SEEDS

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SEEDS Capacity-building programme

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V.1	SEEDS Capacity - Building Programme	EUROTraining + All	22/01/2026	Within Task 3.1, a draft version (V1) of the Capacity-Building Programme was shared in English with all partners, who were invited to provide feedback. All partners contributed to the development of the material and provided structured feedback.
V.2	SEEDS Capacity - Building Programme	EUROTraining + All	06/02/2026	The final version in English is shared with all the partners who translate the document in their national languages.
V.3	SEEDS Capacity - Building Programme	EUROTraining + All	20/02/2026	The Capacity - Building Programme is available in English and all partners' national languages.

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This deliverable was developed based on collective efforts from all partners of the SEEDS consortium.

Glossary and Abbreviations	
CBP	Capacity-building programme
EU	European Union
SOM	Soil Organic Matter
VET	Vocational education and training

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EXECUTIVE SUMMARY

This deliverable presents the SEEDS Capacity-Building Programme, a structured and replicable training package designed to strengthen the capacity of VET providers and VET professionals (teachers, trainers, curriculum designers, and training staff) to integrate agroecology into vocational training provision across Europe and the Western Balkans. Responding to rapidly evolving green skills needs, the CBP will support VET institutions in modernising curricula and learning approaches so that training provision will better reflect labour-market expectations, sustainability-oriented professional profiles, and local community needs. It will guide the next phases of the project, including the Capacity-building for participatory curriculum on agroecology and the study visits.

INTRODUCTION TO SEEDS CAPACITY BUILDING PROGRAMME

The green transition is rapidly reshaping skills needs across Europe and the Western Balkans, creating strong demand for vocational education and training (VET) programmes that prepare learners for sustainable practices, emerging green professions, and evolving labour-market expectations. In this context, agroecology and food sovereignty offer a practical framework for rethinking how food systems are produced, managed, and supported—linking environmental stewardship with social and economic resilience. The SEEDS project will contribute to a more competitive VET ecosystem in the green and sustainable sector by strengthening the capacity of VET institutions and professionals to design and deliver dynamic, participatory learning experiences in agroecology.

Purpose of the Capacity-Building Programme

This deliverable presents the Capacity-Building Programme (CBP) that will support VET teachers, trainers, and institutions in integrating agroecology into training provision in a structured, replicable way. The Capacity-Building Programme is positioned not only as an educational resource, but also as a practical mechanism to bridge the gap between education and labour market needs, ensuring that curricula will reflect real competences required for sustainable jobs and community transformation. The CBP is designed to help VET professionals learn how to design and implement participatory agroecology curricula, while also enabling them to fully utilise and transfer the project results into their institutional context. In practical terms, the programme focuses on how VET staff can co-create learning content with relevant stakeholders, integrate experiential and field-based learning, and adapt curricula so that they are more dynamic, relevant, and aligned with sustainability-oriented labour market needs in agriculture in Europe and the Western Balkans.

Target Group

The primary target group of the Capacity-Building Programme is VET providers and VET professionals (teachers, trainers, curriculum designers, and staff involved in training delivery and programme development). As one of the most decisive drivers of change in the VET sector, this group will be equipped with a concrete set of hands-on teaching and learning materials that will enable them to effectively introduce agroecology, food sovereignty, and broader green skills into their everyday training practice. Through their participation in the CBP, VET professionals will be supported to strengthen both their competences in sustainable agroecological practices and methodological competence in participatory and community-engagement approaches.

The impact of this target group will extend beyond the individuals trained, as their enhanced capabilities will be expected to have a direct multiplier effect within the VET institutions they represent. By bringing newly acquired knowledge, tools, and participatory practices into their daily work, participating VET professionals will contribute to institutional learning, curriculum innovation, and stronger connections between training provision, community needs, and the evolving green job market.

Methodology

The SEEDS Capacity-Building Programme was developed as a structured training programme that translates the project's prior analytical work (context analysis and the Roadmap for agroecology participatory curricula) into learning resources for VET providers and professionals. The methodological approach combined a clear learning progression from theory to practice and co-development with a strong emphasis on usability, consistency, and transferability.

Learning Unit 1 (LU1) was prepared as the theoretical foundation of the capacity-building programme, aiming to familiarise VET trainers and providers with the key concepts and principles of agroecology at environmental, sociocultural, economic, and political levels. LU1 was

structured around the four agroecological dimensions of CIDSE (2018[1]) where major challenges affecting agriculture and food systems were presented together with indicative agroecological practices that respond to those challenges. Each LU1 module includes a brief description, learning outcomes, an introduction to frame the dimension, a structured presentation of challenges and agroecological practices, and reflective questions designed to support understanding of the educational material.

Learning Unit 2 (LU2) was developed as the practical continuation of LU1, with the purpose of introducing VET providers to sustainable agroecological practices already being applied and demonstrating their potential for education and training. LU2 maintained the same four-dimension structure as LU1, but shifted the emphasis to concrete best practices and case studies that can be translated into teaching activities. Each LU2 module includes an introduction, learning outcomes, and two practical case studies, each explicitly connected to LU1 content and mapped to specific HLPE (2019[2]) agroecology principles. A key methodological aspect of LU2 is, the "Integration into the VET curricula" section which aims to function as implementable teaching guidance, including suggested activities, methodological steps, and reflective questions to support trainers in applying the practices in diverse formats.

In addition, LU2 followed a participatory co-creation logic. Relevant stakeholders were involved in the development of content by contributing to the design, demonstration, or validation of Best Practices, thus confirming that the information and practices included reflect authentic, locally relevant agroecological knowledge.

Learning Unit 3 (LU3) was developed to equip VET staff with participatory and community-engagement methodologies that can be used to support stakeholder involvement in curriculum development and inform the implementation of local co-development workshops. LU3 included content from the roadmap by translating strategic recommendations into relevant

[1]CIDSE. (2018). *The principles of agroecology*. Available at: https://www.cidse.org/2018/04/03/the-principles-of-agroecology/

[2] HLPE. (2019). *Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition*. Available at: https://www.fao.org/agroecology/database/detail/en/c/1242141/

methodologies and facilitation activities. LU3 was structured around an iterative engagement pathway and presents a set of complementary participatory formats with clear phases of preparation, facilitation, synthesis and follow-up. Each format is described in terms of what it is best used for, so that VET providers can select and combine tools depending on their context and objectives. To support implementation quality and inclusiveness, LU3 also provides guidance on stakeholder composition and roles, identifying main actors and emphasising balanced participation. Finally, the unit anticipates typical constraints and risks and proposes practical mitigation measures, while encouraging systematic documentation and feedback collection so that curricula can be refined through continuous learning and improvement.

Agroecology as a new paradigm to sustainable food system: a system approach

Europe's transition to sustainable food systems has become an urgent priority, as environmental pressures and social challenges increasingly affect how food is produced, distributed, and consumed. Climate change is already influencing agriculture through more frequent and intense extremes such as droughts, floods, and heat, with documented consequences for productivity, livelihoods, and food security. At the same time, land degradation and water scarcity are increasing risks for agricultural production and the ecosystem services that food systems depend on (IPCC, 2022; Seneviratne et al., 2021). The current food systems are responsible for a significant amount of the global greenhouse gas emissions, biodiversity loss, deforestation, displacement of communities, social inequalities, water and soil degradation (Agroecology Coalition, n.d.)

In this context, it is becoming clear that sustainability cannot be addressed only at the level of the farm plot or a single production technique. A "food system" includes the full set of actors and value-adding activities that move food from field to fork, from inputs and production, to processing, distribution, consumption, and the management of losses, waste, and disposal, within a broader economic, social, and natural environment. This system's lens helps learners understand why changes in agronomy, markets, diets, supply chains, and governance are interconnected rather than separate topics (FAO, 2018). Agroecology is introduced as a pathway that connects ecological functioning (e.g., diversity, resource cycling, and resilience) with social and economic dimensions (e.g., livelihoods, equity, and participation), supporting deeper and more durable transformations across the food system.

Agroeocology: Definition and origins

Agroecology can be described as "an integrated approach that simultaneously applies ecological and social concepts and principles to the design and management of food and agricultural systems. It seeks to

optimize the interactions between plants, animals, humans, and the environment while taking into consideration the social aspects that need to be addressed for a sustainable and fair food system" (FAO, 2024). It is a dynamic concept that aims to promote the regenerative use of natural resources and the creation of equal food systems on the social level, and to contribute to the transformation of the current food systems through the application of ecological principles. From production to consumption, agroecology encompasses all dimensions of food systems and particularly the ecological, sociocultural, economic and political (Agroecology Europe, n.d.).

The term appeared for the first time in scientific publications by the Russian agronomist Bensin in the late 1930s, in an attempt to describe agroecological characteristics and classification of local corn varieties chorotypes. It was created to describe the introduction of ecological practices on commercial crop plants and served as the scientific evolution of agronomy and ecology, while also related to other sectors like zoology. Since the 1980's, the term has been established as a scientific discipline, a movement and a set of practices. In the 1990's in the USA and Latin America, agroecology started to be seen as a set of agricultural practices to develop a more sustainable agriculture (Wezel et al., 2009). From the 1990s onward, agroecology also gained visibility as a social movement, as farmer and civil society networks started to spread agroecological knowledge through collective action and horizontal learning (Wezel et al., 2009). A key actor has been La Via Campesina (founded in 1993), which has promoted farmer-to-farmer training and agroecology schools across its member organizations (La Via Campesina, 2023; Rosset et al., 2019). In the 21st century, agroecology has been more present in scientific publications and the public discourse in the EU and globally as an approach that can drive a real and sustainable food system transformation.

Toward a food system transformation: the potential of the 13 principles of agroecology

According to Gliessman (2007) (Agroecology Europe, n.d.; HLPE, 2019), there are five levels of transition towards sustainable food systems. The first two apply on the incremental transformation of the agroecosystem, while the remaining three are more transformational and involve the whole food system:

Level 1: Increase of input use efficiency and reduce environmentally damaging inputs

Level 2: Substitution of conventional inputs with agroecological alternatives

Level 3: Redesign the agricultural ecosystem based on the agroecological values

Level 4: Establishment of a more direct connection between consumers and producers through the development of alternative food networks

Level 5: Create a new global food system based on participation, localness, fairness and justice.

To better define the content, the concepts and scope of agroecology as a science, set of practices and a social movement, the High-Level Panel of Experts on Food Security and Nutrition (HLPE) identified 13 principles of agroecology to achieve food security and nutrition. Its results constitute the more compact and comprehensive set of principles, built on previous attempts on creating a set of agroecological principles produced by Nicholls et al. (2016), CIDSE (2018), and FAO (2018) and the 10 elements (Agroecology Infopool, n.d.). The principles, as described in the HLPE 2019 report are the following:

1. Recycling: Preferentially use local renewable resources and close as far as possible resource cycles of nutrients and biomass.

2. Input reduction: Reduce or eliminate dependency on purchased inputs and increase self-sufficiency

3. Soil health: Secure and enhance soil health and functioning for improved plant growth, particularly by managing organic matter and enhancing soil biological activity.

4. Animal health: Ensure animal health and welfare.

5. Biodiversity: Maintain and enhance diversity of species, functional diversity and genetic resources and thereby maintain overall agroecosystem biodiversity in time and space at field, farm and landscape scales.

6. Synergy: Enhance positive ecological interaction, synergy, integration and complementarity among the elements of agroecosystems (animals, crops, trees, soil and water

7. Economic diversification: Diversify on-farm incomes by ensuring that small-scale farmers have greater financial independence and value addition opportunities while enabling them to respond to demand from consumers.

8. Co-creation of knowledge: Enhance co-creation and horizontal sharing of knowledge including local and scientific innovation, especially through farmer-to-farmer exchange.

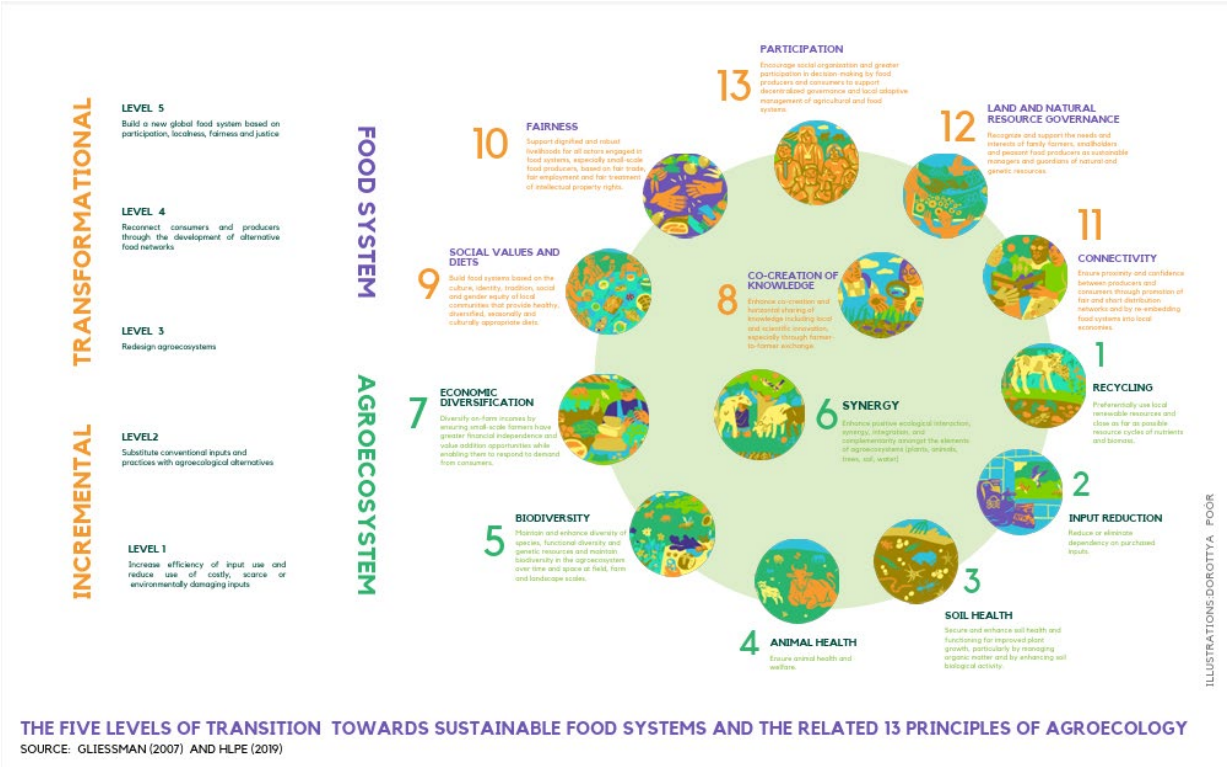
9. Social values and diets: Build food systems based on the culture, identity, tradition, social and gender equity of local communities that provide healthy, diversified, seasonally and culturally appropriate diets.

10. Fairness: Support dignified and robust livelihoods for all actors engaged in food systems, especially small-scale food producers, based on fair trade, fair employment and fair treatment of intellectual property rights.

11. Connectivity: Ensure proximity and confidence between producers and consumers through promotion of fair and short distribution networks and by re-embedding food systems into local economies.

12. Land and natural resource governance: Strengthen institutional arrangements to improve, including the recognition and support of family farmers, smallholders and peasant food producers as sustainable managers of natural and genetic resources.

13. Participation: Encourage social organization and greater participation in decision-making by food producers and consumers to support decentralized governance and local adaptive management of agricultural and food systems.



THE FIVE LEVELS OF TRANSITION TOWARDS SUSTAINABLE FOOD SYSTEMS AND THE RELATED 13 PRINCIPLES OF AGROECOLOGY
SOURCE: GLIESSMAN (2007) AND HLPE (2019)

Source: Agroecology Europe (n.d.)

Agroecology as a distinct agricultural approach

Agroecology is a unique agricultural approach because it integrates ecological, social, economic, and cultural aspects to create sustainable and resilient food systems. It is not simply a set of farming techniques or practices, but a holistic framework that connects science, practice, and social movements to address food security, nutrition, environmental sustainability, and social justice. Here's how agroecology differs from conventional farming, organic farming, and conservation agriculture:

Conventional farming: conventional farming is rooted in industrial, input-intensive methods designed to maximize yields and efficiency, often at the expense of environmental health and social equity. Conventional farming relies heavily on synthetic fertilizers, pesticides, and monoculture cropping systems, which can lead to soil degradation, biodiversity loss, and water pollution. Agroecology, on the other hand, challenges these practices by promoting diverse ecosystems, soil regeneration, and sustainable nutrient cycling. Unlike conventional farming, which prioritizes productivity and economic efficiency at the expense of environmental and social outcomes, agroecology views agriculture as a dynamic system that needs to be balanced with the larger environmental and societal context. Agroecology promotes local solutions to food production and emphasizes ecological health, whereas conventional farming's focus is on maximizing short-term productivity with little regard for long-term environmental or social consequences.

Conservation Agriculture: conservation agriculture aims to promote sustainable agriculture through minimal soil disturbance, permanent soil cover and crop rotation. It integrates water and biological resources with external inputs and aspires to make more efficient use of natural resources, both for ecological and financial reasons. It focuses more on technical aspects rather than on social or political matters. Agroecology differs from conservation agriculture, as it emphasizes not only soil health but broader factors like biodiversity, water management and climate resilience. It is not only an agricultural practice but a social movement focusing on social equity, food sovereignty and community empowerment.

Organic agriculture: organic agriculture is a holistic production management model which focuses heavily on the use of renewable resources, recycling of plant and animal waste to increase soil biological activity and fertility, minimize all pollution from agricultural practices and enhance biodiversity in an agroecosystem (FAO, 2020). While organic farming supports local markets and more sustainable practices, it is less

politically oriented than agroecology. Organic farming standards are often more focused on farming practices and input regulation rather than broader socio-economic issues like land rights, market access, or fair trade. Organic farming is a component of agroecology, but it does not go as deep as agroecology goes.

Permaculture: Permaculture and agroecology prioritize ecological health and resilience, advocating for diverse and multifunctional farming systems. While permaculture is primarily a design-based system focused on creating self-sustaining ecosystems that mimic natural processes, agroecology is more concerned with food systems transformation as a whole, including the social, political, and economic dimensions. Permaculture often focuses on local, small-scale systems and individual self-sufficiency, whereas agroecology recognizes the importance of broader community and institutional change in transforming food systems.

Overall, agroecology is distinct because it does not merely focus on farming practices or the conservation of resources, but it is a transformative approach that seeks to reshape food systems by integrating ecological processes with social equity and economic sustainability. While permaculture, organic agriculture, conventional farming, and conservation agriculture each have specific strengths, agroecology stands apart by offering a broader, more integrated framework that emphasizes not just the ecological health of farms but also the social structures that underpin food systems. By considering both scientific and local knowledge, advocating for social movements, and focusing on sustainable, equitable food systems, agroecology offers a path towards creating farming systems that are truly resilient, just, and sustainable for future generations.

Agroecology as a science, a practice, a social movement

Agroecology is increasingly recognized as a transdisciplinary, participatory, and action-oriented approach (Méndez et al., 2013; Gliessman, 2018), encompassing three interconnected dimensions: a transdisciplinary scientific field (Definition 1), a set of practices, and a social movement (Wezel et al., 2009; Wezel and Silva, 2017; Agroecology Europe, 2017). Together, these dimensions - their mutual articulation and co-evolution - form a holistic framework (e.g., Agroecology Europe, 2017; Gliessman, 2018).
Agroecology has been defined in various ways by different authors. Agroecology is a multidisciplinary field that can be understood through multiple lenses, encompassing science, practice, and social movement dimensions. As agroecology is defined in several complementary ways: (i) it is the integrative study of the ecology of the entire food system, encompassing ecological, economic, and social dimensions, or, succinctly, the ecology of the food system (Francis et al., 2003); (ii) it involves the application of ecological concepts and principles to the design and management of sustainable food systems (Gliessman, 2007); and, more recently, (iii) it represents the integration of research, education, action, and transformative change to promote sustainability across all components of the food system (Gliessman, 2018). These definitions highlight agroecology's dynamic nature, bridging scientific inquiry with practical applications and societal relevance.

