favour thanks to the improvements they found.

2.2 Finding common ground: Revisiting the vision

- We described in the introduction the current characteristics of the agriculture land with basic data (ageing, few women, lack of investment, low price of the product, a need of mechanization…). We rescued information from the previous workshop and informed the audience that the main finding was that most of the participants do not have a vision for the future of the agriculture.
- We presented a vision of a healthy and sustainable agriculture, with a future for the families and with fair trade with local consumers. Upon this vision there were some comments that make clear that the visions are multiples within the stakeholders and they are not always compatible. Some farmers reject the idea that the local consumers will be enough to maintain an agriculture that mainly works for the market. Oranges, clementines, persimmon, vines, and olive oils are sold all over the world and the market should be international. They accept that the agriculture should be healthy and sustainable (who not???) but they inform us that the international markets request high quality products that only chemical farming can offer (size, color, taste of the fruits).
- Then we adapted the vision to a mechanized agriculture with some improvements such as the use of chipped pruned branches. The new adapted vision found themselves more comfortable was fine for 32 stakeholders but 11 of them claimed that organic farming should be present. More ideas come: we need to bring new and young farmers to agriculture, immigrants should be accepted, subsidies must support the farming, and there is a need to improve the local markets (why to sell tomatoes in Berlin and consume here the ones of Morocco??, this was a claim of Jesús Sanchis).
- We agree that the backcasting exercise will starts with a highly technified agriculture, with less workers and more machinery and informatics, with rational use of pesticides (but some prefer organic farming) and powered local markets (but still with international trade to north of Europe) and the use of chipped pruned branches to restore the soils.
- The organizers based on the visions that we developed in the 2nd ERLL workshop, shown a summary we presented above. The topics more related to education and policies were much less mentioned but still present. We used the views of the visit to the fields instead of posters and slides as farmers feel more comfortable with visits to the field.
- The discussion was done in groups of 6 managed by Artemi Cerdà, Saskia Keesstra, Ana Pérez, Enric Terol and Antonio Giménez Morera.
- The following was done. We presented the view of a highly mechanized and technified agriculture, with less workers and more machinery and informatics, with rational use of pesticides (but some prefer organic farming) and powered local markets (but still with international trade to north of Europe) and the use of chipped pruned branches to restore the soils.
- We used groups of 6 instead of 3 people to encourage the discussion in a community as three is to little number and create more a conversation than a discussion.
- We achieved an adapted version of the vision, that everyone is looking forward to work towards. It is ambitious and desirable, but also feasible as still allow the use of chemicals and trade at long distances. The main view a highly mechanized and technified agriculture, with less workers and more machinery and informatics, with rational use of pesticides (but some prefer organic farming) and powered local markets (but still with international trade to north of Europe) and the use of chipped pruned branches to restore the soils. Some organic farmers claim that pesticides should be avoided.

- The participants were open minded about and they contributed to develop a desirable vision of the future of agriculture. Although some stakeholders claim for a more ambitious agriculture (organic, local trade) we agree that this is difficult and more than a vision was a wish. We were realistic.
- Antonio Giménez, Ana Pérez, Enric Terol, Saskia Keessra and Artemi Cerdà promoted the fair and open discussion of the participants so they worked in an open minded discussion and they planned their future. We synthesised a common vision that everyone agrees upon, although some alternatives were present in the discussion.

The initial vision that was presented:

Agriculture

- More mechanization
- More technology and efficiency
- Reduce ageing
- More sustainable
- Healthier

Environment

- Improve sustainability
- Preserve the landscape
- Protect environment

Economy and markets

- Subsidies are necessary
- Local markets promote
- We still are dependent on the international markets
- Lack of a proper salary is the key constrain

Society

- Immigrants must be present
- Ageing is a huge problem
- Reduction of labour
- Immigrants will be not necessary

Political system

- Subsidies
- Promote sustainable agriculture
- Promote education
- Promote dissemination

Science and education

- Need for education of the farmers
- More collaboration with the university as we claim here

Results

- What was the reaction of participants to the vision?

They were sceptical six months ago, but after the introduction of three sessions of excursion they understood better the work to be done. They understood they must dream more than be anchored to the today and past time.

We followed the structure we prepared along the last six months.

Final vision: The initial vision that was presented was maintained along the meeting as it worked well.

2.3 Identifying pathways to out- and upscaling: Backcasting

For each moderator, please describe and explain the overall process of this exercise:

We formed four groups of six with participants coming from different districts and backgrounds.

We introduced each other and requested the opinions about the vision. The exercise went well, with positive answers by the participants and very active and enjoyable. We perceived the process as very successful as the participants were very engaged after the excursion activities and they were very connected and enjoyed sharing their knowledge.

Results

- If required, explanation of causal relations between the elements so they are understandable for someone who has not participated in the exercise
- Information from participant feedback derived in silent discussion
- What do stakeholders want to do the information they collected and the agenda of activities?

It was not possible to write or paint or draw by the participants. The report is based on the moderators' writings and notes.

Tables for each group with elements (barriers, opportunities, actions and actors, major changes for short-, mid- /long-term)

Outscaling template:

	Short-term				Mid-term to long-term				Vision
	Barriers	Opportunities	Actions (actors)	Major change	Barriers	Opportunities	Actions (actors)	Major change	Elements achieved
AGRICULTURE	The use of pesticides. The farmers are adapted, and it will be difficult to change.	New local markets Organic farming	Organic farming and organic farmers	The reduction of the use of pesticides. Mechanization.	Soil and land degradation	New crops such as Pitaya and tropical crops	Use of chipped pruned branches. Catch crops. Organic farming	Organic farming more popular	Widespread use of restoration actions in agriculture
COMMUNITY	Ageing is the big barrier. Also, the emigration to the cities. Land abandonment	Bring new citizens and farmers to recover the population in the rural areas	To build a well-structured community	Maintain the rural communities as a source of stability for the society	Degradation of the local communities	Develop new and structured societies with the arrival that well educated citizens from the cities.	Farmers and shepherds	Society that understands the quality of the products from agriculture	Integrated society with agriculture understood as a basic part of the society

MARKETS	Low prices of agriculture products due to the subsidies and abuse of production in large farms (agroindustry)	Large market in the coastal land	Local markets	Expand the local markets	Loss of local markets	Increase in prices due to the new local market	High prices for quality food	Improve in the income of the farmers	Fair prices for the agriculture products
ENVIRONMENT	Degraded soils Polluted water.	The recovery of beautiful landscapes	Protect the landscapes and their ecosystems services	Desertification	Climate change	The landscape is a commercial opportunity	Improvement of soils and vegetation cover		

Upscaling template:

	Short-term				**Mid-term to long-term**				**Vision**
	Major change	Barriers	Opportunities	Actions (actors)	Major change	Barriers	Opportunities	Actions (actors)	Elements achieved

AGRICULTURAL POLICY	Include the quality of the agriculture product as a target. No quantity.	The lack of education.	New generations with more information	New farmers	The use of subsidies	The perception of the society that farmers are just receiving subsidies without their own investment.	The new markets from the local areas but also from the nearby urban areas.	To promote organic farming	A more sustainable agriculture
SOCIETY	Reduce the ageing	Ageing	New farmers that arrive from urban areas	Young people	Restore abandoned land	Governamental bureaucracy	The prestige of the organic farming	Recover young farmers. Built new local markets	Strong and stable community
MARKETS	Prices of organic farming products	Lack of information of the quality of the agriculture products	New and well-educated citizens	Consumers	Prices of organic farming products	Lack of information of the quality of the agriculture products	New and well-educated citizens	Consumers	Develop a new market of citizens that accept the contribution of the farmers to the society and pay fair prices.

ENVIRONMENT	Restore nature based process and avoid chemicals	Degraded soils	New generations believe in organic farming, old farmers are frustrated with the chemical farming	New pests can stop the process	Improve in the fertility of soils	Climate change with the arrival of new climatic conditions but also the arrival of new pest	A new society, a new life for the farmers. Better quality of life.	The new environmental challenges are key actions with new citizens as actors.	New society that will built a new agriculture. A new agriculture that will help to achieve a more sustainable society.
AGRICULTURE	Farmers were adapted to a mechanized and pesticide base agriculture.	Organic farming markets should be promoted as a key for the future	Organic farmers must be the heroes	Les pesticides and chemical fertilizers. More life.	The degradation of the soils around the fields. We must restores	We need new crops adapted to the climate and avoid the import of traditional products such as oranges.	A new agriculture with alternative managements	Promote organic farming	The use of restoration strategies should be general.

Feedback from the silent discussion

The stakeholders would like to recover the vision and the information from the backcasting exercise in future meetings to check how their perception evolve. We promised them to comeback to these topics in the next meeting. We found that the exercise was a surprise for them, and we think they will need more time to think and express their opinion. Always takes time to find out what do you think.

3 Heraklion, Greece

3.1 Preparing the discussion: Social justice enquiry

Description of the exercise

The hosts first presented the assessment of the pilot Areas, demonstrating the effects that the "afforestation" has on the ecosystem, how these are relevant to the stakeholders according to ERLL2 and how they are monitored. Then, the participants formed two groups each with one moderator. In group A, participated 3 practitioners and 4 administrators, while in group B, 2 practitioners and 3 from education.

The participants were instructed to write their inputs on the cost or benefits of the action alongside the obligator or beneficiary accordingly. Regardless, the participants were not cooperating to a significant enough degree on the role they were given, to the point that the discussion took place at the same time as the notes, **effectively changing the notes to "resolutions" from the discussion**.

Figure 1: Social justice enquiry

Results of the exercise

The costs as seen by the participants, were written on post it notes and transcribed here in Greek as they were written and translated as closely matching the original phrases as:

A.
- Μείωση καλλιεργήσιμης γης - Reduction of arable land
- Κόστος στρατηγικού σχεδιασμού - Cost of strategic planning
- Κίνδυνος εγκατάλειψης των μικρών αγροτικών επαρχιακών περιοχών και κοινοτήτων - Risk of abandonment of small rural provincial areas and communities
- Κόστος ενημέρωσης για δράση - Cost of action awareness
- Μείωση της φυτικής παραγωγής (καλλιέργειας τροφίμων) - Reduction of plant production (food cultivation)
- Κόστος σε εργατικά εγκατάστασης - Cost of installation labor
- Ανάγκη εναλλακτικής χρηματοδότησης ή εύρεσης εργασίας από την απώλεια της κτηνοτροφικής δραστηριότητας - Need for alternative financing or job finding due to the loss of livestock activity

B.
- Κίνδυνος πρόκλησης πυρκαγιάς - Risk of causing fire
- Οικονομικά κόστη - Economic costs
- Μείωση γεωργικών ζωνών - Reduction of agricultural zones
- Κόστος σε υλικά συντήρησης και νερό άρδευσης - Cost of maintenance materials and irrigation water

The benefits as seen by the participants, were written on post it notes that read:

A.
- Μείωση της διάβρωσης - Reduction of erosion
- Βελτίωση αισθητικού αποτελέσματος - Improvement of aesthetic outcome
- Επέκταση του σχεδίου στα νησιά και αλλού - Expansion of the plan to the islands and elsewhere
- Ιδανικό μοντέλο για τις βοσκοτοπικές εκτάσεις του νομού Ηρακλείου να αναβαθμιστεί τμηματικά - Ideal model for the grazing areas of Heraklion prefecture to be upgraded gradually
- Μείωση πλημμυρικών φαινομένων - Reduction of flood phenomena
- Βελτίωση των φυσικοχημικών χαρακτηριστικών του εδάφους - Improvement of the physicochemical characteristics of the soil
- Αποφυγή εκρίζωσης βλαστούμενων περιοχών, αμπελιών και ελαιόδεντρων - Avoidance of uprooting vegetated areas, vineyards, and olive trees
- Εκμετάλλευση προϊόντων που προκύπτουν - Exploitation of resulting products
- Εμπλουτισμός υδροφόρου ορίζοντα από τη μη γεωργική χρήση του εδάφους - Enrichment of the aquifer from non-agricultural use of the soil
- Αποκατάσταση "υγείας" του εδάφους από τη μη χρήση χημικών - Restoration of soil "health" from non-use of chemicals
- Βελτίωση θερμοκρασιών και μικροκλίματος - Improvement of temperatures and microclimate
- Αγροτουρισμός – Agritourism

B.
- Αύξηση της διατροφής των ανθρώπων από φυτά - Increase in human nutrition from plants

- Ωφελείται η πανίδα τοπικά λόγω της μείωσης της γεωργικής παραγωγής - Local fauna benefits due to the reduction of agricultural production
- Τόπος αναψυχής - Place of recreation
- Αποκατάσταση αγρο-οικοσυστημάτων - Restoration of agro-ecosystems
- Αγροτουρισμός και άλλες τουριστικές δραστηριότητες - Agritourism and other tourist activities
- Καταφύγιο άγριας ζωής - Wildlife refuge
- Προοπτικές απασχόλησης σε νέους εργαζόμενους - Employment prospects for young workers
- Οφέλη από πιθανά παραγόμενα προϊόντα - Benefits from potentially produced products
- Προστασία εδάφους από τη διάβρωση - Protection of soil from erosion
- Μέθοδος κατά της ερημοποίησης εδαφών - Method against soil desertification
- Αύξηση βιοποικιλότητας - Increase in biodiversity
- Εγκατάσταση δενδρώδους εκτάσεων - Installation of tree-covered areas
- Πνεύμονας πρασίνου για την ευρύτερη περιοχή - Green lung for the wider area
- Ανάπτυξη γειτνιαζόντων περιοχών και οικισμών - Development of neighboring areas and settlements

Minutes were not kept as the participants were more than originally anticipated, forcing the person responsible for note keeping to act as a moderator.

3.2 Finding common ground: Revisiting the vision

Description of the exercise

The initial vision that was presented:

Community
• producers' groups / agricultural cooperatives • younger people getting into agriculture
Economy
• rotations in cultivations and intercropping • reuse of agricultural waste • increase of organic matter in soils, mulching
Ecosystem
• Rural revitalisation • Decentralised food system: predominantly short supply chains, local production and consumption has priority • Supply chain transparency • Equal distribution of benefits along the value chain
Science, education
• Fields under monitoring • Pilot areas and educational farms
Agro ecosystems
• afforestation • hiking trails / wildlife observatories
Technology
• decentralization of production / land use change limitations

• reservoirs, manmade lakes, embankments • agricultural infrastructure
Administration
• grassing systems implementation / grassing management • good practices • limitations on land use change

The vision was presented in 2 power point slides, showcasing the 2nd workshop and its results, emphasizing more on the agreements of the then groups (younger generations into agriculture and entrepreneurship, good practices implementation, cultivation of native species, zero milage goods, and community organizations). Then they participants were shown the cumulative results for the same workshop from the rest of the consortium (see . Figure 2). After this the participants were asked to give their feedback on the points of the workshop 2, in which there were no objections, leading to skipping the "refining of the vision" for time preservation.