Agroecological practices aim to enhance agroecosystems by leveraging natural processes, fostering beneficial biological interactions, and optimizing ecosystem services for sustainable management (Gliessman, ed., 1990; Wezel et al., 2014). As a social movement, agroecology is recognized as a strategic response to global challenges such as climate change, malnutrition, and unsustainable industrial agriculture. It emphasizes locally adapted food systems, strengthening rural economies through short marketing chains, equitable and safe food production, support for smallholder and family farming, food sovereignty, indigenous rights, social justice, and the preservation of local identity and culture (Altieri and Toledo, 2011; Rosset et al., 2011; Nyéléni, 2015). This political dimension is increasingly central to contemporary discussions on sustainable food

systems (Gonzalez de Molina, 2013; Toledo and Barrera-Bassols, 2017; FAO, 2017a; Agroecology Europe, 2017).

Agroecology as a science

As already mentioned, the term "agroecology" first appeared in scientific literature in the early twentieth century, describing the application of ecological principles to agriculture, including zoology, agronomy, and crop physiology (Bensin, 1928, 1930; Friederichs, 1930; Klages, 1942; Gliessman, 1997; Dalgaard et al., 2003; Wezel et al., 2009; Wezel and Soldat, 2009). Pioneering work by Tischler in the 1950s and 1960s analyzed the interactions between plants, animals, soils, and climate, as well as human management effects (Tischler, 1965). Odum (1969) introduced the concept of the agroecosystem as a human-managed ecological system, and by the 1980s, agroecology expanded its focus from individual fields to entire agroecosystems (Altieri, 1987, 1989; Conway, 1987; Marten, 1988; Wezel et al., 2009; Wezel and Soldat, 2009). Mexican scholars emphasized combining scientific ecological knowledge with local and traditional knowledge systems to develop context-specific agroecological insights (Hernández Xolocotzi, 1977).

Altieri (1995) defined agroecology as "the application of ecological concepts and principles to the design and management of sustainable agroecosystems," while FAO (2016d) highlighted agroecological innovations that integrate ecological principles - such as recycling, resource efficiency, diversification, integration, and soil health - to strengthen interactions among plants, animals, humans, and the environment, promoting food security and nutrition.

From the 2000s, the transdisciplinary nature of agroecology became more pronounced, integrating natural and social sciences (Wezel et al., 2015). Agroecology now addresses the entire agrifood system, including alternative and local food networks, consumer - producer relations, food markets, and rural - urban linkages, leading to concepts like urban agroecology (Francis et al., 2003; Doré et al., 2006; Gliessman, 2007; Wezel and David, 2012; Côte et al., eds., 2019; AS PTA, 2011; Almeida and Biazo, 2017;

Renting, 2017; Morales et al., 2018). Research scales have correspondingly expanded from plots and fields to farms, agroecosystems, and finally the entire food system, reflecting agroecology's evolving scientific scope (Wezel and Soldat, 2009).

Agroecology as a set of practices

Environmental concerns highlighted by Carson's *Silent Spring* (1962) catalyzed the development of agroecological practices, addressing the negative impacts of synthetic inputs on ecosystems and food chains. Over the decades, these practices evolved to move away from industrial agriculture towards systems that optimize biological processes and ecosystem functions (Hernández Xolocotzi, 1977; Rosset and Altieri, 1997; Wezel et al., 2009; Vanloqueren and Baret, 2009; Altieri et al., 2012a; Pimbert, 2015; IPES-Food, 2016; FAO, 2016b; Wezel et al., 2014; Deguine et al., eds., 2017; Wezel, 2017).

Agroecological practices aim to design resilient, multifunctional agroecosystems by integrating crops, animals, soils, and other factors into diversified spatial and temporal arrangements, enhancing natural processes, soil fertility, pest regulation, and overall productivity (Altieri, 2002). While definitions of agroecological practices are still emerging, they generally share three characteristics: reliance on ecological processes, environmental and social sustainability, and adoption of a systemic rather than purely technical approach (Wezel, 2017).

Practices include nutrient cycling, biological nitrogen fixation, soil improvement, water conservation, biodiversity and habitat management, carbon sequestration, biological pest control, intercropping, cultivar diversity, and the reuse of organic waste (Reijntjes et al., 1992; Altieri, 1995; Nicholls et al., 2016; Wezel et al., 2014; Wezel, 2017). Examples range from historical techniques such as rice - duck - fish integration in Asia to modern responses to pests like the fall armyworm in Africa. Adoption varies globally: while organic fertilization, intercropping, and reduced tillage are widespread in temperate agriculture, methods such as biofertilizers, agroforestry, and landscape - level habitat integration are more prevalent in tropical or specialized farming contexts (Leakey, 2014).

Agroecology as a social movement

Agroecology cannot be separated from the social and political contexts of the communities practicing it. Traditional agricultural systems are co - evolved with human societies, and agroecological movements often emerge in response to agrarian crises (Altieri, 2004b; Wibbelmann et al., 2013; Ploeg and Ventura, 2014; Mier y Terán et al., 2018). These movements emphasize the intersection of agroecology with the right to adequate food and food sovereignty.

Food sovereignty was first introduced by La Via Campesina during the 1996 World Food Summit and further defined in 2007 at Nyéléni, Mali, as the right of peoples to healthy, culturally appropriate food produced sustainably, along with the right to define their own food and agriculture systems (Nyéléni, 2007; La Via Campesina, 1996). Principles include recognition of food as a human right, agrarian reform, protection of natural resources, promotion of local food trade, reduction of multinational power, fostering peace, and strengthening democratic control over food systems.

The 2015 International Forum on Agroecology in Nyéléni reinforced agroecology as a political framework for food sovereignty, emphasizing local knowledge generation, social justice, cultural identity, and rural economic viability (Anderson et al., 2015; Nyéléni, 2015). Agroecology functions as a bottom - up approach, centering small producers and local communities rather than agribusiness. By integrating traditional knowledge and scientific insights, these practices enhance the resilience and sustainability of local food systems (Varghese and Hansen-Kuhn, 2013; Nyéléni, 2015; Anderson et al., 2015). Some governments have incorporated agroecological principles into policy to transform food systems and promote equitable, sustainable agricultural development (Altieri et al., 2012b; Wezel et al., 2009; Lambek et al., 2014).

Connection with Agenda 2030, the Green Deal, CAP, Farm to Fork and Biodiversity strategies

The transformation of agriculture towards sustainability has become one of the key priorities at both global and European levels. Climate change, soil

degradation, biodiversity loss, water scarcity, and the depletion of natural resources pose serious threats to the long-term stability of food systems (IPCC, 2022). In response to these challenges, the European Union and the international community have developed strategic policy frameworks aimed at ensuring sustainable food production, environmental protection, and socio-economic resilience (European Commission, 2019). Within this context, agroecology is increasingly recognised as an approach that supports systemic change in agriculture by integrating ecological, social, and economic principles (FAO,2018; HLPE, 2019). The learning material is therefore grounded in the objectives of Agenda 2030, the European Green Deal, the Common Agricultural Policy (CAP), the Farm to Fork Strategy, and the EU Biodiversity Strategy for 2030 (European Commission, 2020b).

Agenda 2030 for Sustainable Development, adopted by the United Nations, defines 17 Sustainable Development Goals (SDGs) that provide a global framework for addressing challenges related to food security, environmental protection, and climate change. Achieving sustainable food systems plays a central role in achieving several of these goals, namely SDG 2 (Zero Hunger), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on Land). Agroecology contributes to these goals by promoting resilient food production systems, more efficient use of natural resources, climate change adaptation and mitigation, and the conservation of ecosystems and biodiversity (FAO, 2018).

You can learn more on agroecology and the SDGs here.

Source: United Nations (n.d.)

At the European Union level, the European Green Deal represents the overarching policy framework guiding the transition towards climate neutrality by 2050. Its aim is to ensure sustainable economic development while reducing environmental pressures and resource use. Agriculture plays a key role in this transition, as it is both affected by climate change and a significant source of environmental impacts. Agroecology aligns with the objectives of the Green Deal by reducing reliance on synthetic fertilisers and pesticides, improving soil health and carbon sequestration, increasing water-use efficiency, and strengthening ecosystem services. In this way, it contributes to reducing negative environmental impacts while enhancing the resilience of agricultural systems (European Commission, 2019).

The Common Agricultural Policy (CAP) is a central EU instrument shaping agricultural practices and rural development. Its objectives include ensuring a stable income for farmers, maintaining food security, and promoting sustainable management of natural resources. Recent CAP reforms place stronger emphasis on environmental performance, climate action, and eco-schemes. Agroecology fits naturally within these priorities by promoting farming practices that protect soil, water, and biodiversity while remaining economically viable (European Commission, 2021). The Farm to Fork Strategy focuses on the sustainability of the entire food chain, from

production to consumption. Its objectives include reducing the use of pesticides, lowering nutrient losses, improving animal welfare, and promoting sustainable food production and consumption patterns. Agroecology contributes to these aims by encouraging crop diversification, biological pest control, reduced dependency on external inputs, and locally adapted production systems, thereby strengthening the resilience and sustainability of food systems (European Commission, 2020a).

The EU Biodiversity Strategy for 2030 complements these policies by aiming to halt biodiversity loss and restore ecosystems, particularly in agricultural landscapes. Agroecology supports these goals by increasing landscape diversity, preserving local crop varieties, supporting pollinators, and integrating natural elements into farming systems, thus contributing to the long-term sustainability of agricultural production (European Commission, 2020b).

Within this policy framework, the Capacity Building Programme provides learners with essential contextual understanding of the role of agroecology in achieving European and global sustainability objectives (FAO, 2018). Agroecology is presented as an integrated, cross-cutting approach relevant to environmental, economic, and social dimensions of agriculture (European Commission, 2019). This enables VET learners to understand the broader policy context shaping contemporary agriculture and highlights the strategic role of agroecology in supporting sustainable development, climate action, food security, and biodiversity protection (European Commision, 2020a).

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LEARNING UNIT 1
FRAMING AGROECOLOGICAL THEORY

Learning Unit 1 introduces agroecology as a theoretical framework for sustainability and resilience in agriculture and food systems. It presents agroecology not as a set of isolated technical measures, but as an integrated way of understanding how ecological processes, social relations, economic conditions, and governance structures interact to shape what is produced, how it is produced, who benefits, and how rural territories evolve over time. To support this systemic understanding, Learning Unit 1 is organised around the four dimensions of agroecology: environmental, sociocultural, economic, and political. Across these dimensions, learners examine the key challenges that currently limit agroecological transitions, as well as indicative approaches to address them. In this way, the unit establishes a shared conceptual foundation that supports learners in applying agroecological thinking to real-world contexts.

ENVIRONMENTAL DIMENSION

Brief description

This module examines the environmental dimension of agroecology, focusing on how agroecological principles can address major environmental challenges in agriculture. It presents agroecology as a way of working with ecological processes to regenerate soils, water resources, biodiversity and agroecosystems, while maintaining productive and resilient farming systems over time.

The module analyses the environmental impacts of dominant conventional agricultural models, including soil degradation, erosion, declining soil organic matter, unsustainable water management, pollution, loss of seed diversity and biodiversity decline, with particular reference to European and Western Balkan contexts. It then explores a range of agroecological practices that can restore soil health, improve water retention and efficiency, enhance genetic and functional biodiversity, and strengthen resilience to climate variability.

Overall, the module provides learners with a grounded understanding of how environmental processes and farming practices interact within agroecosystems, and how agroecology can contribute to long-term environmental sustainability and climate resilience.

Learning outcomes

1. Acknowledge the environmental foundations of agroecology.
2. Analyze major environmental challenges affecting agriculture, i.e. soil degradation, biodiversity loss, loss of seed diversity and unsustainable water management.
3. Assess agroecological practices as alternative approaches to conventional methods to face the environmental challenges.

4. Explain how agroecosystems function as integrated systems in which soil, water, biodiversity and climate processes are closely interconnected.
5. Apply an agroecological perspective to evaluate environmental impacts.

1. Introduction to the environmental dimension

Agroecology, the ecology of agriculture, is a holistic and integrated pathway toward sustainability, recognized globally for its commitment to transforming not only farming practices but the entire structure of food systems (Altieri, 1995). It moves beyond maximizing commodity yields to prioritize long-term sustainability, understood not merely as durability over time but as the renewal of natural resources to ensure that land remains fertile and productive for future generations (Gliessman, 2014). Agroecology also emphasizes resilience, defined as the capacity of agroecosystems to withstand and recover from shocks, whether environmental, such as droughts or emerging pests, or economic, such as sudden price fluctuations (Francis et al., 2003). Drawing its foundations from ecology, the study of relationships among organisms and their environment, agroecology applies these principles to managed ecosystems by deliberately optimizing interactions among plants, soil organisms, domestic animals and humans, while integrating a strong commitment to social justice and food sovereignty (Altieri, 1995; Gliessman, 2014).

This learning unit refers to the environmental dimension of agroecology, inspired by the 13 agroecological principles developed by the High Level Panel of Experts on Food Security and Nutrition (HLPE, 2019). In particular, the emphasis on biodiversity highlights the role of species, varietal and genetic diversification in strengthening ecosystem functioning and resilience. The principle of synergies focuses on fostering beneficial interactions among system components to enhance ecosystem services such as natural pest regulation and nutrient cycling. Input reduction addresses the need to

optimize the use of natural and human resources while reducing dependency on external inputs. Recycling underlines the importance of closing nutrient, biomass and water cycles within farms and landscapes, reducing losses and environmental pollution.

Agroecology: the holistic solution for climate resilience

Agroecology contributes to addressing climate change as a cross-cutting pressure that intensifies existing environmental challenges such as biodiversity loss, soil degradation and water stress (Altieri, 1995). By strengthening ecological processes within farming systems, agroecology enhances both mitigation and adaptation capacities, particularly through the redesign of agroecosystems based on diversity and ecological interactions (Kremen and Miles, 2012). Practices that increase soil organic matter, including diversified cropping systems, cover crops, organic amendments and agroforestry, promote carbon sequestration while improving soil structure and water retention, thereby buffering agroecosystems against droughts, floods and temperature extremes (Tittonell, 2014; Panagos et al., 2015). At the same time, diversified systems based on polycultures and locally adapted varieties reduce vulnerability to climatic variability by spreading risk and enhancing biological regulation, especially in the face of increasingly unpredictable weather patterns (Altieri, 1995). In this way, agroecology strengthens the long-term resilience of farming systems by reinforcing the ecological foundations that underpin system stability and adaptive capacity, rather than by addressing climate change as an isolated issue (Kremen and Miles, 2012).

1.1 Soil degradation in agriculture

Soil degradation refers to the decline of soil quality and soil functions caused by physical, chemical and biological processes. In agricultural systems, this results in soils progressively losing their capacity to support plant growth, regulate water flows, recycle nutrients and sustain biodiversity. Because

soils underpin agricultural productivity, soil degradation represents a structural threat to the resilience of food systems (IPBES, 2018).

Soil degradation occurs through multiple, often interconnected processes. These include loss of fertile topsoil through erosion by water and wind, decline in soil organic matter and soil carbon, soil compaction, nutrient depletion or imbalance, salinization or acidification, and loss of soil biodiversity including microorganisms and symbiotic fungi (FAO & ITPS, 2015; FAO, 2017). These processes frequently reinforce each other, accelerating the loss of soil functions.

Globally, around one-third of soils are already degraded, affecting approximately 3.2 billion people (FAO & ITPS, 2015; IPBES, 2018). Without significant changes in land management, projections suggest that up to 90% of topsoil could be at risk by 2050, at a time of increasing food demand (FAO, 2017). In Europe, the situation is particularly concerning: 60–70% of soils in the European Union are considered unhealthy, mainly due to erosion, loss of organic matter, compaction and contamination (European Commission, 2021).

Soil erosion is one of the most widespread degradation processes in European agriculture. Approximately 24% of EU agricultural land is affected by water erosion, with the highest erosion rates in southern and south-eastern Europe (EEA, 2019). In Mediterranean regions and parts of the Western Balkans, soil losses frequently exceed 2-4 tonnes per hectare per year, well above natural soil formation rates (Panagos et al., 2015). This causes irreversible loss of fertile soil and contributes to sedimentation and nutrient pollution in rivers and lakes (EEA, 2019).

A central driver of soil degradation is the decline in soil organic matter (SOM)[3]. Soil organic matter represents the ensemble of organic carbon compounds in soil originating from plant and animal inputs and

[3] For more detailed information visit:
- the video lesson "Soil organic matter" (in English with automatic subtitles and automatic audio track in French)
- the podcast episode "Organic matter in soil: types and functions" from Fertile Soil (in Italian with automatic subtitles)

transformed through biological processes (FAO & ITPS, 2015; FAO, 2022). It comprises functionally distinct pools, ranging from labile fractions (such as fresh residues and microbial biomass) that support short-term nutrient cycling, to more stable fractions that persist over longer time scales and contribute to soil aggregation, nutrient retention and carbon sequestration (FAO, 2017; FAO, 2022).

SOM is therefore a key regulator of soil fertility, structural stability and water-holding capacity. Declining SOM reduces aggregate stability, increases susceptibility to erosion, limits infiltration and diminishes the soil's capacity to supply nutrients through biological mineralization (EEA, 2019; FAO, 2022). Long-term monitoring indicates that many European agricultural soils, particularly under intensive arable systems, have experienced a sustained decline in SOM. Nearly half of mineral soils in Europe exhibit low or very low soil organic carbon content, increasing vulnerability to drought, erosion and nutrient leaching (EEA, 2019). In many agricultural areas of the Western Balkans, soil organic carbon levels are frequently below 2%, reflecting prolonged residue removal, intensive tillage and limited organic inputs (FAO & ITPS, 2015).

Soil compaction further contributes to physical degradation. It is mainly caused by heavy machinery, repeated traffic and cultivation under wet conditions. Compaction reduces soil porosity and water infiltration, restricts root growth and increases surface runoff, thereby exacerbating erosion and drought stress (FAO, 2017).

Chemical degradation is also significant. Intensive farming systems often rely on synthetic fertilizers and pesticides to sustain yields despite declining soil biological fertility. While fertilizers can maintain production in the short term, their chronic overuse may lead to nutrient imbalances, soil acidification and increased nutrient losses through leaching and runoff. Pesticides can also accumulate in soils and negatively affect soil organisms, reducing microbial activity and nutrient cycling. Together, these inputs alter soil chemical and biological functioning, masking underlying degradation processes and increasing long-term dependence on external inputs (FAO, 2017; IPBES, 2018; Silva et al., 2023).

At the same time, soil biodiversity declines under intensive management. Practices such as monocropping and frequent tillage disrupt soil biological communities that drive decomposition, nutrient cycling and aggregation. In many European cropping systems, populations of mycorrhizal fungi, which are crucial for phosphorus uptake and water acquisition, are significantly reduced, increasing crop dependence on external inputs (IPBES, 2018).