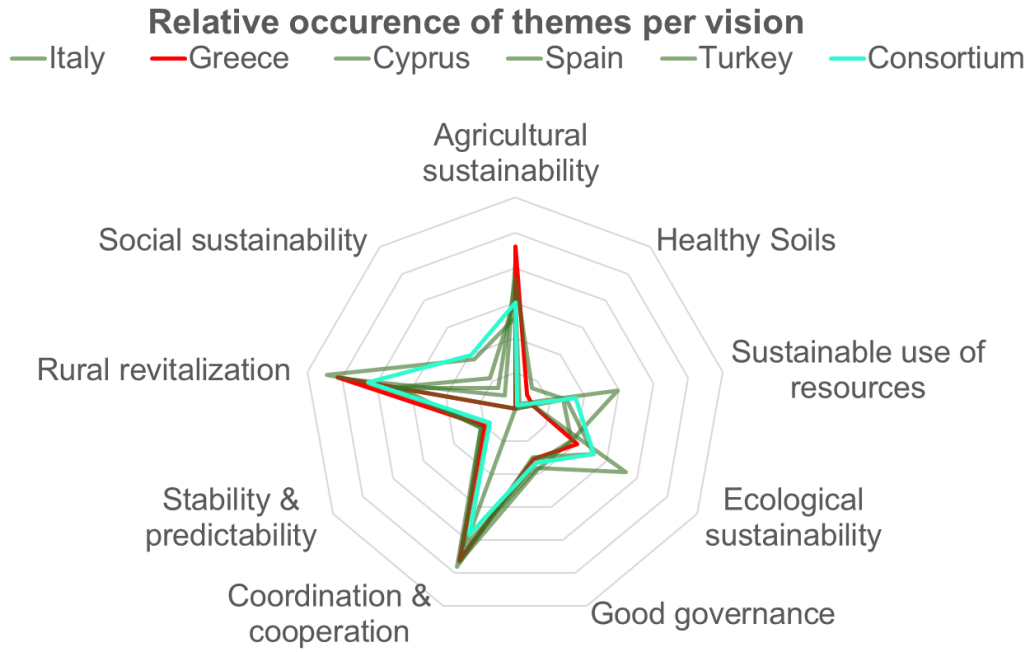


Figure 2: cumulative results of Workshop 2 as shown in internal preparation presentation for the 3rd workshop by WP3 leaders

3.3 Identifying pathways to out- and upscaling: Backcasting

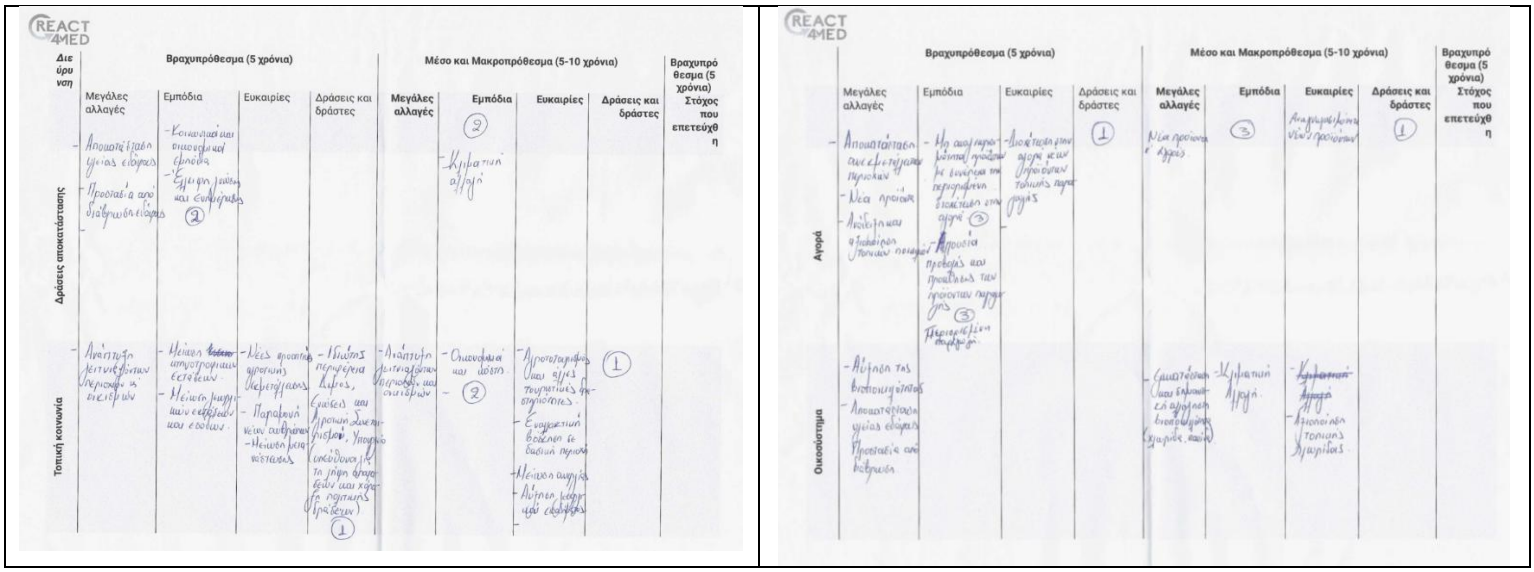
Description of the exercise and reflection

1. 2 groups, formed based on their own volition
2. In **group A** participated 3 practitioners and 4 administrators, while in **group B**, 2 practitioners and 3 from education.
3. After the exercise of "social justice" where the participants had to think about the effects that a intervention would have outside their own lives, the hosts reminded them of the outcomes of the 1st and 2nd workshop and asked the participants to imagine that every aspect of these goals had been addressed, the present is the future they had envisioned, and now it was the time to look back and see how it became true

4. Exercises like this on, where the host is actively asking the participants to engage both with them and their peers are not the usual workshop implementation as participatory approaches are not the norm yet. At the same time, asking a group of people to follow this procedure and try to think backwards in an imaginary timeline, is an even more tedious process as it requires a lot of micromanagement of their train of thought and the conversation taking place.

Results

Backcasting exercise – photo of group 1 Outscaling:



Outscaling template:

	Short-term (5 years)				Mid-term to long-term (10-20 years)				Short-term (5 years)
	Major change	**Barriers**	**Opportunities**	**Actions (actors)**	**Major change**	**Barriers**	**Opportunities**	**Actions (actors)**	**Elements achieved**
RESTORATION ACTION	1.Restoration of soil health 2. Protection from erosion	1. Social and economic obstacles 2. Lack of knowledge and experience				Climate change			
LOCAL COMMUNITY	Development of neighboring areas and settlements	1. Reduction of livestock areas 2. Reduction of agricultural areas and income	1. New prospects for agricultural exploitation 2. Retention of young people 3. Reduction of migration	Private sector, Region, Municipality, Unions and Agricultural cooperatives, Ministry (responsible for decision-making and policy action)	Development of neighboring areas	Economy and costs	1. Agrotourism and other tourist activities 2. Alternative grazing in forest areas 3. Reduction of unemployment 4. Increase in agricultural income		
MARKETS	1. Restoration of unused areas 2. New products 3. Highlighting and utilizing local varieties	1. Lack of product recognition resulting in limited market penetration 2.	Market penetration of new locally produced products		New products and markets		Recognition of new products		

		Lack of promotion and marketing of production products 3. Limited production							
LOCAL ENVIRONMENT	1. Increase in biodiversity 2. Restoration of soil and protection from erosion				Significant change in biodiversity (flora and fauna)	Climate change	Utilization of local flora		

Upscaling template:

	Short-term (5 years)				Mid-term to long-term (10-20 years)				Short-term (5 years)
	Major change	**Barriers**	**Opportunities**	**Actions (actors)**	**Major change**	**Barriers**	**Opportunities**	**Actions (actors)**	**Elements achieved**
(AGRICULTURAL) POLICY	Terraces with dry stone walls on sloping lands			Region and municipality	Management model for mountainous and semi-mountainous areas with land use management plans	Lack of funding for maintenance and longevity of infrastructure		Ministry of Agricultural Development	
EDUCATION AND RESEARCH	Study by specialists for the creation of terraces needed for dry stone walls								
OPTIONAL: ECONOMY		Increased cost of creating water reservoir and irrigation network infrastructure	Job creation, strengthening the local economy (nurseries, etc.)	Need for funding rainwater reservoirs and utilization of springs		Lack of funding for maintenance and longevity of infrastructure	Alternative sources of income		

OPTIONAL: ENVIRONMENT	1. Installation of tree vegetation 2. Protection of soil from erosion 3. Protection of flora and fauna 4. Enrichment of the aquifer through terraces and dry stone walls	Climate crisis - lack of rainfall – drought			Enrichment of the aquifer through terraces and dry-stone walls that collect water	Climate crisis - drought - lack of rain			

What do stakeholders want to do with the information they collected in the backcasting exercise and the agenda of activities?

Although there is no official record due to various deviations from the procedure, the discussion about the afforestation action was both heated and interesting. One participant shared their experience from a similar action in other parts of Greece. They mentioned that practitioners planted mainly Populus trees, a forest species that needs little water, doesn't produce food, and doesn't require cultivation. However, these trees make it difficult for other plants to grow in the same area due to allelopathy.

The participant claimed that this led to a significant reduction in food production, fewer job opportunities, and made it harder to fix the situation because the chosen trees required a fallow period before planting anything else. They argued that such actions should not be taken as their impact is mostly negative.

The other participants, including four administrators and one farmer, disagreed but it sparked a conversation on how the municipality or regional government could prevent misuse of the action. They all agreed that this discussion was helpful, as a similar action is likely to happen soon due to the Common Agricultural Policy (CAP). They expressed interest in having their own open discussion on the topic to consult stakeholders.

4 Lower Gediz river basin, Turkey

4.1 Preparing the discussion: Social justice enquiry

Description of the exercise

Describe and explain the overall process and context of this exercise:

- How were groups formed? How many people were in each group?
- What were the steps you took to structure the exercise?

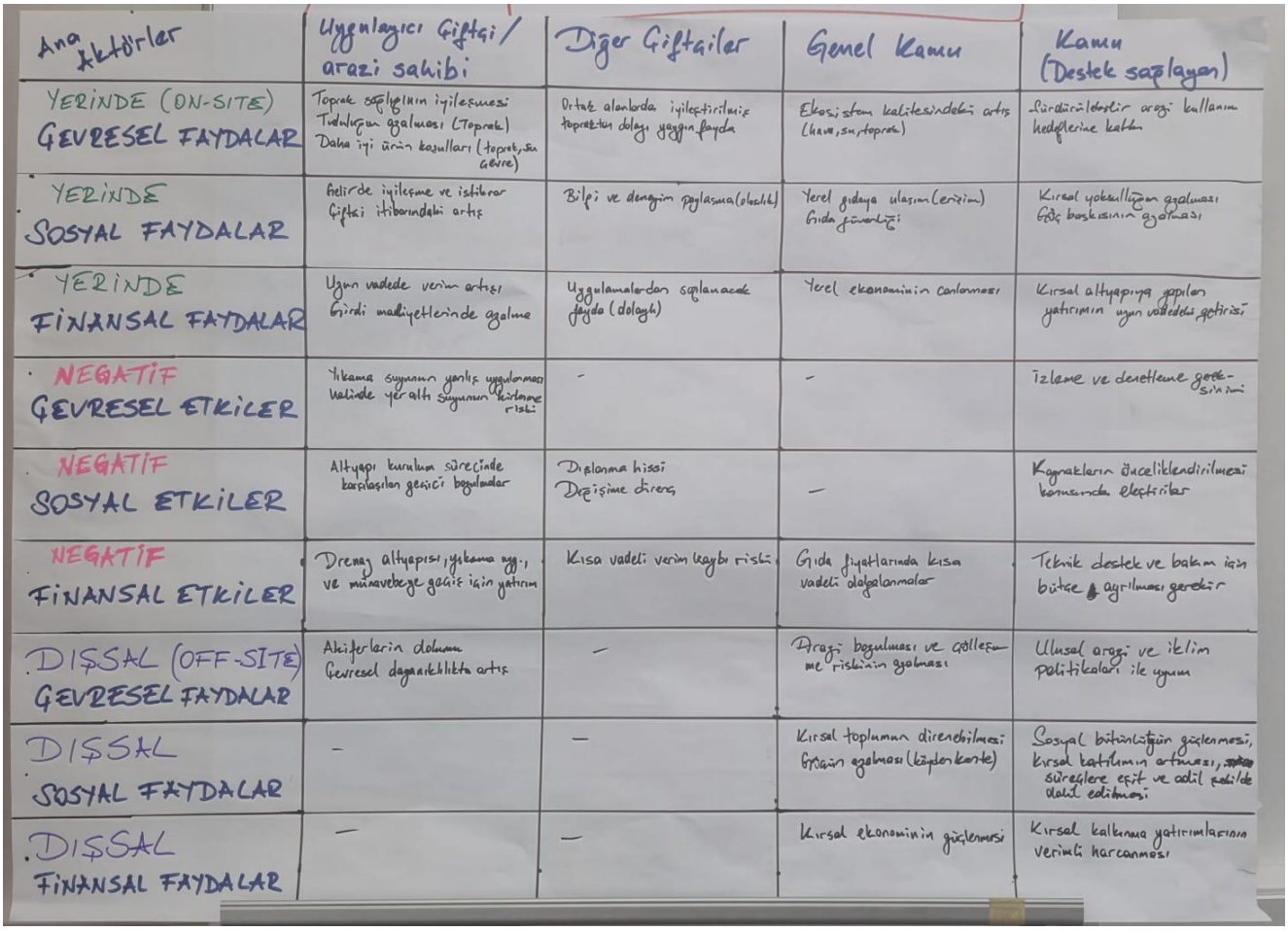
The social justice enquiry exercise focused on how costs and benefits from salinity management are shared among local actors. The focus was clear: drainage system installation, use of leaching water, and crop rotation in the Lower Gediz pilot area. Funda Kıdoğlu moderated the session, following the WP3 methodology.

Participants were asked to analyze the social and economic impacts of these restoration actions for each stakeholder group. The format was simple. All stakeholders worked together as one large group. This created space for open and dynamic discussion.

Before the workshop, WP3 matrix templates were adapted for the local context and printed as large format posters. During the exercise, participants jointly filled in the matrices. Both on-site and off-site costs and benefits were considered for four groups: practicing farmers or landowners, other farmers, the general public, and government institutions.

Participation was high throughout. Many participants were already familiar with the project and with each other. This made the conversation comfortable and productive. Most contributions were made verbally. Important ideas were projected on the posters in real time. The process allowed for a transparent and shared reflection on the impacts of the restoration action.

Results of the exercise



Ana Aktörler	Uygulayıcı Çiftçi / arazi sahibi	Diğer Çiftçiler	Genel Kamu	Kamu (Destek sağlayan)
YERİNDE (ON-SITE) ÇEVRESEL FAYDALAR	Toprak sağlığının iyileşmesi Tuzluluğun azalması (Toprak) Daha iyi ürün koşulları (toprak, su çevre)	Ortak alanlarda iyileştirilmiş topraktan dolayı yaygın fayda	Ekosistem kalitesindeki artış (hava, su, toprak)	Sürdürülebilir arazi kullanım hedeflerine katkı
YERİNDE SOSYAL FAYDALAR	Gelirde iyileşme ve istihdam Çiftçi itibarındaki artış	Bilgi ve deneyim paylaşma (olabilir)	Yerel gıdaya ulaşım (erişim) Gıda güvenliği	Kırsal yoksulluğun azalması Göç baskısının azalması
YERİNDE FİNANSAL FAYDALAR	Uzun vadede verim artışı Girdi maliyetlerinde azalma	Uygulamalardan sağlanacak fayda (dolaylı)	Yerel ekonominin canlanması	Kırsal altyapıya yapılan yatırımın uzun vadedeki getirisi
NEGATİF ÇEVRESEL ETKİLER	Yıkama suyunun yanlış uygulanması halinde yeraltı suyunun kirlenme riski	-	-	İzleme ve denetleme gerekşinimi
NEGATİF SOSYAL ETKİLER	Altyapı kurulum sürecinde karşılaşılan geçici bozulmalar	Dışlanma hissi Değişime direnç	-	Kapasitelerin güçlendirilmesi konusunda eleştiriler
NEGATİF FİNANSAL ETKİLER	Drenaj altyapısı, yıkama vb., ve münavebeye geçiş için yatırım	Kısa vadeli verim kaybı riski	Gıda fiyatlarında kısa vadeli dalgalanmalar	Teknik destek ve bakım için bütçe ayrılması gerekir
DIŞSAL (OFF-SITE) ÇEVRESEL FAYDALAR	Akiferlerin dolması Çevresel dayanıklılıkta artış	-	Arazi bozulması ve çölleşme riskinin azalması	Ulusal arazi ve iklim politikaları ile uyum
DIŞSAL SOSYAL FAYDALAR	-	-	Kırsal toplumun dirençlilmesi Göçün azalması (köpler kente)	Sosyal bütünleşmenin güçlenmesi, kırsal katılımın artması, süreçlere eşit ve adil şekilde dahil edilmesi
DIŞSAL FİNANSAL FAYDALAR	-	-	Kırsal ekonominin güçlenmesi	Kırsal kalkınma yatırımlarının verimli harcanması

Figure 3 photograph of the matrix elaborated by the Groups

Table 2

Main Actor Groups	Practicing farmer / landowner	Other farmers	General public	Government (support)
On-site Environmental Benefits	Improved soil health, reduced salinity, better crop conditions	Spillover benefits from improved soil in shared zones	Enhanced ecosystem quality (air, water, soil)	Contribution to sustainable land use goals
On-site Social Benefits	Increased income stability, enhanced farmer dignity	Potential knowledge sharing, peer learning	Food security, healthier food from local sources	Reduced social pressure related to rural degradation
On-site Financial Benefits	Higher long-term yields, reduced input costs after initial setup	Indirect access to improved practices	Boost to local economy	Long-term return on investment in rural infrastructure
Negative Environmental Effects	Risk of leaching water contaminating groundwater (if misapplied)	–	–	Need for environmental monitoring
Negative Social Effects	Temporary disruption during infrastructure installation	Resistance to change (fear of being left behind)	–	Criticism over prioritisation of limited resources
Financial Costs	Investment in drainage, leaching infrastructure and transition to rotation	Opportunity costs if land use is temporarily reduced	Short-term price fluctuations in the local food market	Budgetary allocation for technical support and maintenance

Off-site Environmental Benefits	Recharge of aquifers, broader improvement in landscape resilience	–	Reduced risk of land abandonment and desertification	Alignment with national climate and land policies
Off-site Social Benefits	–	–	Long-term community resilience, reduced migration from rural areas	Stronger social fabric and rural inclusion
Off-site Financial Benefits	–	–	Strengthened rural economy	More efficient use of public funds in rural development

(1) Costs and Benefits of the Restoration Action and Their Distribution

The restoration action analyzed in the workshop includes a combined strategy of installing appropriate drainage systems, applying leaching water, and implementing crop rotation on saline-affected agricultural land in the Lower Gediz basin.

Baseline: Agricultural land affected by secondary salinisation

In many areas of the pilot region, appropriate subsurface drainage infrastructure is not provided, or existing systems are undersized, poorly maintained, or improperly designed.

Surface drainage alone is commonly used, which is insufficient to control salinity levels, especially on flat or poorly structured soils.

Leaching is often performed without adequate water planning or salinity monitoring, which can lead to inefficient salt removal or risk of groundwater contamination.

Crop rotation is rarely practiced; monoculture systems (e.g. continuous maize or cotton) are common, which makes soil degradation and salinization worse.

Institutional coordination and technical guidance regarding integrated salinity management are currently limited.

The workshop participants assessed the costs and benefits of the proposed restoration actions by considering these baseline conditions. The identified impacts were discussed both as on-site and off-site impacts and distributed across key actor groups including practicing farmers, other farmers, the general public, and governmental institutions.

Table 3 On-Site Costs and Benefits – Lower Gediz Pilot Area: Salinity Management

Costs and Benefits	Practicing Farmer/Landowner	Other Farmers	General Public	Government (Support)
Environmental Benefits	Improved soil structure and reduced salinity; better water infiltration	Indirect benefits from reduced salt transfer across fields	Healthier local ecosystems, reduced risk of land abandonment	Contribution to land restoration and sustainable water use targets
Social Benefits	Improved working conditions and confidence in long-term production	Potential for knowledge-sharing and peer learning	More stable rural economies; reduced migration pressure	Support for inclusive rural development strategies
Financial Benefits	Long-term cost savings from decreased chemical inputs and higher yields	Opportunity to adopt successful practices later on	Access to higher quality local food; economic spillover benefits	Reduced long-term burden on agricultural support and social programs
Negative Environmental Effects	Risk of groundwater salinisation if leaching is misapplied	Possible indirect risks if practices are	Temporary disturbance to surrounding water	Need for environmental monitoring and enforcement

Costs and Benefits	Practicing Farmer/Landowner	Other Farmers	General Public	Government (Support)
		not regionally harmonised	flows or vegetation	
Negative Social Effects	High upfront costs may be a barrier for smallholder farmers	Perceived inequality in who receives support	Short-term noise or disruption during infrastructure implementation	Pressure to fairly allocate limited resources
Financial Costs	High investment in drainage infrastructure and rotation adaptation	Minimal direct cost but potential indirect opportunity loss	Short-term inflation in produce prices due to transitional changes	Need for subsidies, incentives and ongoing technical assistance

Table 4 Off-Site Costs and Benefits – Lower Gediz Pilot Area: Salinity Management

Costs and Benefits	Practicing Farmer/Landowner	Other Farmers	General Public	Government (Support)
Environmental Benefits	Reduced salt movement into neighboring lands	Improved water quality in irrigation canals	Enhanced regional soil health; protection of downstream ecosystems	Contribution to regional environmental and water quality targets
Social Benefits	Strengthened collaboration with nearby farmers and water users	Shared learning and regional dialogue	Improved quality of rural life; reduced social disparities	Integration with broader rural development and climate resilience policies
Financial Benefits	Opportunity to access wider markets with sustainable practices	New service markets (e.g. consulting, maintenance)	Boost to local food chains, employment through indirect agri-support sectors	Long-term economic gains through reduced land degradation and dependency
Negative Environmental Effects	Risk of soil or water contamination if leaching is mismanaged off-site	Localised water stress if not coordinated	Disruption to adjacent natural habitats (e.g. wetlands, canals)	Oversight burden for multi-farm impacts and transboundary planning
Negative Social Effects	Minimal direct impact	Minimal direct impact	Possible tension due to changing land use patterns	Pressure to balance new practices with existing rural heritage
Financial Costs	Cost of extended transport/logistics for new inputs or services	Minimal direct cost	Indirect public expenses (e.g. road, water maintenance)	Budgetary pressure from program expansion and technical supervision

(2) Minutes from discussion of the effect of the distribution of benefits and costs on society/community for each group:

Participants were divided into two multi-stakeholder groups, each including representatives from public institutions, farmers, researchers and extension staff. Both groups reflected on the social outcomes of how costs and benefits from restoration would be shared, using the actor matrix described earlier as a guide.

The consensus was clear.

Both groups agreed that drainage infrastructure, leaching water and crop rotation can deliver significant environmental and economic gains in the long term But the debate also revealed real concerns about equity and the capacity to implement such changes.

Group 1: Smallholder challenges in focus.

This group focused on the barriers faced by small-scale farmers. They noted that while these farmers could benefit the most from improved productivity, they also bear the highest upfront costs. The risk is clear: farmers without access to adequate financial or institutional support may be left behind. The group emphasized the need for inclusive support, such as targeted subsidies, hands-on training, and maintenance guidance. Participatory planning in pilot site selection was also emphasized as essential.

Group 2: Governance and integration.

The second group turned attention to governance and regional coordination. They noted that the general public would benefit from healthier ecosystems and improved food quality, but that these benefits may not be clear or measurable in the short term. They warned that unequal practices across farms could divide results. Better coordination between government agencies, irrigation associations, and local farmers was recommended. Transparency in how resources are allocated and in stakeholder communication was also seen as a top priority.

Common ground:

Both groups agreed on one thing: Long-term planning, ongoing technical support, and environmental monitoring are critical. Only then can the benefits of restoration be maximised and shared fairly.

4.2 Finding common ground: Revisiting the vision

Description of the exercise

The third ERLL workshop revisited the shared vision for sustainable agriculture in the Lower Gediz Basin. This vision was originally developed during the second workshop in November 2023, with input from farmers, extension officers, researchers, water managers, and local authorities. There was strong ownership.

Facilitators reintroduced the key elements of the WS2 vision as a basis for reflection. While the vision was not directly listed in the agenda, its main themes were brought forward for discussion. Participants were encouraged to evaluate the vision in light of new challenges and to suggest adjustments. Feedback was open and constructive. There was a clear focus: Does this vision still match the realities of Lower Gediz today?

The original vision covered six main areas:

- **Agriculture:** Technological innovation, crop diversification, typical crop production, farming appropriate to local environments.
- **Environment:** Biodiversity, sustainability, traditional landscapes, recognition of ecosystem services.
- **Economy and markets:** Support for local markets, protection of local products, growth of rural tourism.
- **Society:** Young people choosing agriculture, improved welfare of farmers.

- **Political system:** Public access to data, reliable subsidies, participatory water governance.
- **Science and education:** Strong agricultural education, assured technical support.

Results

The WS2 vision was seen by participants as both comprehensive and inspiring. It addressed key themes such as environmental protection, technology, farmer welfare, market access and education. The foundation was solid.

Yet new priorities emerged during the WS3 workshop. Various improvements were suggested. The local context is always changing.

The updated vision now includes:

- **Community & Society:** Rural life across generations, greater urban-to-rural migration, and self-sufficient, healthy, and happy communities.
- **Agriculture:** Expansion of nature-based practices, reduced reliance on chemicals, widespread use of drip irrigation, and more integrated crop-livestock systems.
- **Environment:** Stronger protection for water resources, improved soil and biodiversity health, and reduced erosion and fossil fuel use.
- **Technology & Infrastructure:** Greater automation, increased use of renewable energy (solar, wind) and wider adoption of water harvesting and wastewater reuse.
- **Markets:** Development of farm-to-table systems, support for farmer cooperatives, and strengthening of local markets.
- **Education & Policy:** Focus on practical agricultural education, government-supported planning for inputs and products, and reliable insurance for farmers.

The vision now better reflects the realities and ambitions of the Lower Gediz region. The participants left with renewed motivation.

Comparison with last year's vision (WS2):

The vision developed last year in WS2 already emphasized the key elements of sustainable agriculture: crop diversity, technological innovation, local market protection and support for young farmers. This year, the discussion has gone even further. The WS3 vision places greater emphasis on community resilience, nature-based farming, circular water management, and the integration of renewable energy.

Concepts such as multigenerational rural life, urban-to-rural migration, and self-sufficiency have taken on new importance. The role of cooperatives, practical education, and climate adaptation strategies is now clearer. The focus is not just on productivity, but on building strong, healthy, and happy communities.

In short, the vision has shifted from a predominantly technical and economic perspective to a more holistic approach that also takes into account the social, environmental and cultural dimensions of sustainable agriculture in the Lower Gediz.

4.3 Identifying pathways to out- and upscaling: Backcasting

Description of the exercise and reflection

The backcasting exercise formed the core of the third ERLL workshop. The aim was clear: to map out practical pathways for scaling up and out the region's salinity management actions, both in the short and long term.

The session began with a short presentation of the revised vision, drawing on ideas from earlier workshops. This helped everyone focus on a shared future. It set the tone.

Participants were then divided into two mixed groups. Each group included a mix of farmers, public officials, researchers, extension staff, and water managers. The diversity was intentional. Different voices matter.

Each group gathered around a large-format poster with the backcasting table. Step by step, they identified the major changes needed to reach the vision. Barriers, opportunities, actions, and responsible actors were discussed for both the next five years and for the long term (10–20 years).

Participation was consistently high. Participants knew each other from having worked together in previous project meetings. This made the atmosphere comfortable and productive. The range of backgrounds made discussions richer and the suggested paths more realistic and grounded in local reality.

Results

The results of the backcasting exercise were summarised in a structured table. Participants focused on four main goals: agricultural productivity, technology and infrastructure, social participation, and environmental sustainability. For each goal, the groups first identified the necessary short-term changes for the next five years. They then examined current barriers and opportunities to build on. Concrete actions and responsible actors were also defined. Finally, participants described the long-term transformations expected within ten to twenty years. The outcomes are practical. When presented in table form, the roadmap is clear and accessible to everyone.

The visual outputs of the backcasting exercise, as prepared by the two working groups during the workshop, are presented in Figure 2. All results from these group discussions have been synthesised and summarised in Table 6.

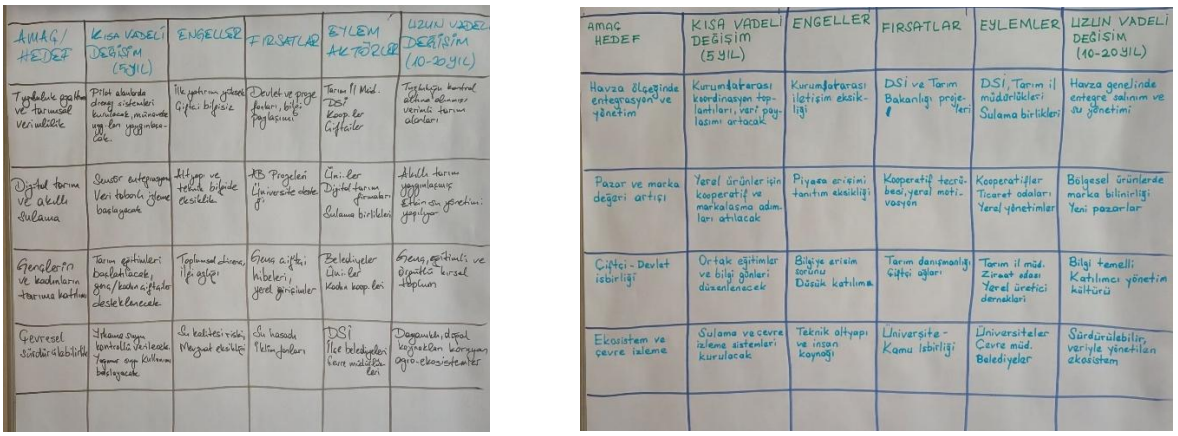


Figure 2 photographs of backcasting groups (group #1 on the left and group #2 on the right)

Major Changes Identified in Backcasting Exercise – Lower Gediz Pilot Area

Table 5 Major Changes Identified in Backcasting Exercise – Lower Gediz Pilot Area

Goal / Objective	Short-term Change (5 years)	Barriers	Opportunities	Actions & Actors	Long-term Change (10–20 years)
Reduction of salinity and increased productivity	Installation of drainage systems in pilot fields; wider adoption of crop rotation	High initial investment costs; lack of knowledge	Government support; project funding; knowledge sharing	Provincial agricultural directorates, DSI, cooperatives, farmers	Productive farmland with salinity under control
Digital agriculture and smart irrigation	Introduction of sensors to irrigation systems; launch of data-driven monitoring	Infrastructure gaps; limited technical expertise	EU projects; university support; private sector	Universities, agri-tech companies, irrigation associations	Widespread smart farming and efficient water management
Youth and women's participation in agriculture	Start agricultural training programs; support initiatives for young and women farmers	Social resistance; lack of interest	Young farmer grants; local initiatives	Municipalities, universities, women's cooperatives	Young, educated, and well-organised rural communities
Ecosystem health and sustainability	Initiation of controlled leaching water use; rainwater harvesting and greywater reuse	Water quality risks; lack of clear regulation	Water harvesting, climate adaptation funds, municipal partnerships	DSI, district municipalities, environmental directorates	Resilient agro-ecosystems that preserve natural resources
Basin-wide integration and governance	More coordination meetings among institutions; improved data sharing	Lack of communication between agencies	DSI and Ministry of Agriculture projects	DSI, provincial directorates, irrigation associations	Integrated salinity and water management at the basin scale
Market and product branding	Steps toward branding and marketing of local agricultural products	Market access; insufficient promotion	Cooperative experience, local motivation	Cooperatives, chambers of commerce, local governments	Recognised regional brands, new market opportunities
Farmer–government collaboration	Joint training activities, knowledge exchange events	Information access issues, low participation	Agricultural advisory services, farmer networks	Provincial directorate, agricultural chambers, producer associations	Knowledge-based, participatory management culture
Environmental monitoring and evaluation	Establishment of monitoring systems for irrigation and the environment	Technical infrastructure, lack of staff	University–public cooperation	Universities, environmental directorates, municipalities	Sustainable, data-driven ecosystem management

Short-term (next 5 years):

- Establish pilot fields to showcase best practices in drainage system design and leaching water application.
- Launch farmer training programmes, focusing on salinity management and effective crop rotation.
- Provide targeted financial incentives, such as grants and subsidies, for those adopting integrated salinity control.
- Start systematic monitoring of soil salinity and water efficiency in selected plots.