These degradation processes are closely linked to the dominant model of intensive and specialized agriculture. Low crop diversity, frequent soil disturbance, residue removal and high chemical input use weaken soil structure and biological functioning. As soil functions decline, farmers often respond by increasing fertilizer use, irrigation or mechanization to maintain yields, creating a negative feedback loop that increases production costs, environmental pressure and long-term vulnerability (FAO, 2017; HLPE, 2019).

Soil health: what is being lost when soils are degraded

Soil degradation is, in practice, the loss of soil health. Soil health refers to the soil's capacity to function as a living system that sustains plants, animals, humans and ecosystems over time (FAO, 2017). Healthy soils are complex and dynamic ecosystems in which physical structure, chemical properties and biological communities interact to support agricultural production and ecosystem services (FAO & ITPS, 2015).

As mentioned above, defining characteristics of healthy soils is the presence of adequate and functionally active organic soil matter (SOM). SOM underpins soil structure, nutrient retention and biological activity, and provides the primary energy source for soil organisms (FAO, 2022). Through its interaction with mineral particles, SOM contributes to the formation and stabilization of soil aggregates, improving porosity, aeration and water-holding capacity (EEA, 2019).

Healthy soils host diverse and abundant soil organisms, including bacteria, fungi, protozoa, nematodes and earthworms. These organisms drive the decomposition of organic inputs, regulate nutrient mineralization and immobilization, and contribute to the formation of stable soil structure (FAO

& ITPS, 2015). Soil biodiversity is therefore essential for efficient nutrient cycling and long-term soil fertility.

Within this biological community, mycorrhizal fungi play a particularly important role. By forming symbiotic associations with plant roots, mycorrhizae extend the effective root system, improving the uptake of relatively immobile nutrients such as phosphorus and enhancing water acquisition, especially under limiting conditions (IPBES, 2018; HLPE, 2019). Mycorrhizal networks also contribute to soil aggregation and carbon stabilization, linking plant productivity with soil structure and organic matter dynamics.

Healthy soils are further characterized by stable physical structure, which allows roots to penetrate the soil profile and enables air and water to circulate effectively. Well-structured soils reduce runoff, promote infiltration and increase resilience to both heavy rainfall and drought (FAO, 2017).

Finally, soil health depends on balanced chemical conditions, including appropriate pH and nutrient availability. Chemical balance influences biological activity, nutrient solubility and plant uptake, and is closely regulated by organic matter content and biological processes rather than by external inputs alone (FAO, 2017; FAO & ITPS, 2015).

When soil organic matter declines and soil biological communities are disrupted, these interlinked functions are progressively weakened. Nutrient cycling becomes less efficient, soil structure deteriorates, water retention decreases and soils become more vulnerable to erosion and compaction. Soil degradation therefore undermines not only environmental sustainability, but also the long-term productivity and resilience of agricultural systems (IPBES, 2018).

1.1.1 Agroecological practices to address soil degradation

Agroecology places soil health at the center of agricultural and food-system transformation. Rather than compensating for degradation through

increasing external inputs, agroecological approaches aim to restore soil functions by working with ecological processes, while maintaining productive systems.

Agroecological soil management focuses on three objectives:

1. Increasing soil organic matter and biological activity
2. Protecting soil from erosion and physical degradation
3. Restoring nutrient cycles and soil structure

Crop diversification and rotation

Crop diversification through rotations, intercropping and polycultures enhances soil functioning by increasing both the quantity and functional diversity of organic inputs returned to the soil. Different crop species contribute residues with varying chemical composition and root architectures, which support a broader range of soil organisms and promote more stable soil organic matter dynamics (FAO & ITPS, 2015).
Diverse root systems stimulate microbial activity through root exudates and promote the development of mycorrhizal networks, which improve nutrient acquisition, particularly phosphorus, and contribute to soil aggregation (HLPE, 2019). Including legumes in rotations increases biologically fixed nitrogen inputs, supporting nutrient cycling while reducing dependence on synthetic fertilizers. Through these mechanisms, crop diversification strengthens soil food webs and enhances aggregate stability, contributing to improved soil structure and resilience.

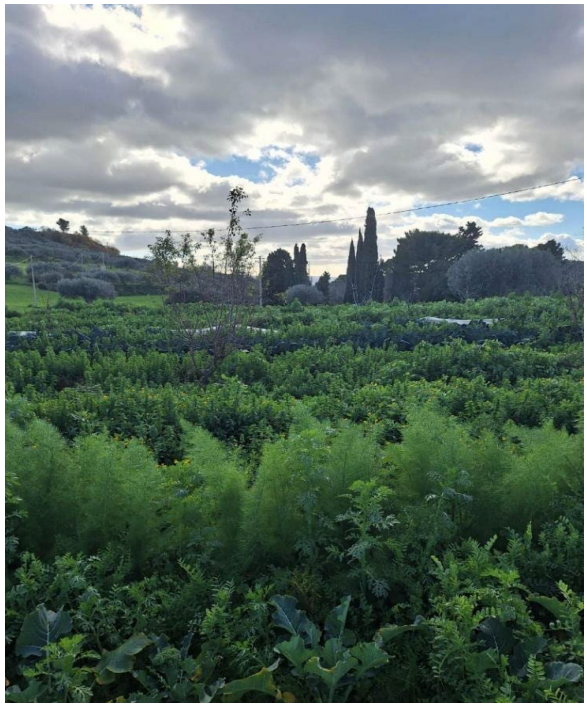


Image 1. An intercropping system in a Mediterranean agroecological garden (Source: CESIE ETS)

Cover crops and green manures

Cover crops play a central role in protecting and regenerating soil during periods when main crops are absent. By maintaining continuous plant cover, they reduce erosion, limit nutrient leaching and moderate soil temperature and moisture dynamics (FAO, 2017). Through their roots, cover crops release organic compounds that stimulate microbial activity and contribute to the formation of labile soil organic matter pools, which are critical for short-term nutrient cycling.

When cover crops are incorporated or terminated as green manure, their biomass contributes to both labile and more stable SOM fractions, supporting aggregation and improving soil structure (FAO, 2022). Deep-rooted species can also alleviate surface compaction and enhance porosity, improving infiltration and water-holding capacity. Under European conditions, the use of cover crops has been shown to reduce erosion by up to 70–80% compared to bare soils (Panagos et al., 2015).

Reduced tillage and conservation agriculture

Reduced or minimum tillage limits physical disturbance of the soil, allowing biological and structural processes to stabilize over time. By preserving soil aggregates and pore continuity, reduced tillage improves infiltration, aeration and root penetration while reducing susceptibility to erosion (FAO, 2017).

Crucially, reduced disturbance supports fungal-dominated soil food webs, including mycorrhizal fungi, whose hyphal networks are highly sensitive to mechanical disruption. Maintaining these networks enhances nutrient uptake efficiency and contributes to aggregate formation and carbon stabilization within the soil matrix (HLPE, 2019). Retention of crop residues on the soil surface further protects soil from erosion and evaporation and provides a continuous source of organic inputs for soil organisms.

Organic amendments: compost, manure and biochar

The application of organic amendments such as compost, animal manure, vermicompost and biochar directly replenishes soil organic matter and supports soil biological activity. These inputs supply both readily decomposable organic compounds that fuel microbial processes and more resistant organic fractions that contribute to long-term SOM accumulation and aggregate stability (FAO, 2022).

Image 2. Example of vermicompost (Source: Adobe Stock)

Organic amendments enhance nutrient retention through increased cation exchange capacity and stimulate microbial-mediated nutrient cycling, improving nutrient availability while reducing losses. Biochar, when applied in combination with organic amendments, can further stabilize organic carbon and improve nutrient retention, contributing to longer-term improvements in soil structure and water-holding capacity (FAO, 2022).

Agroforestry and vegetative measures

Agroforestry systems integrate trees, shrubs or hedgerows into agricultural landscapes, creating vertical and horizontal diversity that benefits soil functioning. Deep-rooted woody species stabilize soil structure, recycle nutrients from deeper layers and provide continuous organic inputs through leaf litter and root turnover (IPBES, 2018).

These systems support diverse soil biological communities and enhance mycorrhizal associations, linking above- and below-ground processes. By improving aggregation and reducing runoff, agroforestry practices are

particularly effective in erosion-prone areas, such as sloping land and Mediterranean environments (IPBES, 2018).

Image 3. Example of agroforestry system (Source: CESIE ETS photo from Myrrhis Permakultur)

Structural and landscape-level measures

Structural measures such as terraces, contour farming, grass strips and stone bunds are designed to reduce runoff velocity and promote infiltration at field and landscape scale. By slowing water movement across the soil surface, these measures protect soil aggregates from detachment and loss, reducing erosion and facilitating water entry into the soil profile (FAO, 2017).

When combined with biologically based practices (e.g. cover crops or perennial vegetation), structural measures contribute to the gradual rebuilding of soil organic matter and the stabilization of soil structure at landscape level.

Integrated Soil Fertility Management (ISFM)

Integrated Soil Fertility Management combines organic inputs, efficient and targeted use of mineral fertilizers, improved crop varieties and sound agronomic practices adapted to local conditions (FAO, 2017). Within an agroecological framework, ISFM prioritizes biological regulation of nutrient cycles by rebuilding SOM and stimulating soil biological activity.

Rather than maximising short-term nutrient supply, agroecological ISFM aims to restore soil functioning over time, progressively reducing dependency on external inputs while maintaining productive capacity and soil resilience (HLPE, 2019).

Reflective questions

1. Why is soil erosion considered “irreversible” on human timescales?

2. How does plant diversity aboveground translate into diversity belowground?

1.2 Loss of seed diversity

The loss of seed diversity represents a fundamental environmental challenge for agroecosystems and food systems. It is closely linked to the widespread replacement of locally adapted crop varieties with genetically uniform commercial seeds, a process that has accelerated under industrial agriculture. Commercial hybrids and genetically modified varieties are designed to perform predictably under standardised, high-input conditions, encouraging uniformity at field and landscape levels. While this model may deliver short-term productivity, it leads to a progressive erosion of genetic diversity by displacing traditional landraces that have co-evolved with local soils, climates and biotic pressures (Gliessman, 2014; SOCLA, 2015).

As genetic diversity declines, agroecosystems lose a critical source of ecological resilience. Uniform crop populations are more vulnerable to pests, diseases and environmental variability because they share similar genetic traits and responses. This genetic homogeneity increases the likelihood of widespread crop failure when new stresses emerge, reducing the adaptive capacity of farming systems, particularly under conditions of climatic uncertainty and increasing extremes (IPCC, 2022). From an environmental perspective, the loss of seed diversity weakens ecosystem functioning by reducing functional redundancy and limiting the capacity of crops to interact effectively with soil organisms, pollinators and natural enemies.

The erosion of seed diversity is reinforced by regulatory and intellectual property frameworks that increasingly treat seeds as standardized and controlled inputs. Seed patents and restrictive certification systems limit farmers' ability to save, exchange, and replant seeds, reducing the circulation of locally adapted varieties. As a result, agricultural landscapes become more genetically uniform and less resilient to environmental stresses such as pests, diseases, and climate variability. This shift also weakens farmers' long-standing role in ecological seed selection, adaptation, and co-evolution with local ecosystems, undermining the dynamic relationship between biodiversity, soil health, and agroecological

resilience. As traditional knowledge related to seed saving, selection and breeding declines, the dynamic relationship between crops and local environments is disrupted, further accelerating genetic erosion and environmental vulnerability (Kopali and Doko, 2017).

Seed quality constitutes an additional dimension of this challenge. In industrial systems, seed quality is primarily defined through centralised certification processes that prioritise uniformity, visual standards and performance under optimal conditions. These criteria often fail to reflect the complexity and variability of real farming environments, particularly in low-input or heterogeneous agroecosystems. As a result, commercially certified seeds may perform poorly under local stress conditions, displaying limited phenotypic plasticity and reduced capacity to adapt to soil, water and climatic variability (Gliessman, 2014). The institutional distance between seed producers and users further weakens trust and farmer engagement in seed quality assessment.

1.2.1 Agroecological practices to address the loss of seed diversity

Agroecology responds to the loss of seed diversity by re-establishing seeds as a living component of agroecosystems rather than as standardized commercial inputs. Central to this approach is the conservation and use of heirloom, open-pollinated cultivars and traditional varieties that are adapted to specific local conditions. Through on-farm conservation and continuous selection, farmers maintain genetically diverse crop populations that evolve in response to local soils, climates, pests and management practices. This in-situ conservation process enhances ecological resilience by preserving a broad genetic base capable of responding to environmental change (SOCLA, 2015).

Farmer-led seed selection is a key agroecological practice that directly addresses genetic erosion. Instead of selecting varieties solely for maximum yield under high-input conditions, agroecological farmers prioritise traits

such as yield stability, pest and disease resistance, seed viability and tolerance to climatic variability. This selection process strengthens the adaptive capacity of crop populations by promoting genetic heterogeneity and continuous co-evolution between crops and their environment, thereby reducing vulnerability to shocks (Gliessman, 2014).

Seed quality is further strengthened through diversified cropping systems and ecological regulation. Polycultures and intercropping systems create more complex agroecosystems that reduce pest and disease pressure on seed-bearing plants by disrupting pest life cycles and supporting natural enemies. This ecological protection improves seed health and viability without reliance on chemical treatments. At the same time, participatory quality control rooted in local knowledge and trust allows farmers to evaluate seed performance under real farming conditions rather than abstract standards. This process preserves not only genetic diversity but also the cultural knowledge associated with seed selection, storage and exchange, ensuring that seed quality remains context-specific and environmentally robust.

Reflective questions

1. How does replacing local crop varieties with uniform commercial seeds affect the ability of farming systems to adapt to environmental change?

2. Why is farmer involvement in seed saving and selection important for maintaining both environmental resilience and local knowledge?

1.3 Biodiversity loss

Biodiversity loss constitutes one of the most profound environmental challenges affecting agricultural systems globally. It is driven by a combination of structural factors embedded in industrial food systems, including the overreliance on a limited number of high-yield crop varieties, the widespread adoption of monoculture systems, the destruction and

fragmentation of semi-natural habitats, and the intensive use of synthetic pesticides and fertilisers. Together, these processes have reshaped agricultural landscapes into simplified and highly specialised systems that prioritise short-term productivity at the expense of ecological integrity and long-term resilience (Altieri, 1995; Gliessman, 2014).

At the crop level, the dominance of a narrow genetic base has significantly reduced diversity within fields and across regions. The repeated cultivation of the same varieties over large areas creates uniform agroecosystems that lack functional redundancy. In ecological terms, this means that when a stressor such as a pest outbreak, disease or extreme weather occurs, the system has limited capacity to compensate or adapt. The resulting vulnerability often leads to cascading effects, including widespread crop losses and increased reliance on chemical inputs to stabilise production (Altieri and Nicholls, 2017).

Monoculture systems further amplify biodiversity loss by eliminating structural and biological complexity. Natural ecosystems are characterised by multiple species interacting across trophic levels, creating feedback mechanisms that regulate populations and resource flows. In contrast, monocultures simplify these interactions, removing habitats for beneficial organisms such as pollinators, predators and soil fauna. This simplification disrupts ecological regulation and contributes to the emergence of pest outbreaks, which are frequently addressed through increased pesticide use, reinforcing a cycle of ecological degradation (SOCLA, 2015).

Habitat destruction at the landscape scale represents another critical driver of biodiversity loss. The removal of hedgerows, grasslands, wetlands and riparian zones to expand arable land has fragmented habitats and reduced ecological connectivity. These landscape elements play a crucial role in supporting biodiversity by providing nesting sites, food resources and migration corridors for a wide range of organisms. Their loss weakens ecosystem services that operate beyond individual fields, such as pollination and biological pest control, making farms increasingly isolated and ecologically fragile (Kopali and Doko, 2017).

The overuse of synthetic pesticides and fertilisers compounds these impacts. Pesticides often act indiscriminately, reducing populations of non-target organisms and disrupting food webs. Fertiliser overuse alters soil chemistry and biology, reducing microbial diversity and contributing to nutrient leaching and water pollution. As biodiversity declines both above and below ground, agroecosystems lose their capacity for self-regulation, becoming increasingly dependent on external inputs to maintain productivity. From an environmental perspective, biodiversity loss is therefore not only a conservation issue but a direct threat to the functioning, stability and sustainability of agricultural systems.

1.3.1 Agroecological practices to address biodiversity loss

Agroecology responds to biodiversity loss by fundamentally redesigning farming systems to function as complex, adaptive agroecosystems in which biological diversity is actively cultivated and managed. Rather than treating biodiversity as an external or secondary concern, agroecology recognises it as a functional component that underpins productivity, resilience and environmental sustainability.

Closing Metabolic Cycles: The Circularity of Life

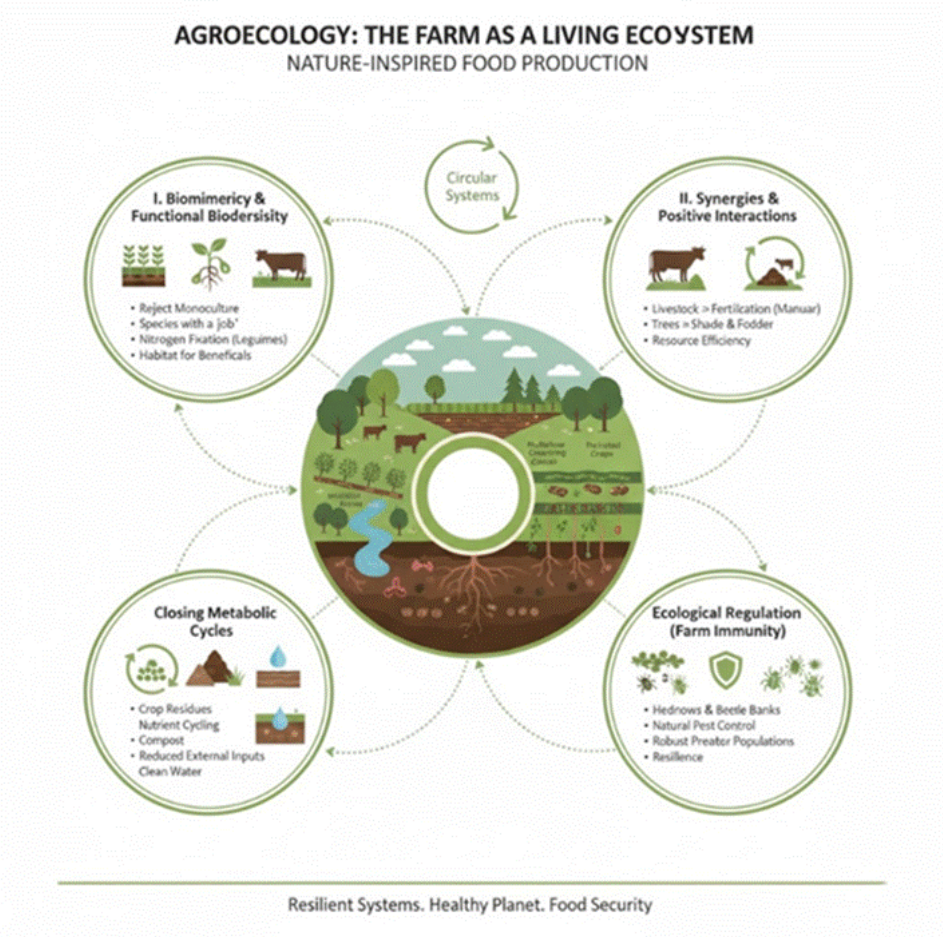


Image 4. Source: Global Alliance for the Future of Food (*https://futureoffood.org/*)

Crop diversification is a cornerstone of this approach. Polycultures and intercropping systems replace monocultures by growing multiple species or varieties within the same field. These systems enhance ecological interactions by allowing crops to occupy different spatial and temporal niches, improving light capture, nutrient uptake and water use efficiency. At the same time, diversified cropping disrupts pest and disease cycles by reducing host availability and supporting populations of natural enemies, thereby lowering the need for chemical interventions (Altieri, 1995).

Agroforestry further expands biodiversity by integrating trees and shrubs into agricultural systems. This vertical diversification creates multi-layered habitats that support a wide range of organisms while enhancing ecosystem functions such as nutrient cycling, soil protection and

microclimate regulation. Tree roots stabilise soils and access deeper nutrient pools, while leaf litter contributes organic matter and supports soil biodiversity. By combining perennial and annual components, agroforestry systems enhance ecological continuity and resilience across seasons and years (Altieri and Nicholls, 2017).

Seed saving and the use of locally adapted varieties complement these practices by maintaining genetic diversity within cropping systems. Diverse genetic populations interact differently with environmental conditions and biotic factors, increasing functional redundancy and adaptive capacity. This genetic diversity allows agroecosystems to respond more effectively to stresses, reducing the likelihood of widespread failure and supporting long-term system stability (Gliessman, 2014).

Habitat preservation and restoration at the farm and landscape levels are essential for rebuilding ecological infrastructure. Hedgerows, field margins and other semi-natural elements provide habitats and corridors for pollinators, predators and other beneficial organisms. Rotational grazing systems contribute to habitat heterogeneity by preventing uniform vegetation structure, promoting plant species diversity and supporting soil biological activity. These practices enhance connectivity across landscapes, allowing ecological processes such as pollination and biological control to operate effectively beyond individual fields (SOCLA, 2015).

Sustainable pest and fertility management further reduces pressure on biodiversity by replacing chemical inputs with biological processes. The application of compost and organic fertilisers increases soil organic matter and supports diverse microbial communities that drive nutrient cycling and enhance plant health. Healthy soils form the foundation of resilient agroecosystems, improving plant resistance to pests and diseases and reducing the need for synthetic inputs (Kopali and Doko, 2017). Through these practices, agroecology restores the capacity of farming systems to self-regulate, closing nutrient cycles and reinforcing ecological feedback mechanisms.

Taken together, these agroecological practices demonstrate that biodiversity is not an optional addition to agricultural systems but a functional input that enables productivity, stability and environmental sustainability. By enhancing diversity at genetic, species and ecosystem levels, agroecology directly addresses the drivers of biodiversity loss while building resilient agroecosystems capable of sustaining food production under changing environmental conditions.

The table below summarises key environmental challenges related to biodiversity loss and ecosystem degradation in the Western Balkans, highlighting corresponding agroecological practices, their ecological outcomes, and their relevance within a broader European context.

Table 1. Agroecological practices, their ecological outcomes, and their relevance within a broader European context.

Environmental Challenge	Agroecological Solution	Ecological Outcome	EU / Wider European Relevance
Soil Erosion	Cover cropping & Stone terraces	Prevention of topsoil loss to the Adriatic/Ionian seas	Common across Mediterranean EU states (Italy, Greece, Spain); stone terracing and cover crops are established CAP-supported practices
Summer Drought	Organic mulching & Agroforestry	Maintenance of soil moisture without excessive irrigation	Highly relevant to Southern and Central EU regions facing increasing

			drought due to climate change
Biodiversity Loss	Polycultures of native species	Preservation of the Balkan "Green Belt"	Comparable to biodiversity challenges in EU regions with similar landscape and farming systems.
Wildfire Risk	Controlled grazing in silvopasture	Reduction of "fuel load" (dry brush) through natural grazing	Increasingly applied in Mediterranean EU countries (e.g. Spain, Portugal, France) as a fire-prevention strategy

Reflective questions

1. How does the simplification of farming systems through monoculture and chemical inputs influence ecosystem stability and resilience?

2. Why is biodiversity considered a functional component of agroecosystems rather than only an environmental conservation goal?

1.4 Unsustainable water management

Water is a fundamental resource for agriculture, yet its management in Europe and the Western Balkans has become increasingly unsustainable. The agricultural sector represents the sector that consumes the largest

share of water resources, accounting for around 40% of total freshwater withdrawals in the European Union, and up to 60–80% in the arid regions of southern and south-eastern Europe, where irrigation is widespread (EEA, 2022; Rossi, 2019). At the same time, climate change is intensifying pressures on these limited resources. Rising temperatures, longer dry periods, and more frequent droughts reduce river flows and overall water availability, making irrigation a critical constraint on agricultural productivity (EEA, 2022).

One of the main structural challenges is water scarcity, defined as the imbalance between water demand and available supply. In southern Europe and the Western Balkans, recurring droughts have become more severe and frequent. The European Environment Agency identifies Mediterranean Europe as one of the EU regions most affected by water stress, with countries such as Spain, Italy, Greece, and parts of the Western Balkans regularly experiencing water exploitation rates above sustainable thresholds (EEA, 2022). Climate projections indicate that annual river flows in southern Europe could decrease by up to 30% by mid-century, intensifying competition for water among agriculture, ecosystems, and urban uses (EC, 2025).

Closely linked to scarcity is the issue of groundwater over-extraction. Irrigated agriculture relies heavily on groundwater, particularly where surface water is limited. In parts of Spain, Italy, and the Western Balkans, aquifers are being depleted faster than they can naturally recharge. FAO estimates that 20–25% of groundwater used for irrigation in Europe is abstracted unsustainably, resulting in declining water tables, increased pumping costs, and salinization in coastal areas. Once depleted, aquifers may require decades or even centuries to recover, threatening the long-term viability of farming systems (FAO, 2020).

Inefficient irrigation practices further exacerbate these pressures. Conventional techniques such as flood or furrow irrigation are associated with significant losses due to evaporation, runoff, and leakage. At the EU level, up to 50% of irrigation water may be lost before reaching crops, particularly where infrastructure is ageing or poorly managed (FAO, 2017;

EEA, 2022). These inefficiencies increase total water abstraction without improving crop productivity, intensifying environmental stress.

In addition to quantity-related issues, water pollution from agriculture represents a major environmental concern. Runoff and leaching of synthetic fertilizers and pesticides contaminate rivers, lakes, and groundwater. Nitrate pollution is widespread, with over 30% of groundwater monitoring stations in agricultural areas exceeding safe nitrate concentrations, posing risks to human health and aquatic ecosystems. In the Western Balkans, limited wastewater treatment and weak regulation of agrochemical use further increase the vulnerability of surface and groundwater bodies (EC, 2025).

Unsustainable water management is also closely linked to soil degradation. Soils with low organic matter retain less water and generate higher runoff, increasing vulnerability to both drought and flooding. Farmers often respond to declining water availability by increasing irrigation, drilling deeper wells, or intensifying input use, creating a negative feedback loop that raises costs and environmental pressure while reducing long-term resilience (EEA, 2022).

Overall, unsustainable water management is not only an environmental challenge but also a structural weakness of current farming systems. Without changes in how water is captured, stored, and used, agriculture in Europe and the Western Balkans will remain increasingly vulnerable to climate variability and extreme weather events.

1.4.1 Agroecological practices to ensure sustainable water management

Agroecology promotes a fundamentally different approach to water management. Instead of relying on ever-increasing water abstraction, agroecological systems aim to reduce water demand, enhance water-use efficiency, and increase natural water storage within soils and landscapes. These practices address the main determinants of unsustainable water management, i.e. scarcity, over-extraction, inefficient irrigation, and pollution, by improving how rainfall and soil water are captured, stored, and used.

Rainwater harvesting and on-farm water retention

This practice involves capturing rainfall where it falls and storing it for later use. Techniques include farm ponds, small reservoirs, contour bunds, swales, and cisterns. In addition, micro-catchments and planting basins concentrate water around crops, enhancing infiltration and reducing surface runoff (FAO, 2017). By retaining water on-site, these structures reduce reliance on rivers and groundwater while providing a buffer during dry periods.

Image 5. Example of farm pond (Source: Kisan Farm Pond Scheme)

Image 6. Example of swales (Source: Permaculture apprentice)

Soil organic matter management and soil cover

Soils act as natural water reservoirs, and increasing soil organic matter improves soil structure, infiltration, and water-holding capacity. Practices such as cover cropping, mulching, and residue retention protect the soil surface, reduce evaporation, and limit erosion. Reduced or minimum tillage further preserves soil structure and pore continuity, allowing more water to infiltrate and remain in the soil profile (FAO, 2017).

Crop diversification and root depth management

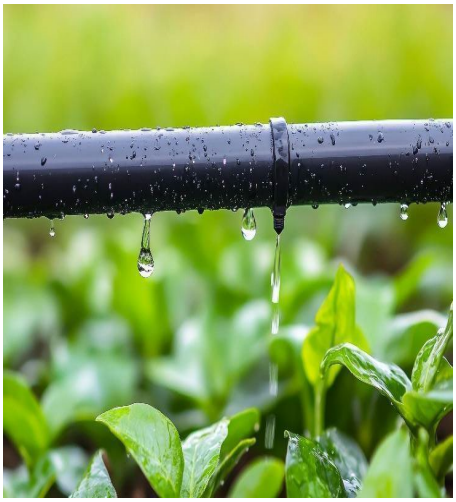
Diversified cropping systems use different root architectures to access soil water at various depths. Crop rotations, intercropping, and the integration of deep-rooted species enhance overall water-use efficiency and reduce peak water demand. By spreading water requirements across multiple crops and soil layers, these practices improve resilience under variable rainfall conditions (FAO, 2017).

Image 7. Example of roots architecture (Source: Adobe Stock)

Agroforestry and vegetative structures

Integrating trees, hedgerows, or shelterbelts into agricultural fields modifies water flows at both field and landscape scales. Tree roots improve soil structure and promote deeper infiltration, while above-ground biomass reduces wind speed and evapotranspiration. Vegetative strips and tree lines can slow runoff and increase soil recharge, enhancing water availability in the root zone (Mitrová et al., 2025).

Efficient irrigation techniques adapted to agroecological systems



Where irrigation is necessary, agroecology encourages low-pressure systems, such as drip or micro-irrigation, often combined with soil moisture monitoring. These techniques deliver water directly to plant roots, reducing losses from evaporation and percolation. Efficient irrigation is not intended to maximize water supply but to minimize water demand, especially when combined with complementary soil and crop management practices (Rossi, 2019).

Image 8. Example of drip irrigation (Source: Adobe Stock)

Reflective questions

1. How does increasing soil organic matter improve water availability for crops?

2. How do unsustainable agricultural practices contribute to water pollution?

1.5 Conclusions

The environmental dimension of agroecology highlights the central role of ecological processes in sustaining agricultural production over the long term. Throughout this module, soils, water, biodiversity and seeds have been examined as interconnected and living components of agroecosystems whose degradation undermines both environmental sustainability and farming system resilience. The analysis shows that many of the environmental challenges facing agriculture—soil degradation, biodiversity loss, genetic erosion and unsustainable water use—are rooted in simplified, input-dependent production models that disrupt ecological functioning.

Across these challenges, agroecological approaches demonstrate a strong capacity to restore ecosystem functions and reduce vulnerability to climate variability. By rebuilding soil organic matter, strengthening biological regulation and improving water retention at field and landscape scales, agroecological practices contribute to reduced erosion, more efficient resource use and greater system stability. Rather than compensating for degradation through external inputs, agroecology restores the ecological foundations of agricultural productivity.

The module also underlines the importance of maintaining diversity within agroecosystems. Genetic, species and ecosystem diversity enhance adaptive capacity, support ecological interactions and reduce dependence on external inputs. Farmer-led seed systems and locally adapted varieties play a key role in preserving this diversity and strengthening resilience under changing environmental conditions.

In conclusion, this module demonstrates that agroecology offers a robust environmental framework for addressing climate change, soil degradation, water scarcity and biodiversity loss in Europe, the Western Balkans and beyond. By focusing on the regeneration of ecological processes, agroecological approaches support resilient farming systems that sustain both food production and environmental integrity. Within the broader set of agroecology modules, this environmental perspective complements the economic, socio-cultural and political dimensions, together contributing to a comprehensive understanding of agroecology as a pathway for sustainable food-system transformation.

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SOCIOCULTURAL DIMENSION

Brief Description

This module addresses the vital role of sociocultural factors in sustaining agroecological systems and rural livelihoods. It explores challenges such as the erosion of traditional knowledge, loss of dietary diversity, weak community organization, marginalization of rural youth and gender inequalities. Participants will learn agroecological approaches that value and integrate local knowledge, promote culturally appropriate diets, and foster inclusive community collaboration. The module also highlights the importance of participatory education and equitable participation of women and youth as key drivers for resilient and sustainable rural development.

Learning Outcomes

1. Identify key sociocultural challenges affecting agroecological sustainability, including the erosion of traditional knowledge, loss of dietary diversity, and community fragmentation.
2. Explain the importance of integrating local knowledge and cultural practices into agroecological approaches.
3. Describe strategies to promote community organization, participation, and collective action for resource management and agroecological initiatives.
4. Recognize the roles and contributions of women and youth in agroecology and develop inclusive approaches to empower these groups.

5. Design participatory learning activities and community events that strengthen social cohesion, knowledge sharing, and cultural identity within rural communities.

2. Introduction to the sociocultural dimension

The second dimension of agroecology is the sociocultural, which centers on the social and cultural characteristics that shape farming. In many parts of the world, agriculture stands as one of the most common occupations and therefore offers many kinds of opportunities to local societies. The social and cultural dimension highlights that agriculture is not only a technical activity but also a way of life deeply rooted in the culture, identity, traditions, innovations, and knowledge of local communities. Farmers' experiences, traditional practices, and relationships within their communities play a key role in how food is produced, contributing to healthy, diverse, seasonal, and culturally meaningful diets (CIDSE, 2018). Agroecology heavily depends on knowledge, cooperation, trust, and horizontal exchanges, especially farmer-to-farmer learning and alliances where both farmers and researchers participate equally. This dimension also emphasizes solidarity and dialogue among culturally diverse groups, including communication between rural and urban populations, which help different communities connect through shared values even when their practices differ. At the same time, agroecology respects human diversity and promotes inclusion by supporting the participation and leadership of women, young people, and individuals of all genders, ethnicities, religions, and orientations. It often relies on trust established between producers and consumers rather than expensive external certification, encouraging alternatives such as Participatory Guarantee Systems (PGS) and Community-Supported Agriculture (CSA). Ultimately, the sociocultural dimension highlights that strong, inclusive communities, connected both spiritually and materially to

their land, are fundamental for building sustainable and resilient agroecological systems (ibid)

Agroecology is often described as a way of farming, but it is better understood as a whole approach to food systems that brings ecology together with questions of knowledge, power, and everyday life. It asks not only how food is produced, but also who shapes the rules of production, whose knowledge counts, and who benefits in this process. For this reason, the sociocultural dimension is central to how agroecology works and what it aims to change. Exploring this dimension means paying attention to people's identities and roles, community relationships, local traditions, gender dynamics, and the ways producers and consumers are connected through food. For this reason, agroecology has become a matter of belonging as much as it is about sustainability creating food systems that are local, socially fair, and resilient.

In the current agricultural world, there are many persistent issues that challenge the everyday life of not only farmers, but also the broader community. This module focuses on some common challenges highlighted by the sociocultural dimension and possible solutions based on practices highlighted by the agroecological theory that aim to address these issues. The challenges presented in this module include:

- The erosion of traditional knowledge and practices
- The loss of dietary diversity and food culture
- The weak community organization and collaboration
- The marginalization of rural communities and youth
- Gender and social inequalities

The presentation of each challenge will be followed by a description of the suggested practices for that specific challenge, as demonstrated in the agroecological context.

2.1 Erosion of traditional knowledge and practices

One of the most significant sociocultural pressures facing agroecological transitions is the gradual erosion of traditional knowledge and everyday farming practices. Traditional agricultural knowledge, sometimes stemming from ancestral or indigenous practices, has been preserved through many years and applied across different time periods and by different communities. It includes practical ways of managing soils, water, seeds, crops, and livestock that are adapted to local conditions. However, this knowledge is often neglected when modern agriculture promotes standardised technical packages and outside expert advice, making local know-how seem less important or irrelevant.

Across many rural contexts, locally developed knowledge built through long experience, observation, and collective learning has increasingly been replaced by standardised technical packages promoted through extension services, input suppliers, and development programmes. While these packages are often presented as modern, efficient, and universally applicable, they can weaken farmers' capacity to adapt practices to their own landscapes, climates, and cultural preferences. Over time, this not only changes how food is produced but also reshapes who is seen as an expert, reduces the status of community-based knowledge, and can interrupt the intergenerational transmission through which farming skills, identities, and cultural memory are sustained.

The production of processed and ultra processed foods has significant consequences on the diversity of traditional crops, cuisines and diets. That is because processed food relies on the demand for a specific and often limited number of yields and plant species. This undermines and reduces the interest in producing certain crop varieties, while intensifying the production of a limited number of others. This gradually leads to the erosion of traditional knowledge, the elimination of an important number of plant

and crop species (even resulting in monocropping), the reduction of farmers power and autonomy, dietary changes, the damage to local food heritage and ultimately weakened cultural identities (Moeller et al., 2023). As can be understood, these developments have a strong impact on social and cultural values, especially in rural areas, and also lead to the absence of local farmer-to-farmer innovation efforts.

2.1.1 Benefits of traditional knowledge and practices

The preservation of traditional knowledge, apart from providing financial or other benefits, also benefits society by creating and preserving cultural values. Practices used by different generations of farmers in a local context, often passed from senior farmers to younger aged professionals, build respect, belonging, historical continuity and create personal bonds both in terms of human relationships and local links. Often, practices are strongly associated with landscapes, seasons, rituals and traditions or tied to local needs, thus heavily contributing to the creation of strong cultural identities.

Local knowledge also empowers farmers by increasing their levels of autonomy with regard to their dependence on external inputs, expert knowledge or influence. This allows farmers to have more freedom and control over their work, decisions and future development, and also encourages bottom-up community innovations.

Local food heritage including tastes, dishes, cultures and traditional crop varieties is also protected. According to Rahman et al. (2021) food heritage refers to traditional practices relevant to consumption and production that:

a) characterize the foodways of specific groups of people, regions, or nations;
b) employ forms of knowledge and craftsmanship, skills, methods, processes and tools;

c) are part of specific cultural or religious celebrations, festive events, performances, customs, and rituals.

Traditional crop varieties, animal breeds, and food processing methods are often the reason a place has its unique flavours. Through growing local varieties, implementing local practices of harvesting, fermenting, processing or cooking, agri-food producers help preserve the essential components of a food culture like recipes, eating habits, traditions and a unique way of living.

Local well-being is also often associated with psychological factors, linked to social factors. Social cohesion and social bonds are of utmost importance for the well-being of the community. The opposite is also true, the more satisfied the members of a community are in terms of quality of life and cultural links, the higher the social benefits will be (Ker et al, 2022). Since in rural areas cultural values are many times dependent on the traditional knowledge and since the way of life many times is influenced by how the food is produced, its preservation can be a decisive contributor to social cohesion and happiness in rural contexts.