Progress will be gradual. Early successes are vital.

Mid-term (10 years):

- Scale up the most effective practices across the Lower Gediz Basin.
- Strengthen coordination among key local actors—DSİ, agricultural directorates, and municipalities—for integrated salinity and irrigation planning.
- Create networks for farmer-to-farmer demonstration and peer learning.
- Integrate water-saving technologies and renewable energy—like solar-powered sensors—into field operations.

Networks and new technologies will drive the transformation.

Long-term (20 years):

- Transition towards resilient farming systems, with routine salinity monitoring, rotation scheduling, and advanced water management.
- Develop new value chains for salt-tolerant crops and build strong regional branding.
- Reinforce rural economies with sustainable agriculture, innovative technologies, and ecosystem services.
- Improve the ecological health of soils and water bodies, securing long-term productivity and biodiversity.

Sustainability will become the new standard.

Insights from the Open Discussion

Although no formal silent discussion took place, the plenary session was lively and candid. Participants raised several key points:

- **Practical and accessible support:**
  Stakeholders agreed that training, on-site technical advice, and simple subsidies remain crucial—especially for small-scale farmers. Many still lack experience with drainage maintenance or leaching. Tailored support is essential.
- **Equity concerns:**
  High initial costs continue to discourage low-income farmers. There is a real risk of unequal benefit distribution, particularly between landowners and tenants.
- **Environmental considerations:**
  While improved drainage and leaching boost productivity, poor implementation could threaten groundwater quality or soil health. Clear operational guidelines and monitoring frameworks are needed. The risks must not be overlooked.

- **Institutional responsibility:**
  Participants stressed that government institutions must take an active role—facilitating collaboration, ensuring fair access to resources, and supporting capacity building for the long run.

How Stakeholders Plan to Use the Results

Following the backcasting exercise, several concrete next steps were agreed:

- Set up pilot fields in key saline areas as learning models for broader use.
- Expect local governments and water authorities to update policies in line with real field conditions.
- Use agricultural chambers and cooperatives to spread practical know-how through peer learning and demonstration days.
- Involve universities and research centres in long-term monitoring and impact assessment.
- Regularly revisit and adapt financial planning, especially as costs for materials and energy shift over time.

This approach will help maintain momentum and keep knowledge flowing across all stakeholder groups.

4.4 Descriptions and outcomes of additional sessions

In addition to the core sessions under the WP3 methodology, the workshop ended with an open group reflection. This final section was informal. It emerged naturally as participants began to share their broader thoughts, concerns, and ideas about both the restoration action and the challenges ahead.

Both technical and social aspects of salinity management were discussed. The open format encouraged cross-sector feedback and provided an informal but valuable synthesis of the day's work. No visual tools or written summaries were produced. Still, the reflections added important insights into what stakeholders expect for the future.

Several key themes emerged from this discussion:

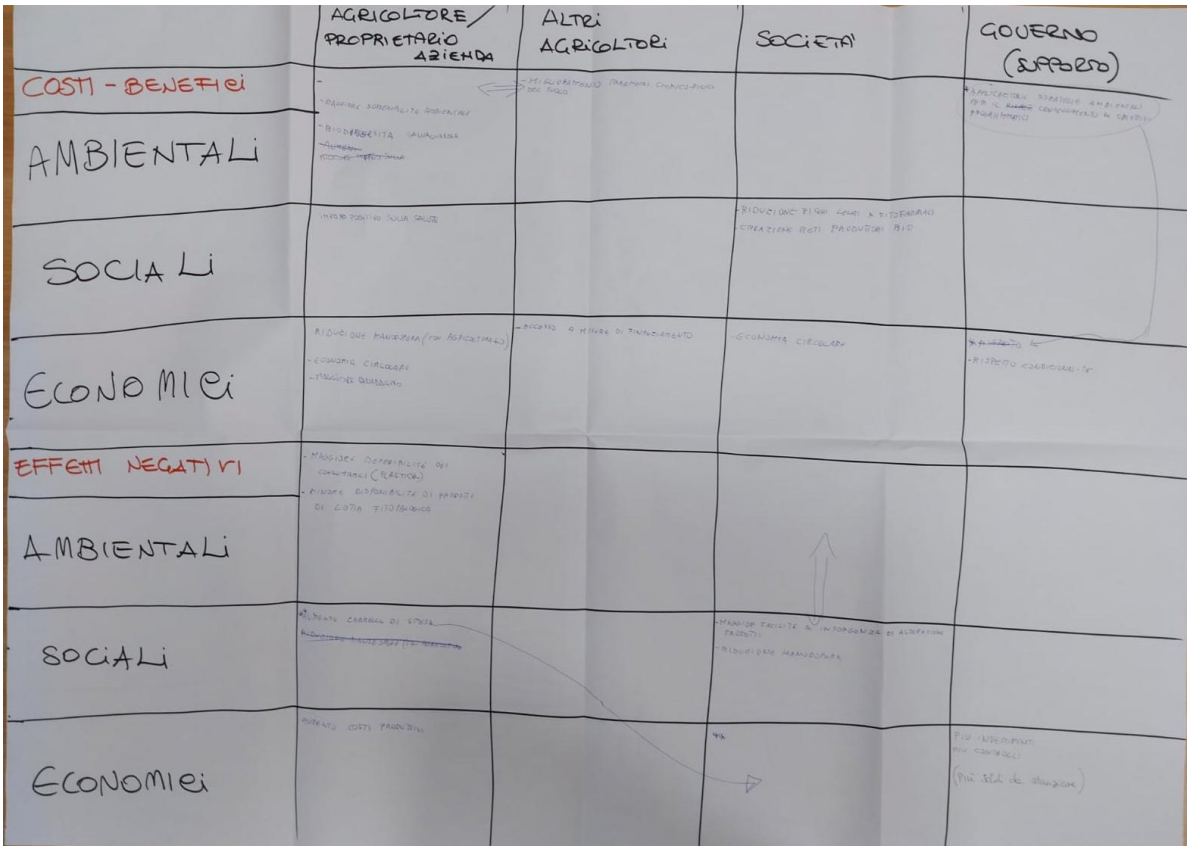
- The ongoing challenge of maintaining a reliable water supply as scaling efforts continue
- The need to simplify procedures to enable easier participation by smallholders
- The crucial role of farmer-to-farmer knowledge transfer
- The expectation for consistent public support and sustained political commitment

This final session helped strengthen the sense of collective ownership and responsibility among participants and also contributed to building momentum for future activities in the pilot area.

5 Stornara and Tarra, Italy

5.1 Preparing the discussion: Social justice enquiry

Hereafter is reported the photograph of the matrix elaborated by the Group



Main actor groups / Costs and benefits	Implementing farmer/land owner	Other farmers	General public	Government (support)
On-site benefits/costs				
Environmental benefits	Biodiversity safeguard. Soil improvement. Better physical-chemical properties of soil. More environmental sustainability.	Improve organic matter in the soil	/	Application of environmental strategies for reaching programmatic objectives
Social benefits	Positive impact of health		Risk reduction related to the reduction in pesticides. Creation of a network for organic producers.	/
Financial benefits	Reduction of labor costs. More income.	Access to subsidies	Circular economy.	Respect of conditionality.
Neg. environmental effects	More perishability of consumables (e.g. need for use of more plastic in packaging). Less availability of products for pest management.	/	/	/

Negative social effects	/	/	Products are exposed to more quality alteration. Less labor means less job opportunities.	
Financial costs	/	/	Increase of product prices.	More investments. More controls.

(2) Minutes from discussion of the effect of the distribution of benefits and costs on society/community for each group:

Stakeholders agreed that the benefits of the organic farming on farmers are related to ***biodiversity safeguard***, playing a crucial role in enhancing soil improvement (better physical-chemical properties of soil) and in fostering healthier ecosystems. From their point of view, these improvements support ***environmental sustainability*** by reducing the need for chemical fertilizers, minimizing soil erosion, and promoting ecosystem resilience to climate change. They argued that protecting biodiversity ensures that ***soil remains fertile and productive***, supporting long-term ecological health and agricultural viability.

Regarding the societal benefits, the participants discussed and reflected on the application of environmental strategies in reaching programmatic objectives, that from their point of view involves integrating sustainability principles and ecological considerations into organizational goals and operations. By adopting environmentally conscious practices in agriculture, organizations can align their actions with broader environmental and societal objectives. ***Overall, embedding environmental considerations into program planning and execution ensures that programmatic objectives are achieved in a way that benefits both the organization and the environment***.

Looking at financial benefits, participants agreed that ***the implementation of organic farming is connected to a reduction of labour and input costs***, due to the farming practices that organic methods promote, which often reduce the need for intensive labor compared to conventional farming. In fact, stakeholders stated that organic farming typically relies on natural techniques which can reduce the need for costly chemical inputs and frequent pesticide applications. These practices often require less constant intervention, as the soil health and ecosystem are generally more resilient, leading to fewer labor-intensive tasks. Additionally, participants argued that while from one side organic farming can be more labor-intensive in certain stages, over time, the reduced need for chemical input supply and management and more sustainable farming methods can lead to long-term reductions in overall labor costs.

Stakeholders agreed that the financial benefits for the public are in the connection with ***circular economy, that focuses on minimizing waste and maximizing the use of resources*** by promoting reuse, recycling, and the regeneration of natural systems. In fact, participants stated that ***organic farming embraces practices that enhance soil health, reduce environmental impact, and eliminate synthetic inputs***, promoting a more sustainable and regenerative approach to agriculture.

Looking at the negative effects, stakeholders discussed and agreed that as organic products often emphasize local, seasonal, and minimally processed goods, they tend to have a shorter shelf life and may require more careful handling and packaging to ensure freshness. Consequently, organic products require faster distribution and consumption within a shorter time frame to reduce spoilage. In addition, participants argued that the ***overall cost of production of organic farming is higher compared to conventional farming techniques, which, in turn, are passed on to consumers in the form of higher prices for organic products***. For the general public, furthermore, less labor due to technological advancements in organic farming can contribute to fewer job opportunities.

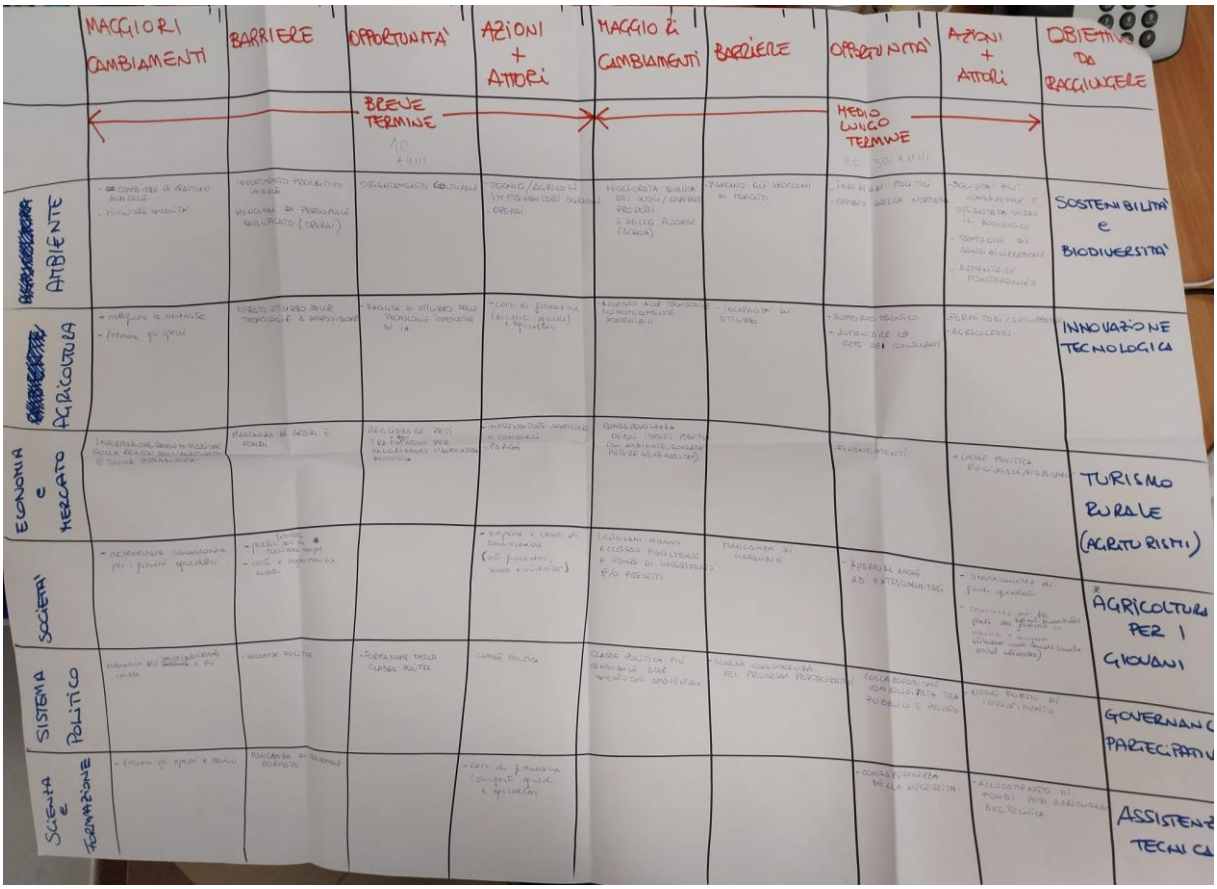
5.2 Identifying pathways to out- and upscaling: Backcasting

Description of the exercise and reflection

As for the previous session, during the backcasting exercise stakeholders worked in a unique group, having an open and fruitful discussion on the proposed elements (barriers, opportunities, actions and actors, major changes for short-, mid- /long-term) for different objectives. The exercise went well, with proactive and enjoyable participation by stakeholders.