2.1.2 Valorization of local and traditional knowledge

Not only collaboration and knowledge sharing between researchers or farmers, but also between farmers and researchers can exist. Both traditional and scientific knowledge can lead to innovation in agroecological contexts, especially when combined (Iuliano et al., 2021). In small-scale agricultural settings, ancestral knowledge can be combined with modern technologies and prevailing scientific knowledge. This combination will create an agri-food production based on agroecological values that can offer solutions to challenges like soil degradation, water management and seed diversity. This gives farmers the power to reject

technologies that undermine local know-how and practices and that support industrialized, destructive and intensive production methods (Torres et al, 2017). When scientific research respects and takes into consideration the traditional knowledge of local farming, there is then room for innovation that allows not only existing but also new knowledge to be passed on to future generations and professionals in the sector (ibid).

The co-creation of knowledge can be supported by allowing transdisciplinary engagement that includes different actors such as producers, traders, scientists from different backgrounds and specializations and local farmers, thus bringing together diverse knowledge. This process of combining both practical and theoretical knowledge enhances scientific research and ensures that the result reflects social realities and addresses local needs (Barrios et al, 2020). This is not a top-down or bottom-up process, but a multidirectional collaboration. The Agroecology coalition (2024) describes the processes it involves as:

- Platforms for the horizontal creation and transfer of knowledge and good practices (e.g., farmer to farmer learning and exchanges including farmer field schools, farmers' climate field schools, community of practices on agroecology)
- Farmer research and experimentation groups
- Recovery, valorization and dissemination of traditional and indigenous knowledge
- Co innovation between farmers and researchers / participatory research / transdisciplinary research (design, implementation, analysis, evaluation)
- Improved access to agroecological knowledge (e.g., capacity building/strengthening agroecological extension, improvement and development of agroecology curriculum, consumer food and nutrition education
- Engagement and participation of producers and consumers in local community and grassroots organizations

Farmers will no longer focus only on standardized technical packages or market-oriented only practices (technical packages) but will instead be empowered and motivated not only to protect their local historical knowledge, but also to contribute to its development in order to help their rural areas grow and address current needs.

Case Study: Alternative Community Peliti (Greece)

Peliti is a voluntary, non-profit community initiative dedicated to the protection of agricultural biodiversity through local seed saving. Since 1995, it has focused on the collection, cultivation, and free dissemination of traditional and local seed varieties, positioning seeds not as commodities but as shared cultural and ecological knowledge. By doing so, Peliti actively contributes to the creation, preservation, and circulation of agroecological knowledge rooted in local practices.

A core element of Peliti's work is the rediscovery and valorisation of traditional knowledge related to local biodiversity, including cultivation methods, seed selection, and adaptation to local agroecological conditions. This knowledge is transmitted through community-based practices, seed exchanges, expeditions to collect local varieties across Greece, and direct engagement with both amateur and professional growers. To date, Peliti has supplied over 300,000 growers with non-GMO seeds, enabling on-farm experimentation and reinforcing farmers' role as knowledge holders and innovators.

Peliti also functions as a knowledge dissemination hub, raising awareness within civil society and sharing Greek experiences

internationally through conferences, festivals, and public lectures. Its Seed Festivals, including the Peliti Seed Festival and the Olympic Seed Festival, embody its philosophy of non-monetary exchange, collective learning, and cooperation, creating open spaces for intergenerational and intercultural knowledge sharing.

Through its decentralized network of local groups and volunteers in Greece and abroad, Peliti mobilizes practical skills, experiential learning, and collective memory to support seed conservation and agroecological transition. Overall, Peliti's actions strengthen food sovereignty and sustainable agriculture by valuing farmers' knowledge, promoting open access to plant genetic resources, and embedding traditional agroecological knowledge within contemporary community practices.

Read more here.

Reflective questions

1. How does preserving traditional knowledge and practices contribute to social cohesion and community well-being?

2. Which links between farming practices and landscapes, seasons, rituals and traditions stand out to you, and why do they matter for cultural identity?

2.2 Loss of dietary diversity and food culture

Industrialized food systems, particularly the rise of ultra-processed foods (UPFs), have significantly reshaped global diets, leading to the loss of dietary diversity and the erosion of local food traditions. UPFs, which are often mass-produced with refined ingredients, additives, and artificial preservatives,

have replaced traditional, locally sourced foods. These highly processed products, designed for convenience and shelf stability, lack the nutritional diversity found in seasonal, cultural diets (Giamperi et al., 2025). For instance, in Mediterranean regions, the shift from whole, seasonal foods to processed snacks and fast food has reduced the appeal of the Mediterranean diet, which involves fresh vegetables, legumes, and locally sourced grains (ibid). It is characteristic that of the 7000 plants that humans historically considered food, only three of them account for 50% of food energy intake from plants. Rice, maize and wheat dominate the global plant consumption and therefore they are produced and preferred in contrast with other cultivars, especially locally sourced alternative varieties (IPES-food, 2016).

These dietary changes not only compromise nutritional quality and human health but also disconnect communities from their agricultural roots, weakening the bond between food, local culture, and tradition. This change impacts cultural identity as traditional food practices are closely related to local agricultural knowledge. For example, the loss of seasonal produce and the adoption of globalized food chains erode not only food sovereignty but also the intergenerational transmission of agricultural skills. As urbanization and migration increase, many younger generations no longer engage with agriculture or learn about traditional crop management, further isolating them from their food systems (IPES-Food, 2016). The loss of biodiversity, along with other factors such as economic pressures and other incentives, makes rural landscapes seem less attractive and less sustainable in social, economic and environmental terms. This results in fewer people living and working in the countryside, which in turn intensifies the loss of dietary traditions and cultural food habits (World Food Forum, 2025). This loss of food culture can lead to a decrease in the variety of locally adapted crops, which are crucial for environmental resilience and the continued sustainability of agricultural systems (FAO, 2012).The breakdown of this knowledge transfer, often exacerbated by modern urban lifestyles,

disconnects people from the origins of their food, threatening both cultural heritage and long-term ecological sustainability.

2.2.1 Promotion of diverse, healthy, culturally appropriate diets

The loss of dietary diversity and food culture is one of the main topics agroecological theory aims to address. In order to reverse this rapid change in people's eating habits and preferences, special importance is given to reconnecting agriculture to nutrition and culture by promoting diets that are both nutritious and culturally appropriate. By supporting agroecological practices, encouraging local food systems, and preserving food heritage, diets that respect both biodiversity and cultural identity can become relevant again.

In agroecological theory, promoting diverse, healthy, and culturally appropriate diets means supporting food systems that are not only ecologically sustainable and nutritionally diverse but also connected to local culture and traditional agricultural knowledge. This concept is present in several core principles of agroecology such as the diversity, sustainability, and participation principles. Some of the main theoretical suggestions include:

- Diversity in Agroecological Diets

Agroecology emphasizes the importance of agro-biodiversity, which ensures that farming systems grow a wide range of crops, including traditional and heritage varieties that are adapted to local climates. This diversity supports nutritional diversity and local diets, protecting against the erosion of local food culture. Seasonal, diverse farming systems also maintain a connection between food production and cultural identity, keeping diets rooted in local traditions and ecological conditions (FAO, 2021).

- Health through Agroecology

Agroecological diets support unprocessed or minimally processed foods, which are nutritionally rich and free from the synthetic chemicals used in conventional agriculture. The promotion of local, sustainable food ensures that local populations have access to nutritious, culturally appropriate diets, in line with their agricultural practices. These diets are also linked to food sovereignty, where communities have control over their agricultural production and their healthy lifestyle (FAO, 2012).

- Culturally Appropriate Diets

Agroecology recognizes the value of traditional knowledge and the role of local food systems in preserving cultural heritage. It aims to support food systems that offer not only nutritional value but that also support local culinary practices and food culture, transmitted through generations (IPES-Food, 2016).

- Connecting Agriculture to Culture

Agroecology considers food systems as being embedded in the cultural ecosystem of a given community, especially rural communities. These systems also aim at reconnecting people to their land and food traditions. This effort involves the support of food knowledge across different generations and the preservation of local crop varieties, which are central to food sovereignty and cultural identity (FAO, 2012).

Case Study: Maniatakeion Foundation (Greece)

The Maniatakeion Foundation (Μανιατάκειον Ίδρυμα) is a foundation based in Koroni that supports the safeguarding and promotion of the Mediterranean Diet as living intangible cultural heritage, linking it to

local identity, the landscape, and sustainable local development. It has been closely associated with Koroni's role as Greece's "emblematic community" in the Mediterranean Diet's UNESCO inscription and has helped sustain the networked safeguarding work that followed, including participation/representation in coordination meetings with other emblematic communities and partner countries. In practice, the Foundation has organized and hosted public-facing actions such as Mediterranean Diet events and festivals in Koroni that combine cultural programming with local product exhibitions and tastings, and it has also delivered scientific events and educational activities (e.g., conferences, seminars, workshops) to translate the heritage concept "from theory to practice." It also supports dissemination through collaborations and publications, examples noted by local authorities include editions documenting Koroni's food heritage (recipes, customs) alongside broader Mediterranean Diet awareness work in Greece and abroad.

Read more here.

Reflective questions

1. Why is maintaining culturally appropriate diets important in agroecological systems?

2. Where do you notice convenience influencing food choices in your own context, and what do you think it replaces (seasonality, local sourcing, shared meals, cooking skills, etc.)?

2.3 Weak community organization and collaboration

The importance of local communities is high when it comes to rural development, sustainable transitions and agroecological systems. Some of the core characteristics of every healthy community, such as cooperation and trust, play a crucial role in the adoption and successful implementation of environmental practices that demand collective action. These can indicatively include seed saving, pest management and resource sharing. As they have high social value and are collective in nature, in order for the members of a rural community to gain benefits in terms of sustainability, community building and financial support, the community members must commit to actively participating in the collective actions agreed among them (Humagain, 2008).

However, when rural communities are fragmented, unorganized or there is a lack of agreement on mutually shared values like trust, support or coordination, then agroecological community systems which are based on collective resources and knowledge sharing cannot thrive. As a result, farmers work in isolation, focusing on private or personal efforts, making decisions based only on personal interest and without gaining or sharing any knowledge with their peers. Therefore, there is reduced social cohesion, collective resilience and sustainability as described by the agroecological theory. This also makes it difficult for interested farmers to adopt or participate in sustainable practice efforts (Wiesinger, 2007; UNISECO, n.d.).

2.3.1 Strengthening community organization and collaboration

Weak community organization and collaboration are critical in the creation process of more responsible and sustainable local agrifood systems. For this reason. Suggestions based on the values of agroecology focus on rebuilding

trust, communication, and cooperation within rural communities. These strategies aim to promote collective action, knowledge exchange, and shared responsibility for sustainable agricultural practices. Below are some practical solutions to enhance collaboration and collective action at the community level, to facilitate the local transitions to sustainable agriculture methods.

- Establish rural associations for collective planning and resource management

One of the most effective ways to strengthen community organization is by creating rural associations like village councils or farmer committees. These platforms provide a formal structure for local farmers to discuss collective challenges, plan sustainable practices, and make decisions regarding the management of shared resources (e.g., water, seeds, land). By organizing in committees, farmers can pool resources, create collective strategies for pest control, share labor, and support each other in adopting agroecological practices. This approach also helps mitigate the risk of fragmentation and ensures that agroecological practices are managed in a way that reflects the community's needs and values (FAO, 2017).

- Organize coordinated activities such as Integrated Pest Management (IPM), compost production or water management at the Community Scale

Coordinated collective activities are vital for ensuring that agroecological practices are effectively implemented at the community level. By organizing IPM programs, compost production initiatives, or community-based water management, communities can significantly reduce costs, improve efficiency, and strengthen local knowledge networks. For example, coordinated pest management involves collective action to monitor, prevent, and manage pest outbreaks in a way that is sustainable and tailored to local agricultural practices. These activities foster a sense of shared responsibility and ensure that community members are engaged in

both the practical and decision-making aspects of agroecology (Humagain et al, 2008).

- Use seed fairs, harvest festivals, or workshops to bring the community together around agriculture and food culture

Cultural events such as seed fairs, harvest festivals, and agriculture workshops provide a dynamic way to reconnect communities with their food culture and agricultural practices. These events are an opportunity to exchange seeds, celebrate the diversity of local food, and share knowledge about sustainable farming practices. By organizing regular events centered around agriculture, communities can strengthen social ties, promote seed saving, and increase awareness of the importance of maintaining local food cultures. These gatherings are essential for fostering community identity and ensuring that agroecology remains rooted in local customs and traditions (Practical Action, 2009).

- Develop local communication networks for coordination and information sharing

Effective communication is a key component of community coordination. By utilizing tools such as WhatsApp groups, bulletin boards, and community radio stations, rural communities can create networks for information sharing and coordination (Nain et al, 2019). These platforms allow farmers to quickly share updates on pest outbreaks, weather patterns, market conditions, and upcoming community events. They also facilitate the rapid dissemination of knowledge about agroecological techniques and best practices, ensuring that information flows efficiently across the community. Digital communication tools can be particularly useful in regions with limited access to formal extension services, offering a cost-effective means for farmers to stay connected and informed (Ollerenshaw et al, 2025).

General steps to strengthen community organisation and collaboration based on the Vega de Valcarce (2023) case study:

Define Shared Goals & Frame Context	Establish a shared understanding of the problem and possible solutions
Identify & Engage Stakeholders	Ensure diverse voices are included and community priorities are captured
Build Knowledge & Awareness	Empower participants to contribute meaningfully to discussions and decisions
Conduct Participatory Workshops	Translate stakeholder inputs into a structured, shared evaluation framework
Facilitate Deliberation & Feedback	Support collaborative analysis and consensus-building; increase transparency
Summarise Collective Views & Agree Direction	Move from evaluation to a community-endorsed path forward
Reflect & Build Capacity	Strengthen organisational capacity and prepare for formal association formation

Case Study: The Water Court of the Plain of Valencia (Spain)

The Water Court of the Plain of Valencia (Tribunal de las Aguas) is a long-standing example of community-based organisation and collective governance of natural resources, deeply rooted in traditional agricultural knowledge. Originating at least in the medieval period—building on Roman and Andalusian irrigation practices and later formalised under King James I—the Court represents one of the oldest continuously functioning democratic institutions in Europe dedicated to water management for agriculture.

At its core, the Water Court embodies the creation, transmission, and application of shared knowledge related to irrigation, water allocation, and land stewardship. Over centuries, local farmers collectively developed rules, norms, and technical know-how to manage water scarcity in the fertile Huerta of Valencia. These rules, initially transmitted orally and later codified, are based on experiential knowledge of the river Turia, irrigation cycles, canal maintenance, and equitable distribution. Rather than relying on fixed water volumes, the system adapts dynamically to the river's flow, reflecting a sophisticated understanding of local ecological conditions.

The institutional structure of the Court strengthens rural collaboration and collective planning. Each irrigation canal (acequia) forms a community of water users, who democratically elect a representative (síndico) to the Court. This bottom-up

governance model ensures that decision-making authority remains with farmers themselves, reinforcing accountability, trust, and shared responsibility. Disputes are resolved publicly, orally, and immediately, using locally understood rules and language, which enhances transparency and social cohesion while preventing conflicts from escalating.

Beyond conflict resolution, the Water Court plays a crucial role in collective resource management, coordinating water use across multiple canal communities to ensure that upstream and downstream users benefit fairly. This cooperative logic maximizes the use of scarce water resources, safeguards agricultural productivity across thousands of hectares, and supports long-term food security. The Court's moral authority—grounded in the legitimacy of farmer-elected representatives and respect for traditional norms—has ensured widespread acceptance of its decisions without recourse to external legal systems.

The endurance of the Water Court demonstrates the value of valorising traditional and farmer-led knowledge systems in modern governance contexts. It shows how rural associations can successfully organise collective planning, regulate shared resources, and adapt inherited knowledge to contemporary challenges. As such, the Water Court of Valencia remains a powerful model for strengthening community organisation, fostering collaboration, and managing agricultural resources sustainably through locally rooted institutions.

Read more here and here.

Reflective questions

1. Why is strong community organization important for the adoption of agroecological practices?

2. How do you interpret the idea that collective actions (like seed saving, pest management, resource sharing) have high social value?

2.4 Marginalization of rural communities and youth

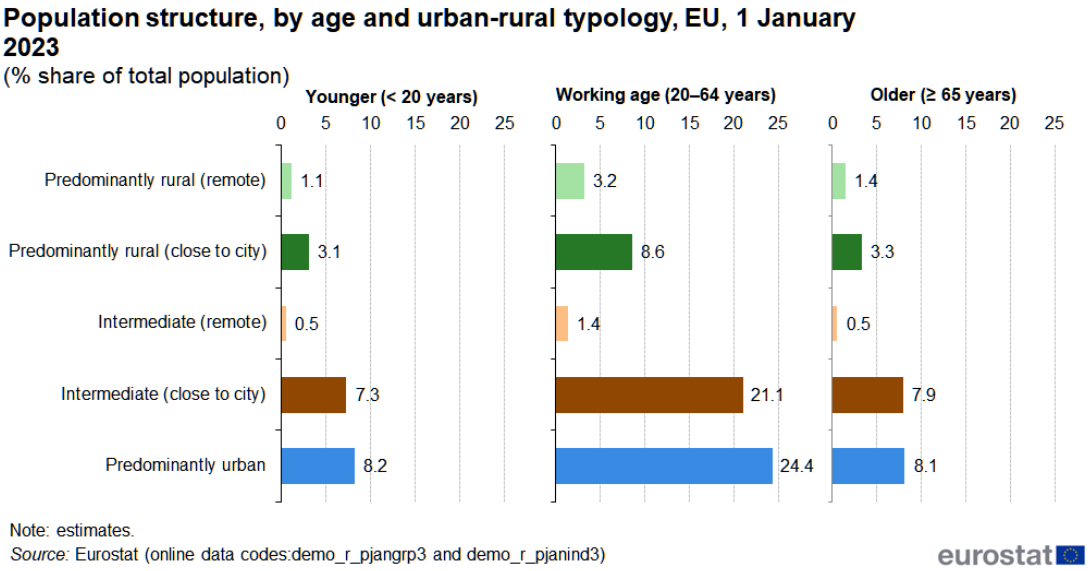
One of the core sociocultural challenges facing agroecology today is the marginalisation of rural communities and the gradual erosion of traditional agroecological knowledge. Rural areas across the world are experiencing significant demographic changes. Young people leave in search of employment, education and better living conditions in cities, while those who remain are mainly older farmers. This trend of rural-to-urban migration, combined with ageing populations, threatens the continuity, renewal, and transmission of agroecological knowledge that has been built collectively over generations.

Some reasons for the migration of youth from rural to urban centres include (McLean, 2022):

- Job opportunities are scarce, especially if one is not interested in practicing agriculture or if they don't have the means, such as family support or farming family.
- There are very limited educational or training programmes in agriculture or other disciplines. Even when they exist, they are often lacking in equipment, teaching staff or quality provision, something that brings discontent to young learners.
- People who relocate to urban centres for studies may not return to their hometowns in order to achieve their employment aspirations.

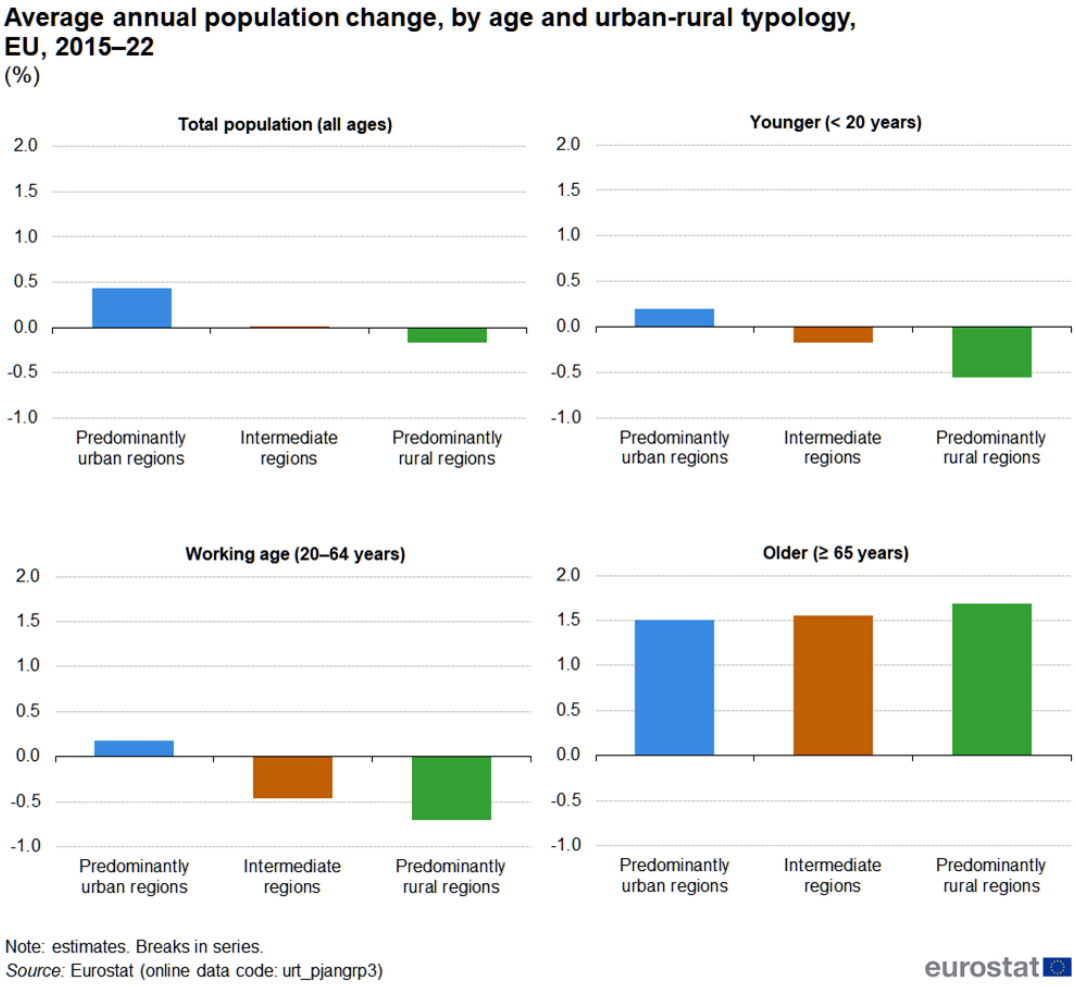
Agriculture is not generally seen as an attractive professional pathway anymore.

- Rural areas are in general perceived to have bad working conditions, extended working hours and intrusive families. In contrast, young people consider their move to the cities as a modern lifestyle with more opportunities and freedom. These perceptions are augmented through social media content.



Source: Eurostat, 2024

Young people are one of the main players in sustaining agroecological knowledge and practices. They bring innovation, physical capacity, and new skills to farming systems. However, economic, social, and personal factors discourage many from seeing a future in agriculture. As youth migrate to urban centres, the intergenerational transfer and continuity of agroecological knowledge is disrupted. This knowledge, often shared orally or through daily practice, cannot easily be documented or replaced. When young people leave, entire cultural images and community memories risk disappearing.



Source: Eurostat, 2024

Migration not only changes demographics, but also social structures, gender balances, and community networks. In many rural communities, youth migration leaves behind mostly elderly, women, and children, altering traditional social and labour demographics. As a result, agroecological and agricultural knowledge is at risk of disappearing (Yunus et al., 2025).

2.4.1 Participatory education

Participatory education is a central topic in agroecological theory and practice. Unlike conventional agricultural training models where knowledge is transmitted from experts to farmers, agroecology promotes horizontal learning processes based on mutual understanding, experience, and

community cooperation. Participatory learning recognises that farmers, students, researchers, and educators possess valuable knowledge and that sustainable food systems emerge from the interaction of various forms of expertise. Through co-learning, agroecology supports community autonomy, empowers youth and creates dynamic spaces where knowledge is collectively built and disseminated in the local community.

Farmer to farmer co-learning model

Farmer-to-farmer is one of the most recognized participatory pathways for spreading agroecological practice while preserving local identity and collective memory. It works through exchange visits, farmer "promoters," demonstration plots, and community experimentation, where farmers learn by observing and testing practices under real local conditions, then re-sharing results in their networks. The "Campesino a Campesino" experience documents how horizontal learning networks linked peasant communities and enabled the spread of agroecology through social organization and peer-to-peer methodology rather than top-down extension (Rosset et al., 2011). [4]

This model:

- restores intergenerational transmission: young people learn directly on farms through peer networks, observation, and practice, exactly the kind of knowledge that is hard to document and is usually transmitted orally and through daily work life.
- rebuilds community cohesion and reduces social fragmentation: farmer-to-farmer approaches depend on trust, mutual support, and collective learning, which strengthens community bonds. It is important when rural areas are aging and networks are weakening.

[4] Learn more: https://www.researchgate.net/publication/332472058_The_'Campesino_a_Campesino'_Agroecology_Movement_in_Cuba

- makes farming socially meaningful and modern: movements like Campesino a Campesino frame agroecology as a modern collective innovation and empowerment movement. That helps counter the perception problem, according to which youth see agriculture as unattractive or backward.

Youth become part of learning networks (farm visits, local promoters, shared experiments), which increases belonging and makes it more likely they stay connected to rural livelihoods.

Teacher-to-student co-learning in agroecology

Teacher-to-student co-learning (in schools, vocational training, community education) means teachers facilitate experiential learning where students and farmers jointly observe, test, and interpret practices in the field and the teacher also learns from local knowledge.

A widely used participatory model aligned with agroecology is Farmer Field Schools (FFS). This approach encourages small-scale producers to find solutions to agricultural problems based on sustainable practices. As a group-based learning model, participants have the opportunity to build observation skills, critical analysis, and decision-making skills tailored to their local context (FAO, n.d.).[5]

This model:

- Closes the lack of education/training gap locally: farmer Field Schools are designed as group, field-based learning where participants learn by doing (observation, analysis, experimentation), rather than depending on institutions located far from their location.
- Increases youth agency and opportunity which are key determinants of whether young people stay, return, or invest in rural life. Young people are able to act and access networks and opportunities which

[5] Learn more: https://www.fao.org/farmer-field-schools/overview/en/

may give them the financial opportunity to work in the field.

Case Study: European Village Programme in Romania

The European Youth Village is a Romanian-led programme that directly addresses the systemic marginalisation of young people in rural areas, a group often rendered invisible in public policy, decision-making, and local development processes. The programme responds to this by empowering young people as active agents of change within their own communities. Its core approach is to reverse traditional top-down policymaking by placing young people at the centre of community organisation, planning, and dialogue with authorities. Through an annual open call, rural youth initiate applications for their village to receive the "European Youth Village" title, supported—but not led—by local authorities and NGOs. This governance model promotes the highest levels of participation, ensuring that young people move from passive recipients of policies to co-creators of solutions.

A key strength of the programme lies in its focus on capacity building and collective learning. Finalist communities enter mentoring and training processes that equip young people with skills in consultation, community organising, advocacy, project design, and cooperation with decision-makers. This strengthens local youth ecosystems in contexts where youth workers, organisations, and infrastructure are often absent. By training young people as youth organisers and practitioners,

the programme transforms a previously marginalised group into a critical local resource for community development.

The European Youth Village is structured around four pillars: education and professional development, culture and intercultural dialogue, volunteering and inclusion, and decision-making and youth policies. Together they aim to combat exclusion, foster inclusion, and build a culture of participation in rural areas. Activities implemented during each year increase youth visibility, strengthen social cohesion, and encourage young people to engage strategically with local challenges using local resources.

Beyond the local level, the programme tackles marginalisation through systemic advocacy and knowledge production, most notably via the White Charter for Rural Youth. This youth-led strategic document translates lived rural youth experiences into concrete policy priorities across ten domains, from education and health to participation, digital spaces, and sustainability. It serves as a bridge between grassroots realities and institutional policymaking at local, national, and European levels, ensuring that rural youth perspectives inform long-term policy frameworks.

The wider ecosystem of initiatives, such as the Rural Youth Summit, Rural Youth Awards, informal youth networks, and the GoRural platform, further amplifies rural youth voices, promotes peer learning, and builds solidarity across regions. These spaces enable rural youth to exchange experiences, gain recognition, and engage directly with policymakers, countering isolation and underrepresentation.

Overall, the European Youth Village functions as a replicable model for addressing rural youth marginalisation through

community organisation, participation, and collaboration. By increasing visibility, strengthening youth work, and embedding youth voices in decision-making, the programme contributes to more inclusive rural communities and more responsive public policies, positioning rural youth as equal partners in shaping their present and future.

Read more here.

Reflective questions

1. How does participatory education help sustain agroecological knowledge in rural communities?

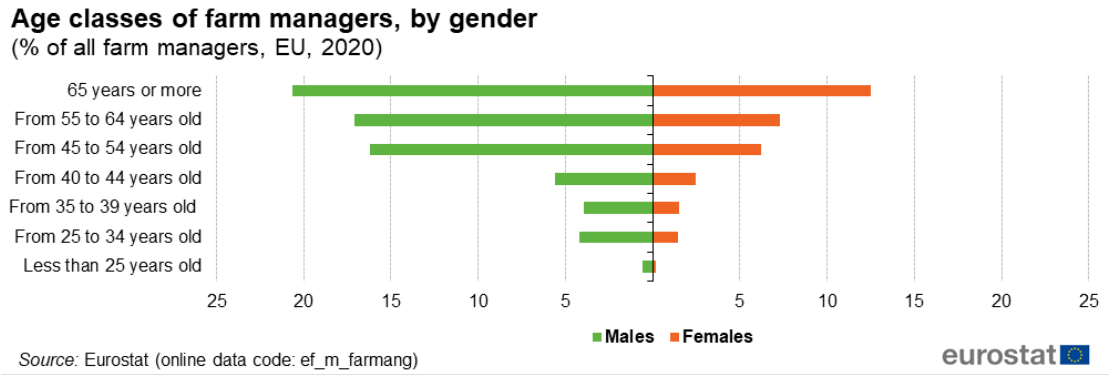
2. Migration changes demographics and also social structures, gender balances, and community networks. Which of these changes do you think would be most visible first in a rural community, and why?

2.5 Gender and social inequalities

Gender and social inequalities often shape agroecological transitions in ways that remain invisible. Women frequently carry essential responsibilities in seed saving and selection, everyday food preparation, and the transfer of local knowledge between generations. This is work that sustains biodiversity, nutrition, and community resilience, but is commonly undervalued in social and cultural terms.

At the same time, structural biases related to gender and young age constrain participation and leadership in agroecology. Unequal access to land ownership and inheritance, limited eligibility for credit and financial services, and barriers to training, extension, and farmer networks reduce the

capacity of women and young people to invest in and make progress in agroecological practices. Addressing these inequalities is necessary to ensure a just transition toward agroecological food systems.



Source: Eurostat, 2022

Agriculture and food are considered central characteristics in human culture and the relation between humans and nature. In this ecosystem, women play an important role regarding food security, nutrition, production, processing and provision within local food systems. Despite this, women rarely possess land, have equal access to natural resources or make their own professional decisions (Barrios et al., 2020). Women often are active as producers, managers, traders or workers (Moeller et al., 2023). This inequality is not only unfair, but also contrary to the principles of co-learning, transgenerational transmission of cultural knowledge. The equal participation of all rural stakeholders in agriculture and equal access to land and resources is crucial to ensure personal and financial investments in sustainable actions like biodiversity, soil protection or other environmental services (Barrios et al., 2020). These inequalities make it difficult for women to start their own agricultural business because of insufficient financial and social capital (Mclean, 2022). Social perceptions along with industrial developments have also augmented the issue. The crops that are most in demand in the food industry have been associated with men taking control of the land and production resources resulting from a distancing from traditional food crops. The erosion of biodiversity and landscapes caused by industrial agriculture have reduced the impact women's knowledge has

in food production and processing (iPES food, 2016). Women, as a marginalised group, often experience health problems and food insecurity in higher levels than other social groups (Moeller et al., 2023).

2.5.1 Equity and inclusion

In order to make progress towards gender/social equality in agroecology, equity and inclusion must become the main priority and promoted though three main strategies:

- Recognition (valuing knowledge and labor)

  treating women and marginalized groups as legitimate experts and innovators in seed systems, food processing, nutrition and agrifood knowledge rather than as secondary participants (Moeller et al., 2023; HLPE, 2019).

- Redistribution (access to resources and opportunities)

  correcting unequal access to land, finance, inputs, training, and time so agroecology is feasible as a feasible strategy and not just theory (Barrios et al., 2020; Mclean, 2022).

- Representation (power in governance)

  ensuring women, youth, and other marginalized groups set priorities in cooperatives, advisory systems, and policy processes, consistent with agroecology's emphasis on participation, fairness, and justice (HLPE, 2019)

Through these strategies equity and inclusion strengthen co-learning and innovation, protect agrobiodiversity and food cultures, and expand the social base required for agroecological practices to move from personal initiatives to proper collective and inclusive sustainable transition.

Case Study: Agios Antonios Women's Agricultural Cooperative of Traditional Products (Greece)

In Agios Antonios, a small village in Northern Greece, women have come together to form a cooperative that tackles gender inequality and fosters community development. With a population of fewer than 700, the village has faced declining agricultural incomes and limited economic opportunities, particularly affecting women, who often experience social isolation, undervaluation of their work, and restricted access to resources.

The cooperative emerged after local women participated in training programs on entrepreneurship, marketing, and traditional food production. Guided by market research on demand for artisanal products, they established a collective framework to produce and sell handmade, locally rooted products, including traditional pastries, seasonal jams, and regional specialties, while also running a small café that attracts both tourists and residents.

Over time, the initiative expanded into a dedicated facility equipped for production, packaging, and distribution, supported by rural development and women's entrepreneurship funding. The cooperative's members continuously engage in professional development, attending seminars on food safety, hygiene, marketing, and business management, ensuring that their practices remain competitive and high-quality.

Beyond economic empowerment, cooperative strengthens social inclusion and community cohesion. By creating a collaborative space where women share responsibilities, knowledge, and skills, it provides a supportive environment that enhances confidence and personal development. The initiative also contributes to preserving local culinary traditions and promoting cultural heritage, while

linking women's entrepreneurship with broader rural revitalization and agrotourism.

Overall, the Agios Antonios Women's Agricultural Cooperative illustrates how targeted support for rural women can reduce social and economic inequalities, enhance visibility and participation in community life, and generate sustainable development, demonstrating a replicable model of inclusive rural entrepreneurship.

Read more here and here.

Reflective Questions

1. What are the main barriers preventing women and marginalized groups from fully participating in agroecology?

2. Equity and inclusion expand the social base needed to move from personal initiatives to collective transition. What do you think prevents that shift to collective action when inclusion is missing?

2.6 Conclusions

The sociocultural dimension of agroecology highlights that sustainable food systems cannot be achieved through technical solutions alone. Agriculture is deeply embedded in social relations, cultural identities, knowledge systems, and community life. Throughout this learning unit, it becomes clear that agroecology depends on trust, cooperation, inclusion, and the recognition of diverse forms of knowledge as much as it depends on ecological practices.

The erosion of traditional knowledge and practices weakens not only farming systems but also cultural identity, social cohesion, and community well-being. Preserving and valorising local knowledge strengthens farmers' autonomy, protects food heritage, and supports intergenerational continuity. When traditional and scientific knowledge are combined through participatory and horizontal processes, innovation becomes socially grounded and locally relevant, empowering communities to address environmental and social challenges collectively.

The loss of dietary diversity and food culture further demonstrates the close relationship between agriculture, nutrition, and culture. Industrialised and ultra-processed food systems disconnect people from their food origins, reduce agrobiodiversity, and undermine food sovereignty. Agroecological approaches that promote diverse, healthy, and culturally appropriate diets help reconnect food production with local traditions, seasonal rhythms, and ecological conditions, reinforcing both social and ecological resilience.

Strong community organisation and collaboration emerge as essential conditions for agroecological transitions. Collective action, shared resource management, and effective communication enable communities to implement practices such as seed saving, pest management, and knowledge exchange. When communities are fragmented or lack trust, agroecological systems struggle to develop. In contrast, organised and cooperative communities enhance social cohesion, collective resilience, and long-term sustainability.

The marginalisation of rural communities and youth poses a major threat to the continuity of agroecological knowledge. Rural-to-urban migration limited educational opportunities, and negative perceptions of agriculture disrupt intergenerational knowledge transfer and weaken community structures. Participatory education models, such as farmer-to-farmer learning and farmer field schools, play a crucial role in empowering youth, restoring community cohesion, and making agroecology socially meaningful and relevant for future generations.

Finally, gender and social inequalities remain significant barriers to just and inclusive agroecological transitions. Despite their central role in food production, seed systems, and knowledge transmission, women and other marginalised groups often face unequal access to land, resources, training, and decision-making power. Addressing these inequalities through recognition, redistribution, and representation is essential for strengthening co-learning, protecting agrobiodiversity, and expanding the social foundations of agroecology.

Overall, this learning unit demonstrates that agroecology is not only a set of farming practices but a transformative approach to food systems that places people, culture, and communities at its core. By addressing sociocultural challenges through inclusion, participation, and collective action, agroecology contributes to the creation of resilient, socially just, and culturally meaningful food systems.

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ECONOMIC DIMENSION

Brief Description

This module explores the economic challenges small- and medium-scale farmers face across Europe, including dependence on costly external inputs and limited credit access, market concentration and unequal value distribution, unfair trading practices, and food loss and waste. Participants will learn about agroecological and community-driven strategies that promote resilient livelihoods, such as short and fair supply chains, farmer cooperatives and producer organisations, diversified farming and value addition, solidarity economy models (e.g., CSA and PGS), and circular economy approaches. The module emphasizes empowering farmers through collective marketing, fair contractual relations, and locally embedded value chains to enhance economic sustainability and reduce vulnerability to market fluctuations.

Learning Outcomes

1. Identify key economic challenges faced by small- and medium-scale farmers, including dependence on external inputs and credit, market concentration and low farm-gate prices, unfair trade, and waste.
2. Explain the impacts of rising input costs, buyer power, and market inequalities on farm profitability and sustainability.
3. Describe agroecological and economic strategies that promote resilience, such as short supply chains, farmer cooperatives/producer organisations, and livelihood diversification.
4. Evaluate the role of solidarity economy models and circular economy practices in creating fairer, more sustainable rural markets.

5. Support farmers in developing collective marketing approaches and local value chains to improve income and reduce economic vulnerability.

3. Introduction to the economic dimension

Agriculture is facing many interlinked environmental challenges that threaten its sustainability, including soil degradation, biodiversity loss, water stress and pollution, seed diversity decline and climate change impacts. Smallholder and family farmers are the backbone of food production in many regions, yet they operate in an economic landscape that often puts them at a disadvantage. Understanding these challenges is the first step toward developing resilient solutions.

Contemporary agricultural systems in Europe are marked by structural constraints that disproportionately affect small and medium farmers. Dependence on externally sourced inputs such as commercial seeds, synthetic fertilizers, pesticides, energy and machinery combined with limited access to affordable and equitable credit mechanisms, exposes farmers to global market volatility and can entrench cycles of debt (Food Tank, 2022; Brahimi & Gajo, 2024; FAO, 2007). At the same time, increasing market concentration in the seed, fertilizer, processing, and retail sectors reduces farmers' bargaining power and contributes to an unequal distribution of value along the agri-food chain (Deconinck, 2021; Sorrentino, Russo & Cacchiarelli, 2018).