Results

In the following picture is reported the template as produced by stakeholders:



SHORT-TERM	MID-LONG TERM
Objective: SUSTAINABILITY AND BIODIVERSITY **Major Changes:** Modify the agricultural practices; improve quality **Barriers**: High initial investment; Lack of qualified personnel (workman) **Opportunities:** Crop orientation; **Actors:** Workers; Farmers; agricultural entrepreneurs; technicians **Actions:** Implement sustainable farming practices as for example crop rotation and intercropping; reduce the reliance on chemical pesticides and fertilizers.	**Objective**: SUSTAINABILITY AND BIODIVERSITY **Major Changes:** Improved quality of soils, environment, products and resources **Barriers**: Lack of market **Opportunities:** Crop orientation (Crop orientation is intended as the choice of crops more oriented towards local climatic conditions and market opportunities) **Actors:** Workers; Farmers; agricultural entrepreneurs; technicians **Actions:** Adopt precision agriculture techniques as for example Integrate technologies and use data-driven decision-making.
Objective: TECHNOLOGICAL INNOVATION **Major Changes:** Change the mentality; Train workers **Barriers**: Wrong use of the available technologies **Opportunities:** Easy use of AI innovative technologies; **Actors:** farmers and agricultural managers **Actions:** provide access to affordable technology and training courses	**Objective**: TECHNOLOGICAL INNOVATION **Major Changes:** Access to technologies that are economically sustainable **Barriers**: Inability to use modern technologies **Opportunities:** Technical support; increase the consultant network **Actors:** developer; suppliers; farmers **Actions:** Facilitate collaborations between farmers and agricultural technology companies or universities to pilot new innovations
Objective: RURAL TOURISM **Major Changes:** Information and dissemination on rural tourism reality and potentiality **Barriers**: Lack of spaces and financial funds	**Objective**: RURAL TOURISM **Major Changes:** Awareness of positive impacts on environment, society, future generations **Barriers**: Limited understanding of rural tourism's potential **Opportunities:** Financing **Actors:** Political class at regional and national level

Opportunities: realize networks among bio-parks to valorise organic farming **Actors:** agricultural entrepreneurs; consortia ; park managers **Actions:** promote local culture, traditions and agriculture ; Create eco-tourism opportunities by highlighting natural attractions.	**Actions:** improve infrastructure and accessibility, invest in transportation
Objective: AGRICULTURE FOR YOUNG PEOPLE **Major Changes:** improve communication towards young farmers **Barriers**: limited participation (due to lack of time); costs for organizing events of dissemination **Opportunities:** integration of technology and innovation into farming practices **Actors:** government and policy makers; farmers **Actions:** enlarge communication channels; funding entities, schools, universities.	**Objective**: AGRICULTURE FOR YOUNG PEOPLE **Major Changes:** Young people have easy access to investment funds and/or loans **Barriers**: Lack of guarantees **Opportunities:** Openness to non-EU citizens **Actors:** government and policy makers; farmers **Actions:** Allocation of subsidized funds; communication by funding bodies and government through new channels (included social networks)
Objective: PARTICIPATIVE GOVERNANCE **Major Changes:** leaner regulations, clearer bureaucracy **Barriers**: Political will **Opportunities:** Proper Training of political class **Actors:** political class **Actions:** implement transparent policy-making processes, empower local agricultural leaders and cooperatives	**Objective**: PARTICIPATIVE GOVERNANCE **Major Changes:** Political class more aware of environmental issues **Barriers**: scarce knowledge of participative processes **Opportunities:** consolidated collaboration between public and private **Actors:** government and policy makers **Actions:** new forms of investment
Objective: TECHNICAL ASSISTANCE **Major Changes:** Training operators and technicians	**Objective**: TECHNICAL ASSISTANCE **Major Changes:** strengthen extension services with modern approaches

Barriers: lack of qualified personnel **Opportunities:** integration of digital platforms and mobile-based solutions **Actions (Actors):** training courses for agricultural managers and farmers	**Barriers**: low digital literacy among farmers **Opportunities:** awareness of the necessity of having a technical assistance **Actions (Actors):** Allocation of funds to ensure technical assistance

5.3 Descriptions and outcomes of additional sessions

An additional activity that was carried out during the workshop was the validation (and integration) of the indicators with stakeholders.

During the first phase, a discussion with stakeholders allowed to collect their opinion about the validity of the proposed list of indicators. After a fruitful exchange of ideas, stakeholders agreed on the list, and advanced a proposal to integrate the list with the following indicators per each criteria:

Criteria for selection	Indicators
Coordination and cooperation	n. of warning messages generated by the Civil Protection divided by risk (Flood, Landslides, Hydrogeological... but also Wind and Snow)
Climate change adaptation and mitigation	Analysis of Extreme events: a) rainy days with maximum intensity; b) consecutive rainy days; c) heat waves; d) number of consecutive days with temperatures above 35°
Education for sustainable development	climate risk and vulnerability assessment to ensure that is proportionate to the scope of the activity and to the expected duration

6 Tamia, Egypt

6.1 Preparing the discussion: Social justice enquiry

Restoration action: Chopping agricultural waste from crops and reusing it as organic fertilizer

Description of the exercise

Describe and explain the overall process and context of this exercise:

- ***How were groups formed? How many people were in each group?***

A total of 33 people attended the workshop, comprising 3 researchers, 3 agricultural engineers, and 27 farmers. The attendees were divided into three groups, with stakeholder roles carefully considered during the formation. Each group was assigned one agricultural engineer and was moderated by one of the researchers. The remaining members in each group were farmers, selected to ensure a mix of different ages. Prior to the main event, a preparatory meeting was held with the group leaders to review all workshop details and exercises.

- ***What were the steps you took to structure the exercise?***

A brief overview of the project was given, followed by a lecture on safe weeding methods. Participation was constructive, with interaction and questions being exchanged. This was followed by an introductory round of visualization exercises. Three groups (heterogeneous groups) were then formed.

Results of the exercise

Group 1

Figure 1: Collecting the answers to the social justice inquiry from the Tamia workshop (Group 1)

(1) costs and benefits of the restoration action and how these costs and benefits are distributed across actor.

Template for the social justice enquiry for each group: Group (1)

Indicate selected baseline: burning the agricultural waste from crops

Aspect	Item	Landowner		Neighbour Farmer		Agricultural Associations		Government Support	
On-site costs		Pays	Pays no	Pays	Pays no	Pays	Pays no	Pays	Pays no
	Shredding Machine		10		10		10		10
	Labour	10		10			10		10
	Storage Space	10		10			10		10
On-site benefits		Benefit	Benefit no			Benefit	Benefit no	Benefit	Benefit no
	Increased Soil Fertility	Yes				Indirect		Indirect	
	Reduced Weeds	Yes				Indirect		Indirect	
	Lower Production Costs	Yes				Indirect		Indirect	
	Reduced Soil Salinity	Yes				Indirect		Indirect	
	Increased Water Retention	Yes				Indirect		Indirect	

Additional information of the answers to the social justice inquiry from the Tamia workshop (Group 1)

Main actor groups / Costs and benefits	Implementing farmer/land owner	Other farmers	Civil and agricultural associations	Government (support)
On-site benefits/costs				
Environmental benefits	Increased soil fertility, Reduced weeds, Reduced soil salinity, Increased water retention	None directly	Indirect success in promoting sustainable practices	Indirect success in meeting environmental goals
Social benefits	Increased self-reliance, Knowledge gain from training	Potential for knowledge sharing	Achieved mandate to educate and support members, Network strengthening	Improved farmer welfare and resilience
Financial benefits	Lower production costs (reduced fertilizer purchases)	None directly	More economically stable members	Reduced need for fertilizer subsidies
Neg. environmental effects	None identified	None identified	None identified	None identified
Negative social effects	Labor burden if no support, Potential conflict if odors occur	Potential nuisance from odors or pests	None identified	Reputational risk if supported project fails
Financial costs	Full cost of machine, labor, and storage (as no one else pays)	None	None	None
Off-site benefits/costs				
Environmental benefits	Indirect from on-site benefits	Cleaner air (no burning), healthier waterways	Contribution to broader environmental goals	Improved public health, climate change mitigation (carbon sequestration), biodiversity
Social benefits	Indirect from on-site benefits	Better community health, potential for local collaboration	Enhanced public reputation	Reduced public health costs, increased rural stability
Financial benefits	Indirect from on-site benefits	Potential cost savings if they adopt the practice	Attraction of more members/funding	Reduced waste management costs, reduced public health expenditure
Neg. environmental effects	None identified	None identified	None identified	None identified
Negative social effects	None identified	None identified	None identified	None identified

Financial costs	None	None	Potential cost if they decide to fund projects	Potential cost if they decide to provide subsidies or grants

(2) reflection on how benefits/ costs are distributed across actor groups and what effect this has on the community. -> Minutes of the reflection on the effect of the distribution of benefits and costs on society/community as whole

1. On-Site Costs and Their Distribution

According to the participants' conclusions, the costs are not being covered by any of the listed stakeholders. This presents a significant barrier to adoption.
Shredding Machine: The high initial capital cost is a major hurdle. The consensus that no stakeholder will pay for it suggests a critical funding gap.
Labour: The process requires time and effort for collecting waste, operating the machine, and managing the compost pile. This cost is being absorbed entirely by the landowner/farmer implementing the practice, as no external support for labour is provided.
Storage Space: This refers to the land area dedicated to storing raw waste and the composting site. This opportunity cost (the land could be used for something else) is borne solely by the landowner.
Implication: The current cost distribution is highly inequitable and unsustainable. All tangible costs fall directly on the landowner who wishes to implement the practice, which actively discourages participation. For this restoration process to be scalable, a new cost-sharing model needs to be developed.

2. On-Site Benefits and Their Distribution

These are the benefits directly enjoyed on the farm where the organic fertilizer is produced and used.
Increased Soil Fertility: Improves crop yields and health. Primary Beneficiary: Landowner.
Reduced Weeds: (Assuming the composting process reaches temperatures high enough to kill weed seeds). Lowers weeding labour and costs. Primary Beneficiary: Landowner.
Lower Production Costs: Reduces or eliminates the need to purchase synthetic fertilizers.
Reduced Soil Salinity: Organic matter can help leach salts and improve soil structure, making land more productive. Primary Beneficiary: Landowner.
Increased Soil Water Retention: Reduces irrigation needs and makes crops more resilient to drought. Primary Beneficiary: Landowner.

3. Off-Site Benefits

These are positive impacts felt by the wider community and environment beyond the farm's boundaries.
Reduced Air Pollution: Prevents the common practice of open burning of crop waste, improving air quality for surrounding communities.
Beneficiaries: Local residents, neighbouring farms, general public.

Reduced Water Pollution: Improves soil structure and reduces runoff, preventing synthetic fertilizers and pesticides from leaching into groundwater and rivers.
Beneficiaries: Downstream communities, water treatment facilities, aquatic ecosystems.

Climate Change Mitigation
Carbon Sequestration: Adding organic matter to soil captures and stores atmospheric carbon.
Avoided Emissions: Prevents methane emissions from landfilled waste and CO2 emissions from producing and transporting synthetic fertilizers.
Beneficiaries: Global community, society at large.

Waste Reduction: Diverts agricultural waste from landfills, extending their lifespan and reducing associated management costs.

Beneficiaries: Local municipalities, waste management authorities.

Enhanced Biodiversity: Healthy soil with high organic matter supports a greater diversity of soil organisms, which can have positive ripple effects on local ecosystems.
Beneficiaries: The broader ecosystem.

Knowledge and Innovation: Successful implementation creates a local model for circular economy practices that other farmers can adopt.
Beneficiaries: Other farmers, agricultural extensions, research institutions.

The workshop exercise reveals a fundamental mismatch: the landowner bears all the costs but also receives all the on-site benefits. However, the high initial cost barrier prevents adoption. Meanwhile, wider society and government institutions gain significant off-site benefits for free. This analysis argues strongly for intervention by agricultural associations and government support. By subsidizing the cost of the shredding machine (e.g., through grants, low-interest loans, or cooperative ownership models) or providing incentives for ecosystem services, they can unlock a process that delivers vast public benefits. This would redistribute the costs more equitably among those who ultimately benefit, making the restoration process economically viable for the landowner.

Group 2

Figure 2: Collecting the answers to the social justice inquiry from the Tamia workshop (Group 2)

(1) costs and benefits of the restoration action and how these costs and benefits are distributed across actor.

Template for the social justice enquiry for each group: Group (2)

Indicate selected baseline: burning the agricultural waste from crops

Aspect	Item	Landowner		Neighbour Farmer		Investors		Government Support Agricultural/Civil Associations	
On-site costs		Pays	Pays no	Pays	Pays no	Pays	Pays no	Pays	Pays no
	Shredding Machine		10		10	9	1	10	
	Labour	10		10		9	1	10	
	Storage Space	10		10		9	1	10	
On-site benefits		Benefit	Benefit no			Benefit	Benefit no	Benefit	Benefit no
	Improved Soil Fertility	Yes				Indirect		Indirect	
	Reduced Soil Salinity	Yes				Indirect		Indirect	
	Enhanced Water Retention	Yes				Indirect		Indirect	
	Improved Soil Properties	Yes				Indirect		Indirect	
	Elimination of Soil Degradation	Yes				Indirect		Indirect	
	Reduced Fertilizer Costs	Yes							

(2) reflection on how benefits/ costs are distributed across actor groups and what effect this has on the community. -> Minutes of the reflection on the effect of the distribution of benefits and costs on society/community as whole

1. On-Site Costs and Their Distribution (Second Group's View)

The second group's consensus reveals a potential pathway to overcoming the financial barrier identified by the first group.

Shredding Machine: The high capital cost is not to be borne by the landowner or neighbour. Instead, it is expected to be covered by investors, agricultural/civil associations, or government support.
Investors might pay for the machine expecting a financial return (e.g., a share of the fertilizer produced or cost savings).

Associations/Government might pay as a grant or subsidy to promote ecosystem restoration and sustainable practices.

Labour and Storage Space: The distribution here is flexible. The landowner, neighbour, investors, or supporting organizations could contribute.
This suggests a model of shared responsibility, such as:
The landowner provides the land (storage space) and labour.
A neighbour provides labour in exchange for a share of the compost.
An investor provides logistical support.
An association organizes volunteer labour from its members.
Dissenting Opinion: One participant disagreed that investors had no role. This reinforces the idea that private investment is a viable and potentially crucial mechanism for funding the initial cost of the machine, moving beyond purely grant-based support.
2. On-Site Benefits and Their Distribution (Second Group's View)
The benefits listed are more focused on soil restoration and economic savings.
Reducing Soil Salinity & Enhancing Water Retention: Improves the land's productivity and resilience to drought.
Primary Beneficiary: Landowner.
Improving Soil Fertility & Properties: Leads to higher and better-quality crop yields. Primary Beneficiary: Landowner.
Eliminating Soil Degradation: This is a major long-term benefit, restoring the health of the land and ensuring its viability for future generations.
Primary Beneficiary: Landowner and Society.
Reduced Cost of Purchasing Mineral Fertilizers: This is the direct financial benefit that offsets production costs.
Primary Beneficiary: Landowner.

3. Off-Site Benefits

Environmental Benefits: Reduced air pollution (from avoiding waste burning), reduced water pollution (from preventing chemical fertilizer runoff), carbon sequestration in the soil, and enhanced biodiversity.
Social Benefits: Improved public health from better air and water quality, knowledge transfer and community resilience, and reduced conflict over natural resources.
Financial Benefits (for public bodies): Reduced government spending on waste management, public health services, and environmental clean-up. Agricultural associations benefit from more sustainable and profitable members.

The perspective of the second group is more optimistic and solution-oriented than the first. They explicitly identify potential payers for the largest cost (the machine) and propose a collaborative model for sharing other costs (labour and storage).