These power imbalances are closely linked to low farm-gate prices, especially where large-scale buyers and intermediaries capture a high share of the final product value (European Commission, 2023; Sorrentino et al., 2018). The situation can be further aggravated by unfair trading practices such as late payments, unilateral changes to contracts, and last-minute cancellations that shift risk onto producers (European Commission, 2023). Finally, significant levels of food loss and waste driven by inadequate infrastructure, inefficient logistics, strict market standards, and consumer

behavior reduce revenues and squander resources across Europe (Furesi et al., 2022; Silvestri et al., 2024; Wolniak & Grebski, 2025).

This module provides an integrated examination of these challenges, drawing on empirical research and case studies to illustrate how structural vulnerabilities erode the financial stability and autonomy of smallholders. It highlights agroecological and solidarity-based approaches including short and fair supply chains, on farm diversification and value addition, cooperative action and producer organisations, community-supported agriculture, participatory guarantee systems, and circular farming practices that offer practical pathways toward more resilient, equitable, and sustainable rural livelihoods. By situating these strategies within broader socio-economic and environmental contexts, the module aims to equip learners with a deeper understanding of how systemic reforms and community-driven innovation can transform regional agri-food systems.

3.1 Dependence on external inputs and credit

Debt Cycles and Input Dependency Among Small and Medium Farmers

Small and medium-scale farmers across Europe can be heavily reliant on external agricultural inputs and credit, which exposes them to significant vulnerabilities. In some European sub-regions, a large share of farm inputs (seeds, fertilizers, pesticides, fuel, and machinery) is imported, increasing dependence on global supply chains (ACIT, 2024). This reliance means that global price shocks can translate into higher production costs for farmers. Recent crises, notably the war in Ukraine, have contributed to sharp increases in prices for fertilizer, fuel, and other inputs (Vukmirović & Bogdanov, 2024), raising costs of production. These rising input expenses have squeezed farmers' profit margins, often negating any benefits from higher food prices by cutting into potential income (Food Tank, 2022).

With limited savings or buffers, many farmers resort to credit to afford each season's inputs. However, access to formal credit can be constrained: lenders may charge high interest rates on agricultural loans and may be

reluctant to lend to small farms viewed as higher risk (Brahimi & Gajo, 2024). Lacking collateral and facing inefficient credit markets, farmers may turn to input suppliers or cooperatives for financing, but these arrangements can be costly (FAO, 2007). As a result, producers can become trapped in debt cycles: they take on short-term loans to purchase inputs, then struggle to repay from limited post-harvest profits, forcing them to borrow again the next season. This combination of external input dependency and expensive credit creates systemic vulnerabilities that undermine financial stability and resilience, threatening the viability of small-scale farming and rural livelihoods.

3.1.1 Reducing input dependency and improving financial resilience

Agroecological approaches can reduce reliance on purchased inputs by strengthening on-farm resource cycles and lowering cash needs at the start of the season. Practices such as integrated crop–livestock systems, improved soil fertility management, and reduced reliance on synthetic inputs can help stabilize costs and reduce exposure to external price shocks (FAO, 2019; Gattinger et al., 2022). Cooperative approaches can also reduce vulnerability: farmer organisations may bulk-purchase inputs, share equipment, or collectively access advisory services, lowering costs and improving bargaining conditions (Amat et al., 2019; COPA-COGECA, 2017). These strategies do not remove market volatility, but they can strengthen farmers' autonomy, reduce cash-flow stress, and mitigate debt risks in periods of rising input prices (Food Tank, 2022; FAO, 2007).

Case Study: CUMA (Coopératives d'Utilisation de Matériel Agricole) farm machinery cooperatives

Farm machinery is one of the main drivers of debt for small and medium farms, as tractors, harvesters, and manure spreaders

require large upfront investments that are often financed through loans (CUMA Report, 2024). To address this, farmers in France and Québec developed CUMA (Coopératives d'Utilisation de Matériel Agricole), cooperative systems where machinery is owned and used collectively rather than individually. In a CUMA, farmers form legally registered cooperatives and join "activity branches" for specific machines, committing to a minimum level of use while sharing purchase, maintenance, and financing costs (CUMA Report, 2024). Equipment is typically financed through cooperative loans combined with member equity, which spreads financial risk across many farms instead of concentrating it on one household. Evidence from Québec shows that a dairy farm using CUMA machinery worth $93,200 paid only $4,340 per year, compared with $15,094 under individual ownership—cutting machinery costs by about 70% (CUMA Report, 2024). Because loans are held by the cooperative rather than by individual farmers, members face much lower personal debt and reduced exposure to credit risk. This case illustrates how cooperative ownership of machinery can significantly reduce input costs, limit reliance on credit, and improve financial resilience, directly addressing the problem of input dependency and debt cycles faced by small and medium farmers.

Read more here.

Reflective questions

1. How do rising input costs increase farmers' need for credit and vulnerability to debt cycles?

2. Which agroecological practices can reduce reliance on purchased inputs while maintaining productivity?

3.2 Market concentration and unequal value distribution

Market concentration is a structural economic challenge for European farmers, as a limited number of firms dominate key segments of the agri-food chain, including agricultural inputs (seeds, fertilizers, agrochemicals) and downstream processing and retail (Deconinck, 2021). This concentration creates asymmetric power relations in which farmers have limited bargaining power and little influence over price-setting mechanisms (Sorrentino, Russo & Cacchiarelli, 2018). A core outcome of these structural imbalances is unequal value distribution along the agri-food chain. While consumers may face increasing food prices, farmers typically receive only a small share of the final retail value, as margins are captured by processors, wholesalers, and large retailers (European Commission, 2023; Sorrentino et al., 2018). Persistently low farm-gate prices are therefore best understood as a systemic consequence of market structure, rather than a reflection of farm-level inefficiency.

Private quality standards and marketing requirements further reinforce unequal value distribution. Criteria related to size, appearance, and uniformity often determine market access, even when products are nutritionally sound. Produce that fail to meet these standards may be rejected or left unharvested, transferring economic risk and loss to producers and contributing to avoidable food waste (Santini et al., 2013; Silvestri et al., 2024). As a result, small and medium farms frequently experience a "price squeeze", facing rising input costs alongside structurally constrained output prices. Overall, market concentration and unequal value distribution weaken farm profitability, undermine long-term planning, and increase vulnerability to external shocks. Addressing these challenges requires structural responses that rebalance power relations and allow farmers to retain a fairer share of food system value.

3.2.1 Short and fair supply chains (local markets and direct sales)

Short and fair supply chains provide a direct response to market concentration and unequal value distribution by reducing the number of intermediaries and strengthening farmers' position within food markets. Agroecological initiatives across Europe promote localized food systems such as farmers' markets, on-farm direct sales, box schemes, and local procurement by schools and public canteens, reconnecting producers and consumers through closer geographical and social ties (Lucas et al., 2024; Torquati & Rossi, 2025). These channels align with the EU definition of short food supply chains, which emphasizes a limited number of economic operators and proximity between actors (European Parliamentary Research Service, 2016).

By selling through fewer intermediaries, farmers can retain a larger share of the final food value and reduce dependence on buyer-dominated chains (Dupé et al., 2025; Lucas et al., 2024). Farmers' markets foster face-to-face trade, improve price transparency, and lower transaction barriers for small farms (Lucas et al., 2024). Direct sales and box schemes, including CSA-related distribution approaches, can improve incomes and cash-flow predictability by strengthening producer–consumer relationships (Dupé et al., 2025; Ušča & Tisenkopfs, 2023). Local sourcing by public canteens can further stabilize demand and create reliable outlets for small farms when supported by appropriate procurement policies and cooperative infrastructure (Torquati & Rossi, 2025). Together, short and fair supply chains help rebalance structural power asymmetries, improve farmers' bargaining position, and buffer farms from market concentration pressures.

Case Study: Campi Aperti, Italy

Campi Aperti is a network of small-scale agroecological farmers based in and around Bologna, Italy, that operates as a short and fair supply chain connecting producers directly with urban consumers. The network brings together farmers, food processors and consumers through farmers' markets, solidarity purchasing groups and direct delivery schemes, bypassing large retailers and wholesalers (Winkler et al., 2024). Producers sell their vegetables, bread, dairy, fruit and processed foods directly at Campi Aperti markets and through community-supported purchasing schemes, allowing them to retain a significantly higher share of the final consumer price than in conventional supermarket chains (Winkler et al., 2024). Prices are set transparently and negotiated collectively within the network, ensuring that production costs and fair farmer incomes are reflected in final prices. A key feature of Campi Aperti is its Participatory Guarantee System (PGS), in which farmers and consumers jointly verify production practices through peer review and on-farm visits. This replaces expensive third-party certification and strengthens trust, transparency and accountability within the supply chain (Winkler et al., 2024). The system lowers entry barriers for small producers while maintaining product credibility. By eliminating intermediaries, strengthening producer–consumer relationships and organizing collective markets, Campi Aperti directly addresses market concentration and unequal value distribution. Farmers gain bargaining power, stable outlets and better price outcomes, while consumers gain access to locally produced, agroecological food. This model demonstrates how short and fair supply chains can rebalance power in food systems and support the economic sustainability of small farms (Winkler et al., 2024).

Read more here.

Reflective questions

1. How does market concentration influence farmers' bargaining power and share of the final food price?

2. How can short and fair supply chains improve income stability and reduce structural dependency on intermediaries?

3.3 Unfair trade practices in agri-food chains

While market concentration explains the structural origins of power imbalances, unfair trading practices (UTPs) describe how this power is exercised in contractual and commercial relations. In buyer-dominated agri-food chains, farmers may face late payments, short-notice order cancellations, unilateral contract modifications, or requirements to absorb costs related to marketing, storage, or logistics (European Commission, 2023). These practices increase income uncertainty and shift commercial risk from retailers and processors into producers.

Unfair trading practices often intensify farmers' economic vulnerability by undermining cash flow, legal certainty, and planning capacity. Unlike structural price pressure (addressed in Section 3.2), UTPs directly affect the timing and reliability of payments and market access. For small and medium farms with limited reserves and few alternative buyers, contesting such practices is particularly difficult, reinforcing financial stress and dependence on credit.

Addressing unfair trading practices therefore requires not only regulatory enforcement and policy support, but also practical market arrangements that improve transparency, stabilize commercial relations, and strengthen farmers' negotiating position.

3.3.1 Solidarity in Action: Cooperative and Community-Based Food Models

Solidarity-economy models including cooperatives, Community-Supported Agriculture (CSA), and Participatory Guarantee Systems (PGS), offer concrete mechanisms for countering unfair trading practices by reshaping market relations around trust, shared responsibility, and democratic governance. In CSA schemes, consumers commit in advance to purchasing a share of a farm's harvest, providing farmers with predictable income, improved cash flow, and shared production risk (Urgenci, 2016; IPES-Food, 2021; Middendorf & Rommel, 2024). PGS complement these models by enabling community-based quality assurance through transparency and peer review, reducing reliance on costly third-party certification while strengthening trust and accountability (Winkler et al., 2024). Traditional cooperatives, based on one-member-one-vote governance and collective ownership, further support fairer value distribution and reduce dependence on distant intermediaries (Plank et al., 2024; CREASSE, 2025). By shortening chains, clarifying expectations, and stabilizing demand, solidarity-based models directly mitigate the risks associated with unfair trading practices. Even in contexts characterized by farm fragmentation and low institutional trust, these approaches are widely regarded as effective tools for rebuilding equitable market relations and supporting sustainable rural development (Muriqi et al., 2019; CREASSE, 2025).

Case Study: Community Supported Agriculture in Croatia

CSA initiatives in Croatia known as Grupe Solidarne Razmjene (GSR) or Solidarne Ekološke Grupe (SEG) developed as citizen–farmer networks based on transparency and shared responsibility. Subscription-based purchasing helps farmers secure predictable and fair income while consumers access fresh local food (Urgenci, 2016; IPES-Food, 2021). In highly fragmented farm structures, community-based purchasing and cooperation can provide a

practical pathway for strengthening smallholder viability and reducing exposure to unstable buyer practices (Muriqi et al., 2019).

Read more here.

Reflective questions

1. How do unfair trading practices increase farmers' income instability and economic vulnerability?

2. How do CSA and PGS models improve transparency, fairness, and price stability in agri-food chains?

3.4 Food waste and inefficiency

Food loss and waste (FLW), spanning production through consumption, has far-reaching environmental, economic, and social impacts and threatens food and nutrition security (Furesi et al., 2022). Across Europe, food is lost due to on-farm factors (harvest decisions, grading and standards), post-harvest handling, storage limitations, inefficient logistics, retail practices, and consumer behavior (Silvestri et al., 2024; Wolniak & Grebski, 2025). For example, field-level losses can be driven by mismatches between production and demand and by sorting decisions linked to quality standards (Silvestri et al., 2024). At retail and household levels, rigid aesthetic norms and confusion over date labeling contribute to discarding edible food (Wolniak & Grebski, 2025).

In some European sub-regions, including parts of the Western Balkans, infrastructure gaps such as limited cold storage and fragmented logistics can intensify these losses (Piorr et al., 2024). Uneaten food also carries a large environmental footprint: resources invested in production are squandered and decaying waste emits greenhouse gases (Wolniak & Grebski, 2025). Reducing FLW therefore supports farm profitability, resource efficiency, and climate and sustainability goals (Furesi et al., 2022).

3.4.1 Circular farming: composting, upcycling, and waste reduction

Circular economic practices in agriculture aim to reduce waste and regenerate natural systems by cycling materials and nutrients back into production. Composting transforms organic waste into nutrient-rich fertilizers, helping close nutrient loops while reducing methane emissions from unmanaged waste (FAO, 2019). Upcycling agricultural by-products (e.g., fruit pomace, grape skins, cereal husks) into animal feed, bio-based products, or energy can create additional value and reduce disposal costs (Aschemann-Witzel & Stangherlin, 2021). Low-waste farming systems including mixed farming, no-till methods, and crop–livestock integration, further reinforce circularity by optimizing on-farm resource use and reducing dependence on external inputs (Aruwajoye & Coetzee, 2025; Gattinger et al., 2022).

Case Study: Food Loss and Waste Plum Supply Chain

A case study published by the World Wildlife Fund (WWF) illustrates how inefficiencies across the industrial supply chain result in significant food loss and waste (FLW), using plums produced in Eastern Europe as an example. The study tracked the plum supply chain from orchard to consumer and revealed that over 50% of the fruit was lost or wasted before consumption. Losses occurred at multiple stages: in the field (due to overproduction and quality standards), during storage and transport (from spoilage and damage), and at the retail level (from visual rejections and unsold inventory). One of the most critical findings was that many plums were left unharvested or discarded due to not meeting size or appearance specifications, despite being nutritionally sound. Further losses were linked to poor coordination between growers and buyers, limited cold storage capacity, and "just-in-time" logistics systems that offered little flexibility. The report emphasizes that much of this waste could be prevented with improved

communication, more inclusive grading standards, and better post-harvest infrastructure. The study underscores the need for systemic reforms to reduce waste, improve food security, and build more sustainable value chains in perishable produce sectors.

Read more here.

Reflective questions

1. What are key drivers of food loss and waste across European agri-food chains (farm, logistics, retail, household)?

2. How do circular practices like composting and upcycling help reduce food waste and lower input dependency?

3.5 Conclusions

The themes examined across the units underscore the interconnected nature of the challenges confronting small and medium farmers across Europe. External input dependency, high-cost credit, oligopolistic market structures, unequal value distribution and low farm-gate prices, unfair trading practices, and inefficiencies across supply chains collectively limit farmers' capacity to maintain viable livelihoods and adapt to external shocks. Yet the evidence and case studies also reveal significant potential for transformation.

Short and fair supply chains, diversification and value addition, cooperative and producer-organisation strategies, and solidarity-economy models (CSA/PGS) can strengthen farmer bargaining power, improve income stability, and build trust and transparency in food systems (Lucas et al., 2024; IPES-Food, 2021; COPA-COGECA, 2017). Circular resource-use approaches can reduce waste, lower costs, and improve sustainability outcomes (FAO, 2019; Aschemann-Witzel & Stangherlin, 2021). Achieving lasting change requires coordinated policy support, investment in rural

infrastructure, and institutional recognition of models that prioritize fairness, resilience, and ecological regeneration.

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POLITICAL DIMENSION

Brief Description

The Political Dimension of the SEEDS curriculum critically explores the political and governance structures that shape the transition toward agroecological systems, emphasising the ways in which power, policy and institutional arrangements determine access to and control over resources, information, knowledge, dissemination channels, and policy making processes. Agroecology is not merely a set of farming practices, but a socio-political construct that challenges the industrial agri-food regime and seeks to democratise the governance of food systems. The present module investigates how the concentration of power within transnational agribusinesses[6], policy biases favouring industrial agriculture and weak commons governance contribute to structural inequalities and environmental degradation. Through analysing these dynamics, learners will engage with the concept of food sovereignty as both a rights-based and governance framework for reclaiming local control over production, distribution and consumption. The module also introduces participatory governance mechanisms, such as food policy councils, territorial pacts and cooperative models, that enhance the political agency and representation of small-scale producers and rural citizens.

Learners will also study how community-managed infrastructures, collective organisations and multi-actor alliances strengthen local resilience and equity in access to resources such as land, water and seeds. European case studies, ranging from France's CIVAM networks[7] to Italy's Rete Semi Rurali[8], illustrate how agroecological governance can emerge

[6] Transnational agribusinesses are profit-oriented firms whose production, processing, distribution, and marketing activities span national borders, often coordinating global value chains in agriculture and food.

[7] The main site for the Centres d'Initiatives pour Valoriser l'Agriculture et le Milieu Rural, a national network of farmer and rural groups working on agro-ecological transition and rural development: https://www.civam.org/

[8] Official website of Rete Semi Rurali, the Italian seed network supporting farmers' seed systems, biodiversity, and agro-ecological practices: https://rsr.bio/

through bottom-up, participatory and democratic processes. Ultimately, the module encourages learners to view agroecology as both an ecological and political transformation, one that requires redistributing power, reconfiguring policies and institutionalising inclusive governance frameworks to ensure sustainable and just food systems across Europe and beyond.

Learning Outcomes

1. Identify key political and governance challenges affecting agroecological and local food systems, including power concentration and policy biases.
2. Understand the concept of food sovereignty and its importance for empowering small-scale farmers and rural communities.
3. Describe participatory governance mechanisms that promote inclusive decision-making and strengthen farmer representation.
4. Evaluate strategies for collective organisation and policy engagement to influence agricultural policies and rural infrastructure development.
5. Support community-led initiatives to democratise access to resources such as land, water, seeds and infrastructure, enhancing local control and sustainability.

4. Introduction to the political dimension

Across the European countryside, the rhythms of agriculture are increasingly shaped not by local ecosystems or farmer knowledge, but by global markets and corporate power. A handful of agribusinesses now dominate the production and distribution of seeds, fertilizers and food commodities, creating systems of dependency that erode both ecological diversity and rural autonomy (Marsden, Lamine, & Schneider, 2020). In this context, small-scale producers frequently face pressures linked to declining farm-gate prices and increasing input costs, while existing policy frameworks, including

the Common Agricultural Policy (CAP), have tended to prioritise productivity and economic efficiency. At the same time, alongside ongoing structural concentration within the agri-food sector, alternative approaches are gaining visibility, highlighting pathways for adaptation and innovation grounded in agroecological practices and food sovereignty principles.