Additional information of the answers to the social justice inquiry from the Tamia workshop (Group 2)

Main actor groups / Costs and benefits	Implementing farmer/land owner	Other farmers	Investors	Civil and agricultural associations/Government (support)
On-site benefits/costs				
Environmental benefits	Reduced soil salinity, Enhanced water retention, Improved soil fertility & properties, Eliminated soil degradation	None directly	N/A	Indirect success in promoting sustainable practices & healthy ecosystems/Indirect success in meeting environmental goals
Social benefits	Increased self-reliance, Knowledge gain, Community standing	Potential for knowledge sharing and collaboration	N/A	Achieved mandate, strengthened member network, enhanced reputation/ Improved rural welfare and resilience
Financial benefits	Reduced cost of purchasing mineral fertilizers	None directly	Return on Investment (e.g., share of product/cost savings)	More economically stable and productive members/ Reduced need for fertilizer subsidies
Neg. environmental effects	None identified	None identified	None identified	None identified
Negative social effects	Labor burden if no support, Potential conflict if odors occur	Potential nuisance from odors or pests	Reputational risk if project fails	Reputational risk if supported project fails
Financial costs	Possible contribution to labor or storage space	Possible contribution to labor or storage space	Pay for the shredding machine	Could pay for the machine, contribute to labor or storage
Off-site benefits/costs				
Environmental benefits	Indirect	Cleaner air (no burning), healthier waterways	N/A	Contribution to broader regional environmental goals/ Improved public health, climate change mitigation, biodiversity, cleaner water
Social benefits	Indirect	Better community health, strengthened local ties	N/A	Enhanced public reputation and influence/ Reduced public health costs, increased rural stability
Financial benefits	Indirect	Potential cost savings if they adopt the practice	N/A	Attraction of more members/funding/ Reduced waste management costs, reduced public health expenditure, more robust agricultural economy
Neg. environmental effects	None identified	None identified	None identified	None identified
Negative social effects	None identified	None identified	None identified	None identified

Financial costs	None	None	Capital risk on machine investment	Financial cost if they fund the machine or projects

Group 3

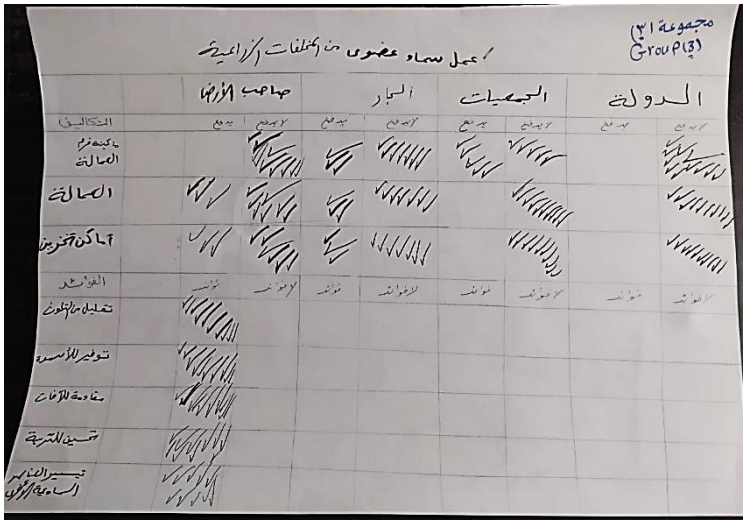


Figure 3: Collecting the answers to the social justice inquiry from the Tamia workshop (Group 3)

(1) costs and benefits of the restoration action and how these costs and benefits are distributed across actor.

Template for the social justice enquiry for each group: Group (3)

Indicate selected baseline: burning the agricultural waste from crops

Aspect	Item	Landowner		Neighbour Farmer		Agricultural Associations		Government Support	
On-site costs		Pays	Pays no	Pays	Pays no	Pays	Pays no	Pays	Pays no
	Shredding Machine		10	3	7	5	5		10
	Labour	3	7	3	7		10		10
	Storage Space	3	7	3	7		10		10
On-site benefits		Benefit	Benefit no			Benefit	Benefit no	Benefit	Benefit no
	Reducing pollution	Yes				Indirect		Indirect	
	Saving fertilizers	Yes				Indirect		Indirect	
	Resisting pests	Yes				Indirect		Indirect	
	Improving soil properties	Yes				Indirect		Indirect	
	Facilitating the availability of other fertilizer elements	Yes				Indirect		Indirect	

(2) reflection on how benefits/ costs are distributed across actor groups and what effect this has on the community. -> Minutes of the reflection on the effect of the distribution of benefits and costs on society/community as whole

1. On-Site Costs and Their Distribution (Third Group's View)

The third group's opinions show a lack of consensus, creating uncertainty and high risk for the landowner.

Shredding Machine:

Landowner: Would not pay (majority view), but a minority (30%) believe they could share the cost.

Neighbour Farmer: Would not pay (70% majority), but a minority (30%) believe they could share the cost.

Agricultural Associations: Deeply split. 50% believe they could provide support, 50% believe they would not.

Government Support: unanimous agreement that there would be no government funding for the machine.

Labour and Storage Space:

Landowner/Neighbour: A strong majority (70%) believes neither the landowner nor the neighbour will contribute labour or storage. A minority (30%) believe they could.

Associations/Government: Unanimous agreement that they will not contribute to labour or storage costs.

Summary of Cost Distribution: The outcome is highly uncertain. The most likely scenario, based on the majority views, is that the landowner is left alone to bear all costs (machine, labour, storage), with a small chance of sharing the machine cost with a neighbour or receiving association support. This represents the highest risk scenario for the implementing farmer.

2. On-Site Benefits and Their Distribution (Third Group's View)

The benefits identified are a mix of environmental, agronomic, and economic factors.

Reducing Pollution: Primarily refers to on-site pollution from waste disposal (e.g., burning). **Primary Beneficiary:** Landowner and immediate environment.

Saving Fertilizers: This is the direct financial benefit from reduced need to purchase mineral fertilizers. Primary Beneficiary: Landowner.

Resisting Pests: Healthier soil and plants can lead to increased resistance to pests and diseases. Primary Beneficiary: Landowner.

Improving Soil Properties: Enhances soil structure, nutrient content, and biodiversity. Primary Beneficiary: Landowner.

Facilitating the availability of other fertilizer elements: Improves the soil's ability to mobilize and retain nutrients. Primary Beneficiary: Landowner.

Distribution: As with the other groups, the landowner is the direct and primary recipient of all on-site benefits, provided they can overcome the significant cost barriers.

3. Off-Site Benefits (Applicable to All Groups)

These positive externalities remain consistent and are a strong argument for why other stakeholders should support the landowner.

Environmental Benefits: The group's mention of "reducing pollution" has a major off-site component: improved air quality (from preventing burning) and improved water quality (from reducing chemical fertilizer runoff).

Social Benefits: Improved public health from cleaner air and water.

Financial Benefits (for public bodies): Reduced government spending on waste management, public health services, and environmental remediation.
Beneficiaries: The wider community, future generations, and governmental institutions.

Additional information of the answers to the social justice inquiry from the Tamia workshop (Group 3)

Main actor groups / Costs and benefits	Implementing farmer/land owner	Other farmers	Civil and agricultural associations	Government (support)
On-site benefits/costs				
Environmental benefits	Reduced pollution (on-site), Improved soil properties, Resisting pests	None directly	Indirect success in promoting better practices	Indirect success in environmental goals
Social benefits	Increased knowledge, Community standing	Potential for knowledge sharing	Achieved mandate, member support	Improved agricultural sustainability
Financial benefits	Saving fertilizers (reduced purchase costs)	None directly	More economically stable members	Reduced fertilizer subsidy burden
Neg. environmental effects	None identified	None identified	None identified	None identified
Negative social effects	High personal burden, Potential for isolation/conflict	Potential nuisance from odors/pests	Reputational risk	Reputational risk
Financial costs	Possible share of shredder cost (30%), Full burden of labor & storage (70% likely)	Possible share of shredder cost (30%), No labor/storage (70% likely)	Possible support for shredder (50% likely), No labor/storage	No support for shredder, No labor/storage
Off-site benefits/costs				
Environmental benefits	Indirect	Reduced air/water pollution, healthier ecosystems	Contribution to broader environmental goals	Improved public health, reduced pollution cleanup costs, biodiversity
Social benefits	Indirect	Better community health	Enhanced public reputation	Reduced public health costs
Financial benefits	Indirect	Potential future cost savings	Attraction of members/funding	Reduced waste management and public health expenditure
Neg. environmental effects	None identified	None identified	None identified	None identified
Negative social effects	None identified	None identified	None identified	None identified
Financial costs	None	None	Financial cost if they fund projects (50% likely)	None

6.2 Finding common ground: Revisiting the vision

Description of the exercise

The following was followed until multiple viewpoints were brought together into one unified vision that all attendees could support.

Presentation: The three distinct visions from previous groups were presented to all attendees to establish a common starting point.

Synthesis and Discussion: The group discussed the visions to identify common ground, integrate unique ideas, and refine the language, creating a single draft vision structured around four pillars: **Agriculture, Resources and Environment, Economics and Technology, and Social System.**

Structured Feedback: Attendees tested the draft vision using guided questions to ensure it was robust and complete:

Gut Reaction: To gauge initial emotional response and buy-in.

Likes: To identify strengths and build consensus.

Dislikes: To surface concerns and criticisms.

Missing Elements: To ensure no critical priorities were overlooked.

Final Compilation and Commitment Check: Feedback was compiled in a plenary session. The facilitator made a final call for missing items and then asked the crucial question: "Does this vision represent a future you would like to work toward?" This served as the ultimate test for group alignment and commitment to the final vision.

The initial vision that was presented:

Agriculture
• Increase productivity and production quality • Cultivate new and improved crop varieties • Ensure availability of high-quality seeds, natural fertilizers, and safe pesticides • Effectively combat pests and diseases (e.g., palm weevil) • Adopt modern cultivation methods (e.g., greenhouses) • Localize the cultivation of valuable cash crops and fruits
Resources and Environment
• Increase the abundance and quality of irrigation water • Adopt sustainable water practices (use of treated wastewater) • Implement high-tech water desalination and treatment • Reduce environmental pollution and ensure a clean environment
Economics and Technology
• Use the latest technological systems and advanced mechanization • Implement modern and smart irrigation management • Develop markets and increase agricultural exports • Cultivate high-value cash crops for economic growth
Social System
• Ensure equitable distribution of resources (water, fertilizers) • Eradicate poverty and ensure educational equity • Prevent the migration of youth from agriculture • Promote happiness, progress, and prosperity in rural communities

Results

Positive reactions (What they liked):

Hope for the Future: They felt the vision addressed core problems like poverty, water scarcity, and youth migration, giving them a clear goal to work toward.

Inclusivity: They appreciated that the vision included social justice (equitable distribution) and environmental care (clean environment), not just profit.

Balance: They liked that the vision balanced modern technology (to improve yields and income) with the protection of their traditional knowledge and community values.

Concerns and Criticisms (What they disliked or questioned):

"How?" The biggest concern was likely about implementation. How will a poor community access this technology? Who will pay for it? Who will train us?

Fear of Being Left Behind: Some may have worried that only the wealthiest farmers would benefit from new programs, exacerbating inequality.

Scepticism: Some may have felt the vision was too idealistic and doubted whether agencies and governments would truly provide the necessary support.

Overall, the answer to the final question—"Does this vision represent a future you would like to work toward?"—was likely a resounding YES. The vision successfully integrated their needs and aspirations. The concerns were not rejections of the vision itself, but rather critical questions about the practical path forward, indicating a desire to roll up their sleeves and start the work.

Adaptations to the vision	
added	• A bullet point was added under Social System or Agriculture stating: Recover, protect, and integrate positive traditional agricultural knowledge and practices. • A new point was added under Economics and Technology: Develop diversified income sources through multifunctional agriculture (e.g., agri-tourism, processing of local produce, direct sales to consumers). • A point may have been added under Economics and Technology: Ensure fair access to credit and grants for smallholder farmers to invest in new technologies and inputs.
Left out	• "Using the latest technological systems" could be improved to be more specific (eg, "Adopting modern, affordable irrigation systems"). • Highly Expensive Technologies with Long Timelines: While "high-tech water desalination" remained as an aspirational goal, the group likely focused more on immediate, achievable solutions.

Final vision:

Agriculture

- Increase productivity and production quality
- Cultivate new and improved crop varieties
- Ensure availability of high-quality seeds, natural fertilizers, and safe pesticides
- Effectively combat pests and diseases (e.g., palm weevil)
- Adopt modern cultivation methods (e.g., greenhouses)
- Localize the cultivation of valuable cash crops and fruits
- **Recover, protect, and integrate positive traditional knowledge and practices**
- **Promote crop and income diversification (e.g., agri-tourism, local processing)**

Resources and Environment

- Increase the abundance and quality of irrigation water
- Adopt sustainable water practices (use of treated wastewater)
- ~~Implement high-tech water desalination and treatment~~ (Refocused on more immediately viable solutions)
- Reduce environmental pollution and ensure a clean environment
- **Protect and restore local ecosystems and soil health**

Economics and Technology

- Use **appropriate and affordable** technological systems and advanced mechanization
- Implement modern and smart irrigation management
- Develop markets and increase agricultural exports
- Cultivate high-value cash crops for economic growth
- **Ensure fair access to credit, grants, and funding for smallholder farmers**
- **Develop local capacity for maintenance and repair of technology**

Social System

- Ensure equitable distribution of resources (water, fertilizers)
- Eradicate poverty and ensure educational equity
- Prevent the migration of youth from agriculture **by making it a profitable and respected profession**
- Promote happiness, progress, and prosperity in rural communities
- **Strengthen community-led organizations and cooperatives**

6.3 Identifying pathways to out- and upscaling (Backcasting exercise)

Description of the exercise and reflection

Two groups were formed from a total of 14 participants. The division was purposeful, designed to tackle the scaling challenge from two distinct but complementary angles. This ensured that both the practical (on-the-ground) and political (enabling environment) perspectives were thoroughly explored.

The composition of each group was carefully considered to leverage diverse expertise:

Group 1 (Outscaling - Practitioner Focus): This group consisted of one researcher, two agronomists, and four farmers. This mix was chosen to ground the discussion in practical reality. The farmers provided first-hand knowledge of barriers and incentives, the agronomists acted as bridges between science and practice, and the researcher helped structure the thinking and consider evidence-based approaches.

Group 2 (Upscaling - Policy & Condition Focus): This group consisted of two researchers, two agronomists (one from a cooperative), and three farmers. The higher number of researchers and the inclusion of a cooperative agronomist equipped this group to think more strategically about systems change, policy design, and building institutional support networks, while the farmers ensured these ideas remained feasible and relevant.

The exercise was structured using the backcasting methodology, which involves starting from a desired future and working backwards to identify necessary actions.

Setting the Vision (The "Future"): We began by clearly restating the long-term vision for 2045: "A region where on-farm compost production from crop waste is the default, widespread practice." This was kept visible throughout the exercise to serve as a guiding star.

1. Step 1 - Major Changes: I asked each group to project themselves to 2045 and describe what had been achieved in terms of Restoration Actions, Local Community, Local Markets & Economy, and Local Environment. This generated "Major Changes" (Yellow cards), painting a picture of success.
2. Step 2 - Barriers & Opportunities: Working backwards from that ideal future, I prompted the groups to discuss: "What obstacles did you face to get here? What opportunities did you leverage?" This identified "Barriers" (Orange cards) and "Opportunities" (Green cards).
3. Step 3 - Actions & Actors: This was the most crucial step. I asked: "So, what specific actions were needed to overcome those barriers and seize those opportunities? And who was responsible for making it happen?" This forced the groups to move from abstract ideas to concrete "Actions and Actors" (Red cards). I encouraged everyone, including researchers, to ask themselves, "What can I/we do?"

Synthesis and Sharing: After the group work, each table presented their roadmap. This allowed for cross-pollination of ideas and highlighted the distinct yet interconnected pathways of Outscaling (Group 1) and Upscaling (Group 2).

The exercise was highly successful and engaging.

People got really into it. The coloured cards were a big hit—it made things hands-on and let everyone, even the quiet folks, easily put their ideas on the table.
In the first group, the farmers were really honest about the tough stuff, like how much equipment costs and where to find the time to do this.
In the second group, the researchers were great at figuring out the big-picture plans to make it all work.
The best part was asking everyone, "Okay, but what can you actually do about it?" That question really changed the mood. You could see lightbulbs going off. Farmers started seeing themselves as teachers who could show others, and researchers remembered that their ideas need to work in the real world, not just on paper.
From my point of view, it went great. Breaking it down into steps kept everyone from just complaining about today's problems. Imagining the future first got people thinking positively.
The hardest job was pushing people to be specific. It's easy to say "someone should give us money," but it's harder to say "we will form a group and apply for that grant next month."
In the end, each group built their own step-by-step plan. Because they built it themselves, they really believed in it and knew exactly what to do next.

Results

Group 1

Figure 4: Picture of the results of break-out group 1 Outscaling

Group (1) Outscaling: farmers, farm advisers, land managers and supply chain organisations (suppliers, retailers, cooperatives etc.), administration, scientists

	Short-term (5 years)				Mid-term to long-term (10-20 years)				Short-term (5 years)
	Major change	**Barriers**	**Opportunities**	**Actions (actors)**	**Major change**	**Barriers**	**Opportunities**	**Actions (actors)**	**Elements achieved**
RESTORATION ACTION	Benefits and costs of compost production are clear and demonstrated	High bureaucratic burden for support; No simple compost quality verification	Ministries support RA widely; Lower yields of transition are compensated	Farmers are convinced of RA; Trustworthy certification process is established	Restoration action is profitable and routine; Strong farmer conviction	Overcome from short-term	Carbon farming can provide additional income	Training of advisers and extension services (by Ministries, Cooperatives); Advisers know about and recommend Restoration action	On-farm composting is the default, profitable practice for over 95% of farms. Shredders are affordable and shared.
LOCAL COMMUNITY	Benefits of compost for food quality are clearly communicated; Awareness about on-farm environmental benefits grows	Changing consumer mentality takes time	Young farmers are strong supporters; Local community is receptive; Research and communication of benefits (by NGOs, Science)	Communication and PR (by grocery stores, non-governmental organizations)	High awareness of environmental and health benefits is standard	Overcome from short-term	Integrated into major change	Ongoing communication efforts	The community takes pride in its sustainable leadership. Healthy soil and food are common values.
MARKETS	Niche markets for "compost-grown" produce emerge	Profits are lower during the transition period	Farmer-to-farmer groups spread knowledge (Cooperative, Associations);	Contracts and networks with stores and restaurants are formed	Strong market for produce from restored soil; Organic supply	Overcome from short-term	Spread knowledge & networking (e.g., organic	Funding of start-ups for equipment (Regional economic	A circular economy model thrives with local businesses

			Exclusive local organic supply stores appear		ecosystem is established		farming organisations)	support institutions)	supporting composting. Costs for waste disposal and fertilizers are drastically reduced.
LOCAL ENVIRONMENT	Reduced open burning of waste, improved air quality	(Initial slow progress)	Measurable initial improvements in soil health on pilot farms	Monitoring by Researchers, Farmers	Soils are fertile, drought-resilient, and have high water retention; Biodiversity increases	Overcome from short-term	Carbon sequestration becomes a significant ecosystem service	Continued stewardship by Landowners	Soils are highly fertile and sequester carbon. Waterways are cleaner, and biodiversity has significantly increased. The farm environment is resilient.

Feedback from silent discussion - Group 1

- Need for clear, simple info: People want easy-to-understand guides and steps on how to actually make and use the compost, without confusing terms.
- Cost is a big problem: Everyone is worried about the high price of the shredding machine and the extra work needed. They want help with funding or finding ways to share costs.
- Want proof it works: Farmers need to see real examples and solid evidence that this method improves soil and saves money before they fully commit.
- Better cooperation needed: People want easier ways to connect—like farmer groups or co-ops—to share machines, knowledge, and support.
- Less paperwork: Many are frustrated by complex application processes for grants or subsidies and want simpler ways to access support.

Action agenda - Group 1

- What Stakeholders Want to Do with the Information:
  Some participants considered using the information to push for better support. Some, who could help, presented the plans to government agencies and said, "This is what we need to make this project successful: assistance with machinery costs, reduced paperwork, and useful training." Everyone recognized the importance of bringing together diverse groups (farmers, researchers, and agricultural engineers). They wanted to continue this dialogue and meet again to monitor progress and support each other.
- Proposed Agenda of Activities:
  Encourage them to talk to decision makers: How to organize a meeting with people from the Ministry of Agriculture or a funding agency to present the plan and request specific support.

Group 2

Figure 5: Picture of the results of break-out group 2 Upscaling

Group Upscaling: policy makers, education, NGOs and consumer groups, scientists

	Short-term (5 years)				Mid-term to long-term (10-20 years)				Short-term (5 years)
	Major change	**Barriers**	**Opportunities**	**Actions (actors)**	**Major change**	**Barriers**	**Opportunities**	**Actions (actors)**	**Elements achieved**
(AGRICULTURAL) POLICY	A national policy dialogue on circular agriculture is initiated.	No subsidies for transitional costs; Policy frameworks favor conventional practices	Provides a political opportunity for new programs	Lobby for grants & tax breaks for shredder purchases (Farmers' Unions, NGOs); Simplify subsidy application processes (Ministry of Agriculture)	Circular agriculture" is a core pillar of national farm policy; RA integrated into national subsidies		Optimal utilization of financial resources	Leverage EU Green Deal funds for national programs (Policymakers); Create laws that reward carbon sequestration (Government)	Policies actively support and reward circular practices as the standard.
EDUCATION AND RESEARCH	The first official pilot programs for RA training and research are launched.	Lack of applied, practical research on compost benefits for local conditions; RA not in standard curriculum	High interest from students & farmers in sustainable methods	Develop practical RA curriculum for agricultural schools (Researchers, Ministry of Education); Start pilot studies on compost	RA knowledge is standard in adviser & farmer training; National research center for circular agriculture			Launch long-term studies on soil health & carbon sequestration (Universities); Train the trainers on RA (Extension Services)	The country is a leading knowledge hub for profitable, circular farming.

				benefits (Universities, Research Institutes)	is established				
RELATION BETWEEN SOCIETY AND AGRICULTURE	A sustained public conversation about soil health begins.	Public disconnect from farming practices; Lack of awareness	High consumer interest in sustainable and healthy products	PR campaigns on the link between compost, healthy food, and a healthy environment (NGOs, Media); Organize farm open days (Farmers, Communities)	"Compost-grown" is a recognized & trusted label for consumers; Citizens see farmers as stewards of the land			Create education programs for schools (Teachers, Farmers); Develop a trustworthy "Compost-Grown"	A strong social contract exists; consumers actively support sustainable farms, and farmers are valued for ecosystem services.

Feedback from silent discussion - Group 2

- Many participants, especially farmers, said they need to see solid evidence from real farms in their area that shows compost improves soil and saves money before they invest time and money.
- The biggest worry for almost everyone is the price of the shredder. People want to find ways to share the cost, like community ownership or rental programs, and need help getting grants.
- People learn best by doing. There's a strong desire for hands-on training workshops, demonstration plots they can visit, and simple, picture-based guides instead of complicated manuals.
- Participants want to build local networks—like a compost co-op or a farmer group—to share equipment, knowledge, and help each other solve problems.
- They want support systems that are easy to access and understand, with less bureaucracy.
- Farmers want help finding markets and customers who will appreciate and pay for food grown with compost, perhaps through a special label or partnership with local stores.

Action agenda - Group 2

- What Stakeholders Want to Do with the Information:

They recommended to use the collected information and roadmap as evidence to lobby policymakers for supportive legislation, such as subsidies for shredders, tax incentives for circular practices, and simplified grant applications.
The information can be used to develop new training modules and curricula for agricultural schools and extension services, ensuring future farmers and advisers learn about compost production as a core skill.
Stakeholders want to use the information to launch public awareness campaigns that explain the benefits of compost-grown food and regenerative farming, helping to build consumer trust and demand.
The identified gaps in knowledge (e.g., long-term soil carbon sequestration rates) will be used to direct university and institutional research towards practical, applied science that supports farmers.

- Proposed Agenda of Activities:

Create a task force with representatives from farmers' unions, NGOs, and research bodies to formally present the policy recommendations to the Ministry of Agriculture.
Organize a workshop with educators, researchers, and practitioners to design the new curriculum and training materials for agricultural schools.
Develop and test a "Compost-Grown" certification or label with a group of pilot farms and stores to build consumer recognition.
Write joint research proposals between universities and cooperatives to secure funding for long-term studies on the environmental and economic impacts of large-scale compost use.
Schedule a yearly meeting of all stakeholders to review progress, adapt strategies, and share success stories to maintain momentum.

Feedback from the silent discussion - Group 3

- We need to see local, real-life examples and solid evidence that this method saves money and improves soil before investing.
- A shredder is expensive. We need help with funding, grants, and practical cost-sharing ideas, such as rental programs or cooperatives.
- We learn by doing. We want practical workshops, demonstration farms to visit, and simple visual guides—not complicated manuals.
- We want to connect with other farmers. Help us form groups or cooperatives to share knowledge and equipment and support each other.
- Make it easier to get help. We want simpler applications for grants and subsidies, with less paperwork.

- Help us find customers who value and pay for food grown this way, through special labels or partnerships with local stores.
- Provide simple, step-by-step instructions on how to make and use compost, without confusing technical jargon.

Action agenda - Group 2

Participants are engaged and see the potential value of on-farm compost production, but their adoption depends on seeing proof, getting financial help, learning by doing, working together, and operating within a simpler, more supportive system that rewards their efforts.

6.4 Pilot area leader: Feedback on workshop

	Agree	Rather agree	Rather disagree	Disagree
The optional method for the "introduction round" was adequate to get the stakeholders acquainted with each other.	√			
Comments:				
The exercise "social justice enquiry" was adequate to reflect on the distribution of costs and benefits of the restoration action and its effect on society.		√		
Comments:				
The backcasting exercise was adequate to guide participants in composing an agenda of activities required to reach the desired future state.		√		
Comments:				
The supplementary material provided (schedule, checklists, method guide) by WP3 was useful and effective:				
• Schedule	√			
• Checklists	√			
• Method guide	√			
The workshop material provided (presentations, questionnaires) by WP3 was useful and effective:				
• Presentations	√			
• Questionnaires	√			
• The workshop strengthened the ties between stakeholders.	√			
• The workshop supported us in understanding the needs of and next steps within our ERLL.		√		
In general, about workshop 3 I especially liked: The exercise was very difficult for the stakeholders.				
As recommendations for other PALs, in my opinion this was crucial to prepare and implement the workshop well: Many stakeholders requested awareness-raising workshops on the problems they face and ways and means of solving them.				
For workshop 4 (planning, preparation, implementation) of my ERLL, I would recommend: The next workshop could be prepared with some models and presentations of the most important available technologies that were discussed in the workshop. Such as technologies related to the use and recycling of plant waste as natural sources of fertilization.				

Next time, what would I do differently? I will hold field days for farmers, and the actual results of methods and agricultural practices to combat soil salinity resistance that have been implemented in the region will be presented.
Considering the participants, would you recommend other approaches (presentations, interviews, less/more writing) that are more suitable for the capabilities and preferences of your stakeholders? Please explain. Stakeholders need to combine personal interviews in the field, which are best for them, and presentations, which contain the most important problems they face and ways to solve them.
Is there anything else you wish to share? Stakeholders felt that the exercise was a routine, with issues being raised without solutions. This was because the exercise was too difficult for stakeholders.

6.5 Next steps for the ERLL

Statistical analysis and presentation of field experiments results and writing of a research paper for relevant authorities, to arrive at appropriate recommendations for relevant authorities.

7 Troodos Mountains, Cyprus

7.1 Preparing the discussion: Social justice enquiry

Formation of Groups: instead of forming small groups for the social justice enquiry, the suggested exercises were conducted as an inclusive discussion (prior and during the event) followed by a structured questionnaire; the questionnaire was given to 14 selected stakeholders out ~35 participants. This approach allowed wider discussion (and narrowed focus when it comes to responses) and allowed stakeholders to reflect on and document their perspectives individually; the participants left out were mostly sommeliers and wine traders/shop owners that had little relevance to the restoration action. The 14 participants represented diverse backgrounds, including vine-growers/winner managers (producers), agricultural officers (rural policy and viticulture), local action group representatives, agricultural consultants, local community members and researchers.

Figure 4: Ektoras Tsiakkas explaining the terrace system at Petralona, one of the highest terraced vineyards in Cyprus; this site was equipped with soil moisture sensors and weather station as part of REACT4MED project

Figure 5: Demetri Walter showing the Kyperounda terraced vineyards

Steps to Structure the Exercise:

- Pre-discussion Introduction: The restoration action (mountain terraces*) and its importance for sustainable agriculture and ecosystem services were presented during the event. This included contextualizing the topic within the goals of the REACT4MED project.

* The restoration action focuses on mountain terraces, which includes both traditional and modern/mechanised terracing systems; both systems aim to address soil erosion. Mechanised terraces were highlighted as a potential innovation in the visioning exercise of the 1st and 2nd ERLLs. They are considered relevant for modernising mountain agriculture by easing farming practices, through the use of machinery and reducing labour intensity. This was though to align with the broader goals of adapting traditional terrace systems to current challenges, such as climate change and socio-economic pressures.

Considering the lack of guidelines for mechanised terraces (as indicated by stakeholders), mechanised terraces is the main focus and restoration action assessed in Cyprus.

- Open Discussion: Attendees were encouraged to exchange ideas and share experiences during the event, particularly focusing on the perceived costs and benefits of terraces on-site (within the farm) and off-site (in adjacent and further communities).
- Questionnaire Distribution: Following the open discussion, a structured questionnaire (provided in Greek) was distributed to capture detailed responses from participants regarding the social, economic, and environmental impacts of the restoration action. This method allowed for systematic documentation and evaluation of viewpoints (Fig. 4).

Figure 6: Discussions and completion of questionnaire during the 3rd ERLL in Nicosia, Cyprus

Results of the exercise

(1) costs and benefits of the restoration action and how these costs and benefits are distributed across actor -> so that the costs, benefits, respective actor groups are understandable for someone who has not participated in the exercise

(2) reflection on how benefits/ costs are distributed across actor groups and what effect this has on the community. -> Minutes of the reflection on the effect of the distribution of benefits and costs on society/community as whole

(1) Costs and Benefits of the restoration action and their distribution

The restoration action analysed – terraces primarily constructed with mechanised means, see baseline below – was evaluated through stakeholder input (discussion) and questionnaire responses. The identified costs and benefits are categorised as on-site and off-site impacts and distributed across key actor groups.

Baseline: Agricultural terraces (mechanised or traditional/abandoned)

- Mechanised terraces: Mechanised terraces that may have been implemented without sufficient hydrological or environmental planning, potentially causing erosion, soil compaction, or habitat disruption.
- Traditional or abandoned terraces: Manually constructed terraces that, while culturally valuable, are less effective in addressing modern agricultural and environmental challenges. This includes previously managed traditional terraces that are now abandoned, leading to increased soil erosion, water runoff, and loss of agricultural productivity.
- In either system, there is currently limited or no hydrological planning/assessment when terraces are designed; they rely on empirical knowledge/design.

On-Site Costs and Benefits:

Costs and Benefits	Implementing Farmer/Landowner	Other Farmers	General Public	Government (Support)

Environmental Benefits	Improved soil quality, water retention	Indirect benefits through knowledge sharing	Better water management and reduced erosion	Progress towards national soil conservation targets
Social Benefits	Job creation during construction	Potential training opportunities	Agrotourism potential and improved landscapes/biodiversity	Support for rural revitalisation initiatives
Financial Benefits	Increased productivity and resilience	Future adoption opportunities	Access to higher-quality local produce	Long-term reduction in restoration costs
Negative Environmental Effects	Soil compaction and habitat disturbance; soil erosion if not constructed/maintained properly	Minimal impact	Habitat loss in affected areas	Monitoring and compliance costs
Negative Social Effects	High costs limit adoption by small farmers	Inequities in access	Disruption during construction	Strain on equitable resource allocation
Financial Costs	High implementation and maintenance costs	Minimal direct impact	Indirect financial burdens (e.g., infrastructure)	Subsidy requirements

Off-Site Costs and Benefits:

Costs and Benefits	Implementing Farmer/Landowner	Other Farmers	General Public	Government (Support)
Environmental Benefits	Reduced sediment flow and improved irrigation	Improved regional soil and water quality	Enhanced ecosystem health and biodiversity	Contributions to international environmental targets
Social Benefits	Community integration	Regional collaboration	Tourism potential and aesthetic appeal	Strengthened rural policies and programmes
Financial Benefits	Market expansion for high-quality products	Supply chain development	Economic uplift through agrotourism	Stabilised rural economies
Negative Environmental Effects	Erosion during construction, emissions (inc. dust) and noise	Minimal impact	Temporary pollution in adjacent areas	Oversight for unintended impacts

Negative Social Effects	Minimal direct impact	Minimal direct impact	Altered traditional landscape aesthetics	Balancing development with heritage
Financial Costs	Transportation and logistics costs	Minimal direct impact	Public resource allocation	High funding needs for support programmes

(2) Minutes from discussion of the effect of the distribution of benefits and costs on society/community for each group:

Reflection on how costs and benefits are distributed across groups: minutes from discussion

Participants discussed and reflected on the distribution of costs and benefits; the discussion focused on equity and social justice within the Troodos Mountain communities.

Economic Impacts:

- Farmers, particularly larger-scale ones, were seen as the primary beneficiaries due to productivity gains in the long run, while small-scale farmers faced challenges with the high implementation costs (partial inequalities due to scale/size of plots).
- Local businesses and the tourism sector benefitted from enhanced market opportunities and landscape improvements/aesthetic value.

Social Impacts:

- Job creation during the construction phase can boost local economies and social cohesion, in communities that still have relatively younger (and not only aged) population.
- Concerns about the marginalisation of small farmers and the loss of cultural identity associated with traditional terraces were mentioned.

Environmental Impacts:

- The environmental benefits, including reduced erosion and improved water management, were widely recognised.
- Concerns about habitat destruction and changes to the landscape prompted discussions on sustainable design of mechanised terraces.

Effect on the Community/Region:

- The mountain communities and the Troodos region as a whole experience mixed impact. While the restoration action can socio-economic resilience and sustain farming activities (and financially viable in the long run), inequities in the distribution of costs – particularly financial – posed challenges for smaller-scale farmers, marginalised communities or plots that are at higher elevations; these refer to sites that are less easily accessible.

Potential mitigation strategies

The main points discussed were

- Financial support for farmers (incl. small-scale) through targeted subsidies and grants.
- Preservation of cultural and aesthetic values by integrating traditional designs into mechanised terraces.
- Improved design of mechanised terraces to incorporate hydrological and soil considerations (better drainage, soil compaction reduction), to reduce negative environmental impacts.
- Increased awareness and training programmes to promote the adoption of restoration practices among farmers and agricultural workers

7.2 Finding common ground: Revisiting the vision

The vision refinement exercise built on the outputs from the 2nd ERLL workshop, where stakeholders collaboratively developed visions for sustainable mountain terrace agriculture in Troodos. Instead of groups, however, the refined vision (main points from the two groups/visions in the 2nd ERLL) was discussed with 14 stakeholders in the 3rd ERLL.

Presented Vision: The summarised vision contains the key elements that formed the basis for discussing how to adapt the vision to current realities and stakeholder priorities. The key points, included:

Mountain Agriculture
Sustainable practices focusing on terrace cultivation, mechanised farming, and diverse cropping systems adapted to altitudinal zones
Environment
Conservation-focused approaches, consideration of Natura 2000 areas, erosion control, and biodiversity enhancement
Markets and economy
Emphasis on local branding, short supply chains, and integration of agriculture with agrotourism.
Community and social conditions
A revitalised rural community with employment opportunities, improved social infrastructure, and enhanced quality of life.
Regulations and policies
Incentives for sustainable land use, governance reforms, and support for innovation
Technology and infrastructure
Precision farming, renewable energy, and sustainable transport systems.
Science and education
Applied research, smart technologies, and Living Labs as hubs for innovation

Results

- What was the reaction of participants to the vision
- What did you add, what did you leave out?

Reactions of participants to the vision

Participants were generally supportive of the summarised vision, recognising its holistic approach to addressing the challenges of mountain agriculture in Troodos. Stakeholders noted that the vision includes a number of ambitious and modern practices, and noted the integration of environmental, economic, and social considerations. A couple of concerns and suggestions for refinement emerged during the discussion were:

Concerns: participants agreed on the importance of ensuring that mechanised terraces are hydrologically sound and environmentally sustainable, highlighting the risk of erosion and habitat disruption if poorly designed. The need for equitable access to the benefits of mechanisation, particularly for small-scale farmers was also mentioned. See additional challenges and concerns in italics, below

Suggestions: Stakeholders proposed further integrating agrotourism (similar to wine routes) and rural development into the vision, while also emphasising the preservation of traditional knowledge and cultural heritage associated with terrace farming.

Adaptations to the vision	
added	• Improved design for mechanised terraces, i.e., incorporation of hydrological and soil management principles to prevent erosion and enhance environmental benefits of terracing • Agrotourism integration, as a vital part of multifunctional agriculture, contributing to rural revitalisation and economic resilience. • Support for small-scale farmers, e.g., through financial schemes and technical support to ensure equitable participation in restoration efforts.

	• Cultural and traditional knowledge preservation, including measures to recover, protect, and integrate traditional terrace construction techniques (e.g., through targeted training) within modern systems to maintain cultural heritage.
Left out	• Some participants thought that the assumption of an overall de-centralised and local food system was too reductive and simplistic to illustrate the complex web of benefits and costs in supply chains. Thus, it was left out.

Final Vision:

To develop a more realistic vision, the key points were discussed, and participants were asked to indicate whether these goals/visions are realistic for Troodos. While most points are generally realistic (with a few considered ambitious, as noted below), they are not always or immediately achievable and require a range of targeted interventions, including:

- Funding and technical support: essential for terrace design/construction (incl. mechanisation), precision farming, and renewable energy integration.
- Capacity building: training farmers to adopt and implement existing technologies (e.g., training on terracing and drystone wall construction/maintenance) and raising awareness about modern technologies and available agri-environmental schemes.
- Stakeholder collaboration: involving farmers, local communities, technical support services, researchers, policymakers, and businesses in co-developing targeted measures/solutions for mountain farming.
- Incremental implementation: prioritising achievable goals with significant immediate impacts (e.g., terrace design improvements, construction methods, and erosion control) before addressing more ambitious objectives (e.g., renewable energy integration, advanced transport systems, precision farming, and the establishment of living labs).

Below, we note the additions with green highlights and summarise the responses to the question of each point being realistic in *italics*. The mutually agreed response is given in **bold**.

Mountain Agriculture
Sustainable practices focusing on terrace cultivation, mechanised farming, and diverse cropping systems adapted to altitudinal zones. Realistic? **Partly yes**: Troodos already has a history of terrace farming and diversified cropping systems. Mechanised terraces are a feasible adaptation if designed with local hydrological and ecological conditions in mind. However, scaling up mechanisation as a general restoration action will require substantial training and support for small-scale farmers.
Environment
Conservation-focused approaches, consideration of Natura 2000 areas, erosion control, and biodiversity enhancement. Hydrologically sound and environmentally sustainable terrace designs Realistic? **Yes**: Troodos has protected areas (i.e., Natura 2000 sites). Erosion control measures through terraces align with existing priorities. Biodiversity enhancement could be achievable through agroecological measures, e.g., if farmers apply and utilise existing schemes.
Markets and economy
Emphasis on local branding, short supply chains, and integration of agriculture with agrotourism. Balanced focus on short supply chains and broader market systems. Realistic? **Partly yes**: local branding (see for example *Troodos label*) and agrotourism are gaining traction in Troodos. Short supply chains can be encouraged, but balancing local and broader markets is also important for economic viability and overall demand for Troodos

products. Investments in marketing and infrastructure will be necessary to maximise these opportunities.
Community and social conditions
A revitalised rural community with employment opportunities, improved social infrastructure, and enhanced quality of life. Support for small-scale farmers to ensure equitable participation. Realistic? **Ambitious**: reversing rural depopulation requires significant investment in social infrastructure (e.g., schools, health care, employment opportunities) and long-term commitment from both the government and private sector. Mechanised terraces can provide some employment opportunities, at least during the implementation phases. Regarding the small-scale farmers, targeted subsidies, grants, and technical support need to be prioritised. Without these, small-scale farmers may be excluded due to high costs associated with modern farming techniques.
Regulations and policies
Incentives for sustainable land use, governance reforms, and support for innovation Realistic? **Ambitious:** this issue (i.e., utilisation of available land) relates to property rights and a potential reform is dependent on political will and coordinated efforts among local and national policymakers; governance reforms typically take time but could be critical for long-term sustainability.
Technology and infrastructure
Precision farming, renewable energy, sustainable transport systems, and better terrace designs incorporating traditional knowledge. Realistic? **Partly yes**: while precision farming is increasingly accessible, its adoption in Troodos might be limited by cost and technical know-how especially among older farmers. Renewable energy (e.g., solar for irrigation) could be feasible but requires investments in relevant infrastructure, while sustainable transport systems (e.g., electric vehicles) are less feasible for the time being. The addition of terrace design and incorporation of traditional knowledge to modern innovations could be achievable, but requires education of farmers and agricultural workers, as well as subsidies (extra cost due to additional labour work).
Science and education
Applied research, smart technologies, and Living Labs as hubs for innovation Recovery, protection, and integration of traditional knowledge into modern practices through training (farmers and agricultural workers) Realistic? **Partly yes**: with adequate funding and collaboration between local universities, research centres, and international partners. Living Labs could focus on testing sustainable farming practices in Troodos Mountain conditions. Regarding the revitalisation addition, it relates to awareness-raising and the need for training a critical mass of agricultural farmers and workers in Troodos, as noted above, which is currently lacking.

7.3 Identifying pathways to out- and upscaling: Backcasting

1. No groups were formed for this exercise. Instead, the exercise was conducted as part of an open discussion with the selected stakeholders during the "Vines Above the Clouds" event.
2. The discussion included stakeholders representing diverse backgrounds: vine-growers, winery owners/managers, agricultural officers, consultants, and local community members.
3. The exercise deviated from the structured backcasting methodology outlined in the guidelines. Instead, stakeholders were encouraged to openly discuss the barriers, opportunities, and actions related to mechanised terraces. Notes from the discussion were taken and insights were grouped into short-, mid-, and long-term actions to outline pathways for scaling the restoration action.
4. The open discussion was well-received, with active participation from all stakeholders. It allowed for diverse perspectives to emerge organically and the process was productive in capturing individual and collective insights.

Results

- Photographs of posters
- Tables for each group with elements (barriers, opportunities, actions and actors, major changes for short-, mid- /long-term) (see template below)
- If required, explanation of causal relations between the elements so they are understandable for someone who has not participated in the exercise
- Information from participant feedback derived in silent discussion
- What do stakeholders want to do the information they collected and the agenda of activities?

Barriers:

- High implementation and maintenance costs, particularly for small-scale farmers.
- Limited technical expertise and lack of training for designing and constructing hydrologically sound terraces.
- Lack of labour / terrace builders
- Insufficient financial support for large scale (great upscale) of terraces
- Concerns over potential environmental impacts, such as soil compaction and erosion due to poor design.
- Limited awareness of modern terrace systems and their benefits among stakeholders.

Opportunities:

- Increased productivity and resilience in mountain agriculture.
- Reduction in soil erosion and improvement in water retention, contributing to sustainable land management.
- Integration of agrotourism with improved landscape aesthetics.
- Opportunity to modernise agricultural practices and promote local branding of high-value (wine) products.
- Collaboration with research institutions to develop innovative solutions and pilot farms (Living Labs)

Actions (Actors):

- Government and policymakers: Provide subsidies and financial incentives for small-scale farmers to repair terraces and modernise mountain farming; establish guidelines for sustainable design and construction.
- Farmers: participate in training and capacity-building programmes to implement/repair terraces effectively.
- Researchers and technical experts: Develop guidelines for better terrace design and conduct field demonstrations in model terraced fields.
- NGOs and small specialised agrobusiness: Facilitate collaboration, raise awareness about the benefits of terraces. Small agrobusiness can be established and specialise on terrace construction/maintenance; these can be hired by wineries and/or other mountain farmers to build terrace walls.
- Private sector: invest in mountain farming and necessary equipment.

Major Changes

Short-term (5 years):

- Development of training programmes focused on terracing and landscape planning.
- Introduction of more/targeted subsidies and grants for terrace farming and for small-scale farmers.
- Implementation of pilot sites showcasing best practices in modern/mechanised terraces.

Mid-term (10 years):

- Wider adoption of new terracing approaches across Troodos, supported by (public-private) financial and technical interventions.

- More integration of agrotourism activities linked to improved terraced landscapes.
- Establishment of supply chains for high-quality agricultural products from terraced mountain farms; the “vines above clouds” is a good starting point.

Long-term (20 years):

- Transition to sustainable terrace systems, combining modern designs with traditional knowledge.
- Establishment of resilient agricultural ecosystems that mitigate climate change impacts and enhance biodiversity.
- Strengthened rural economies driven by a blend of agriculture, tourism, and local branding initiatives.

Feedback from the silent discussion

The silent discussion was not conducted as per the guidelines, however, stakeholders provided valuable insights during the discussion and subsequent questionnaire responses. Key points include:

Need for practical support: Stakeholders emphasised the importance of tangible support mechanisms, such as subsidies and training programmes, to enable farmers, including small-scale farmers, to construct and maintain terraces effectively. A significant challenge highlighted was the general lack of skilled labour; many wineries reported difficulties in finding and retaining workers due to the physically demanding nature of agricultural activities in mountainous areas; “even foreign workers tend not to stay long in these regions”. Additionally, concerns were raised about equity in implementation; the benefits of terrace construction and maintenance are less evident for small-scale farms, where the high costs are often not proportionate to the potential returns.

Environmental/cultural concerns: with mechanisation, terraces may cause more environmental damage than benefit (in the short-run); to preserve the cultural character and minimise environmental impacts (erosion) in these landscapes, design and maintenance guidelines are needed. Further minimisation of environmental impacts and long-term sustainability/economic viability can be achieved when integrating renewable energy, precision farming and link mountain farming with agrotourism.

Summary of actionable steps outlined by stakeholders:

There is a need to frequently re-evaluate the cost of terracing, including the use of mechanised means for land levelling. Policies and funding mechanisms supporting the scaling of terraces should be regularly revised to account for site-specific characteristics and increasing costs over time.

Pilot sites could be established to test and demonstrate best practices in terrace design, landscape planning, and the integration of various agro-environmental schemes. These sites can serve as models for wider implementation and stakeholder learning.

Systematic monitoring and evaluation of restoration actions (terracing) is also necessary. Authorities, particularly the Ministry of Agriculture, should monitor the progress of terrace implementation, with the support of other institutions (e.g., Cyprus Agricultural Payments Organisation). Research institutions could provide technical and scientific support to ensure effective evaluation, and could also support the evaluation/analysis of socio-economic and environmental impacts over time.

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