From the community land trusts of Ireland to the participatory seed networks of Italy and the local food councils of Lisbon, European farmers and citizens are reclaiming decision-making power over how food is produced, distributed and governed (Omar & Thorsøe, 2024). These movements are not merely technical responses to agricultural crises but deeply political acts of democratisation. They challenge the privatisation of commons such as land, water and seeds and advocate for policies that honour ecological stewardship and social justice. By engaging in participatory governance, forming cooperatives and forging alliances across rural and urban spaces, these actors demonstrate that sustainable food systems are built as much through civic engagement as through ecological practice.

This module invites learners to explore these intersecting dynamics of power, policy and institutional arrangements, that define the political dimension of agroecological transformation. Through real case studies, participants will examine how governance choices shape local food systems and how communities can mobilise to reclaim them. The journey will move from critical diagnosis of structural inequalities to the practical strategies of collective action, policy advocacy and community management that make agroecology not only a mode of farming, but a project of democracy and emancipation.

4.1 The Political economy of power concentration

Europe's agricultural landscape has undergone a profound transformation over the past decades. What once consisted of diverse, locally embedded farming systems is increasingly governed by the logic of global value chains and market concentration. In this context, most small and medium-sized

farms find themselves at the margins of decision-making processes that determine how food is produced, distributed and consumed.

Agroecology, which relies on local knowledge, ecological diversity and participatory governance, faces a major obstacle: the concentration of power in the hands of a few multinational corporations. These actors not only control access to key resources such as seeds, fertilizers and markets but also shape agricultural policy frameworks and research agendas. Consequently, the struggle for agroecology in Europe is also a struggle over who controls the means and knowledge of food production (Clapp, 2022).

The global agrifood system operates through a highly concentrated structure, where a few multinational corporations dominate each stage of the value chain. In Europe, this is most visible in three interconnected sectors: production resources, food processing and storage capacities and retail distribution. Following a series of mergers and acquisitions, just four corporations, Bayer-Monsanto, Corteva, Syngenta and BASF, control more than 60% of the global seed and agrochemical market (Beyond Pesticides, 2023). Such consolidation enables them to influence prices, determine product availability and set research priorities that favour industrial monocultures over agroecological diversity.

At the retail level, supermarket chains like Carrefour, Lidl and Aldi dominate food distribution networks. They use their market power to impose strict contractual conditions on suppliers, pushing farmgate prices down while extracting most of the profit. This structure leaves small-scale farmers with little negotiating power and forces them into dependency on industrial inputs and volatile global markets. The European Commission (2021) reports that between 2005 and 2020, the EU lost over 5 million farms, most of them small and medium-sized (Eurostat, 2021). This trend reveals a political economy where efficiency and productivity are valued over social equity and ecological resilience. The result is a dual rural structure: a small number of large, capital-intensive farms coexist with an eroding base of family farmers who struggle to survive within globalized supply chains.

Crucially, this concentration of economic power is mirrored by concentration in political influence and representation. Food system governance across Europe remains largely shaped by agribusiness corporations, industrial lobbies, large processors, and retail actors, all of whom benefit from privileged access to policy arenas, technical expertise, and financial resources. These advantages enable them to shape regulations, standards, and research agendas in ways that reinforce industrial agricultural models. By contrast, small-scale farmers, consumers, and local communities face persistent barriers to participation, including bureaucratic complexity, fragmented advocacy structures, and limited access to decision-making forums. This imbalance contributes to forms of policy capture, whereby public decision-making disproportionately reflects dominant commercial interests rather than broader social, environmental, or territorial priorities (Perlaviciute et al., 2025).

4.1.1 Food sovereignty as a framework for resistance

Against this backdrop, the concept of food sovereignty has emerged as a counter-hegemonic framework for rethinking food systems. First articulated by the global peasant movement La Vía Campesina in the 1990s, food sovereignty asserts the right of people to define their own food and agriculture systems, emphasising local control, ecological sustainability and democratic participation (La Vía Campesina, 2025).

Food security, as defined by the FAO, refers not only to the availability of food but to a broader set of conditions in which all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets dietary needs for an active and healthy life. This understanding is commonly structured around four interconnected pillars—availability, access, utilization, and stability—and has been further expanded in recent

policy discussions to include dimensions such as agency and sustainability[9].

Food sovereignty, by contrast, places greater emphasis on the governance and power relations shaping food systems. It represents more than a set of agricultural practices, functioning as a political and ethical framework that foregrounds the rights of producers and communities to define their own agricultural and food policies, reduce dependency on globalised markets, and strengthen democratic governance within food systems. In the European context, these principles are advanced by the European Coordination Via Campesina (ECVC), which represents small-scale farmers and rural workers and promotes smallholder rights, seed autonomy, and policy reform within the framework of the Common Agricultural Policy (CAP).

Case Study: The Civam Network in France: Building Local Power through Collective Knowledge

The Centres d'Initiatives pour Valoriser l'Agriculture et le Milieu Rural (CIVAM) network in France provides a powerful example of how farmers can reclaim autonomy through collective action. Emerging in the 1950s and revitalised in the 1990s, CIVAM promotes territorialised agriculture, where farming is seen as both a productive and social activity linked to local communities. CIVAM's model is built on horizontal learning and peer exchange. Farmers share experiences, experiment collectively and adapt agroecological practices to their local ecosystems. This contrasts sharply with the top-down extension models often driven by agribusiness interests. In regions like Brittany, CIVAM groups have developed local dairy processing facilities and vegetable cooperatives that allow farmers to control their supply chains and retain a greater share of the added value.

[9] FAO, *Ensuring food security: Why agency and sustainability matter*. Available at: https://www.fao.org/cfs/cfs-hlpe/insights/news-insights/news-detail/ensuring-food-security--why-agency-and-sustainability-matter/en

The case of CIVAM reveals that alternatives to agribusiness concentration already exist across Europe. These examples show that reclaiming agency in the food system involves more than technical innovation; it requires organisational and political innovation. Local networks, cooperatives and farmer associations act as counterweights to the centralized power of global markets. They enable producers to create alternative economic circuits that prioritise environmental stewardship, fair distribution and social solidarity. Agroecology, therefore, becomes both a science of ecological resilience and a movement for social justice. It challenges the notion that efficiency should be measured solely in economic terms and instead promotes the idea that true efficiency lies in sustainability, equity and community well-being.

Read more here.

Reflective Questions

1. Why does the concentration of power in agribusiness undermine agroecology and how can food sovereignty movements help restore balance in the food system?

2. In your local or national context, where do you observe concentration of power in the food system, and how does it affect farmers' choices, consumer access, or environmental outcomes?

4.2 Policy bias and regulatory challenges: the legacy of the CAP

Agricultural policy is never neutral. It reflects the political priorities, economic interests and social values of the time. In Europe, few instruments demonstrate this more clearly than the Common Agricultural Policy (CAP), one of the oldest and most influential policy frameworks of the European Union. Created in 1962 to ensure food security and stabilise prices, the CAP became a cornerstone of European integration. However, over decades, its

financial and regulatory mechanisms have come under scrutiny for reinforcing industrial models of agriculture at the expense of small farms and ecological balance (Scherfranz et al., 2025).

While the CAP succeeded in boosting productivity and maintaining rural incomes during the post-war years, its system of subsidies and compliance standards has inadvertently privileged large-scale, capital-intensive farms, leading to land concentration, biodiversity loss and social inequality (BirdLife Europe, 2025). In this context, the transition toward agroecology faces significant policy and institutional barriers. To transform European food systems, policy reform must go beyond technical adjustments by redefining agricultural success, from one measured in yields and exports to one grounded in ecological health, social justice and territorial resilience. The Common Agricultural Policy (CAP) is the largest single budget item in the EU, accounting for around 30% of total expenditure (European Commission, 2023). However, significant shares of CAP expenditure tend to be concentrated: in 2020, for example, France alone received approximately 17.3 % of total CAP allocation (Papalexatou & Matsaganis, 2023).

Key policy objectives of the CAP 2023-27 (European Commission, 2019)

Direct payments remain primarily linked to land area, while recent reforms, including the introduction of eco-schemes, seek to enhance the consideration of environmental and social objectives within income support

mechanisms. As a result, small and diversified farms, often the most agroecological, receive minimal support, while industrial farms accumulate both subsidies and political influence. Moreover, regulatory compliance frameworks, from food safety to environmental standards, tend to be complex and costly. While large agribusinesses can absorb or outsource compliance management, small farmers often face disproportionate administrative burdens, effectively excluding them from markets or support schemes.

In addition to financial and regulatory instruments, policy bias within the Common Agricultural Policy (CAP) is also reflected in governance processes and modes of participation. Historically, CAP decision-making has been characterised by predominantly top-down structures, with limited direct involvement of small-scale farmers, rural communities, and civil society actors most affected by its outcomes. Although consultation mechanisms have expanded over time, effective participation often remains uneven, favouring well-resourced organisations with the capacity to engage in complex administrative and lobbying environments.

For many small-scale producers, barriers such as bureaucratic complexity, limited access to policy information, and weak representation in formal decision-making forums constrain meaningful engagement. This governance gap can reduce both the legitimacy and effectiveness of agricultural policies, as measures developed without adequate participation may fail to respond to concrete challenges such as fair pricing, market access, or ecological constraints. From an agroecological perspective, addressing policy bias therefore also entails strengthening inclusive, deliberative, and participatory governance arrangements that recognise farmers and rural citizens as active contributors to policy design rather than passive recipients.

Policy orientations are also reflected in research and innovation programmes, where funding has traditionally tended to prioritise high-tech and industrial approaches, such as precision agriculture and biotechnology.

At the same time, recent developments indicate a growing openness to agroecological research, notably through dedicated initiatives under Horizon Europe, including the Agroecology Partnership[10], which mobilises funding to support agroecology-based, systems-oriented, and participatory innovation projects. The result is a paradox: even as the EU rhetorically commits to sustainability through the Green Deal and Farm to Fork Strategy, its underlying policy instruments still primarily serve industrial efficiency rather than agroecological transition.

4.2.1 Participatory policy engagement and collective advocacy

Despite these systemic challenges, farmers and civil society organisations across Europe are increasingly mobilising to reshape agricultural policy through participatory engagement. This reflects a growing recognition that agroecology is not only a set of farming practices but also a political movement that seeks to democratise decision-making and rebalance power between farmers, markets and governments.

Participatory engagement can take many forms:

- Policy consultations and lobbying, where farmers' organisations and cooperatives advocate for fairer subsidy schemes or environmental incentives.
- Regional networks and alliances, linking farmers with researchers, NGOs and consumers to co-design sustainable policy proposals.
- Public campaigns, using advocacy, storytelling and citizen mobilisation to influence national and EU-level debates.

These processes reflect a shift from "policy recipients" to "policy co-creators" enabling small-scale farmers to assert their needs and priorities. The recognition of such engagement within the EU Green Deal and "Farm to Fork" Strategy illustrates a gradual, though uneven, move toward more inclusive governance.

[10] https://www.agroecologypartnership.eu/partner

Reflective Questions

1. How can small-scale farmers and cooperatives overcome policy bias to promote agroecology in Europe?

2. Which current agricultural policies or regulations most directly influence your region or sector, and how could they be redesigned to better support agroecological and small-scale farming practices?

4.3 Weak governance of commons and agroecology

In traditional rural Europe, commons such as land, forests, water and seeds were managed collectively by communities through locally agreed rules. These shared resources supported biodiversity, sustained livelihoods and maintained social cohesion. However, during the 20th century, processes of privatisation, enclosure and market liberalisation progressively eroded communal resource management.

Under neoliberal agricultural policies and the pressures of globalisation, resources once viewed as collective goods became commodities, tradable assets controlled by private actors. This shift has fragmented rural territories, weakened local governance and undermined ecological stewardship. As Elinor Ostrom (1990) famously argued, commons are not inherently doomed to overuse; rather, they thrive under collective governance arrangements that balance rights, responsibilities and sustainability (Ostrom, 1990). Agroecology draws directly on these principles by promoting farming systems that are rooted in collective knowledge, shared stewardship of natural resources, and locally embedded governance structures. In agroecology, reclaiming the commons is not merely about resource management but a political act of re-establishing community control, rebuilding trust and redefining the relationship between humans and nature.

Commons refer to resources that are collectively used and governed by communities under shared norms. They can be tangible, such as land, forests, or water, or intangible, such as knowledge and seeds (Ostrom, 1990). In Europe, the historical "enclosure of the commons" began in the 18th and 19th centuries, when communal lands were privatised in the name of agricultural modernisation. Similar processes continued in the 20th century under policies encouraging large-scale mechanisation and land consolidation.

Today, this legacy manifests in land concentration and restricted access to natural resources. In the European Union there is a steep concentration of farmland: although the great majority of the roughly 9.1 million agricultural holdings in 2020 were very small (under 5 ha), a relatively small group of large-scale farms hold the lion's share of agricultural land (Eurostat, 2021). This imbalance not only threatens social equity but also ecological resilience as expansive monocultures tend to degrade soils, water systems and biodiversity. Moreover, seeds, once freely exchanged among farmers, are increasingly subject to intellectual property rights, limiting farmers' ability to save and reproduce them. As a result, the commodification of genetic resources undermines both traditional knowledge and local adaptation to climate change.

4.3.1 Democratising resource governance

The democratisation of resource management involves restoring collective rights and community decision-making over natural assets. This process requires new institutional arrangements, legal frameworks and social movements capable of countering privatisation.

Across Europe, a range of community-based initiatives are developing governance mechanisms that seek to address the weakening of the commons by re-embedding ecological stewardship and collective decision-making at the local level. Seed-sharing networks, for example, enable farmers and gardeners to collectively conserve, reproduce, and

exchange seeds, thereby sustaining agrobiodiversity and reinforcing shared custodianship of genetic resources outside purely commercial logics. Cooperative land trusts and land stewardship associations establish collective or non-speculative ownership arrangements that secure long-term access to farmland, protect it from market pressures, and align land use with ecological and social objectives defined by local communities.

Community-supported agriculture (CSA) initiatives, while not primarily mechanisms of resource governance, contribute in a complementary way by strengthening reciprocal relationships between producers, consumers, and local communities. Through shared risks, commitments, and knowledge exchange, CSAs help rebuild trust, shorten food chains, and create socio-economic conditions that can support agroecological practices, even if they do not directly democratise ownership or governance of land and other commons.

For example, participatory seed networks such as Réseau Semences Paysannes (France) and Rete Semi Rurali (Italy) work to maintain seed diversity and farmers' rights to reproduce and exchange seeds. These organisations challenge corporate monopolies by creating open-source systems of genetic exchange, grounded in solidarity and biodiversity,

At the governance level, some regions are experimenting with commons-based rural development. Participatory land management committees, watershed councils and local biodiversity observatories are enabling citizens and farmers to jointly define the use of shared resources. This shift aligns with agroecology's principle of co-governance where local actors collaborate to manage ecosystems sustainably.

Case Study: Italy's Rete Semi Rurali (Rural Seed Network)

Rete Semi Rurali

The Italian network Rete Semi Rurali (RSR), established in 2007, embodies the practical application of commons governance in the domain of seeds. Comprising farmers, researchers and civil society organisations, RSR promotes seed sovereignty, the right of farmers to save, exchange and improve their own seeds outside corporate control.

RSR operates through a decentralised structure, supporting community seed banks, on-farm seed selection and participatory plant breeding. By reintroducing traditional and regionally adapted varieties, it strengthens resilience to climate variability and reduces dependence on commercial seed markets.

Crucially, RSR collaborates with local governments and research institutions to advocate for policy changes. Its lobbying contributed to Italy's 2018 recognition of farmer-managed seeds in national legislation, marking a significant step toward re-legitimising the commons in agricultural biodiversity governance. RSR demonstrates how reclaiming control over genetic resources is both a technical and political process, one that rebuilds the commons through collective knowledge, trust and solidarity.

The experience of Rete Semi Rurali also highlights the broader implications of commons governance for agroecological systems. Where such governance structures are weak or absent, agroecological practices are undermined by the erosion of local control, the fragmentation of collective management, and the prioritisation of private over public interests. Re-establishing commons-based governance, as illustrated by RSR's work on seeds, helps restore the social relationships of cooperation and shared responsibility that are essential for agroecology to thrive. From genetic resources to land and water, the underlying principle remains consistent: resources function most sustainably when managed as shared goods rather than as commodities, supported by multi-level governance arrangements that link local participation with enabling national and European policies.

In the long term, strengthening commons governance can:

- Enhance biodiversity conservation through local stewardship.
- Improve social equity by expanding access to resources.
- Build resilience against market shocks and climate impacts.
- Reinforce cultural identity and intergenerational knowledge transfer.

Transforming the governance of commons enables Europe to advance toward agroecological systems that are not only productive and sustainable, but also democratic, inclusive and just.

Read more here.

Reflective Questions

1. Why is democratic governance of commons, such as land, water and seeds, essential for agroecology and how can community initiatives in Europe restore these commons?

2. What commons (e.g. land, water, seeds, knowledge) are under pressure or poorly governed in your territory, and what forms of collective action could realistically strengthen their democratic management?

4.4 Exclusion and limited representation in food system governance

Beyond market concentration and policy bias, agroecological transition is also constrained by persistent inequalities in food system governance. Although participatory mechanisms have expanded across Europe, decision-making spaces often remain dominated by well-resourced agribusiness actors and institutional stakeholders. Their financial capacity, technical expertise and lobbying influence enable them to shape policy agendas more effectively than small-scale producers or rural communities.

By contrast, small-scale farmers, rural youth, women, migrant workers and marginalised consumers frequently face structural barriers to participation, including bureaucratic complexity, limited access to information and weak representation structures. These inequalities mirror the power asymmetries identified in previous sections and contribute to a democratic deficit within food governance.

Since agroecology depends on local knowledge, collective stewardship and inclusive decision-making, exclusion from governance processes undermines both ecological and social transformation. Strengthening equitable representation and institutionalising participatory governance are therefore essential steps toward building sustainable and just food systems.

4.4.1 Participatory governance models

Participatory governance refers to mechanisms that enable citizens and producers to directly engage in shaping policies, programs and institutions. Within food systems, this approach has gained momentum through the rise of Food Policy Councils (FPCs), local food charters and multi-stakeholder platforms that bridge the gap between state and society.

FPCs serve as collaborative bodies bringing together farmers, civil society organisations, municipal authorities and researchers to co-design strategies for sustainable food systems. They integrate different dimensions of policy, from health and environment to trade and rural development, under a shared, democratic framework.

At the same time, local food charters provide a vision and ethical foundation for territorial food systems, expressing community values around food sovereignty, ecological sustainability and social justice. They act as political compasses guiding municipal actions, procurement policies and public awareness campaigns.

Such models reflect the shift from hierarchical governance toward co-governance, in which responsibility and power are shared among diverse actors. This pluralistic model aligns closely with agroecology's social dimension, recognising that ecological transformation depends on democratic inclusion.

Case Study: Bristol Food Policy Council (UK)

Founded in 2011, the Bristol Food Policy Council (BFPC) is one of Europe's most established and influential examples of participatory food governance. It was formed to bridge the divide between local authorities, food producers and the public, creating a shared vision for a sustainable and fair food city. The council's composition is deliberately diverse: it includes smallholder representatives, NGOs, academics, business owners and health officials. Its mission is to ensure that food policy is driven by the needs of people and the planet, not merely market efficiency.

BFPC has achieved significant results:

- The development of the Bristol Good Food Charter, a collective commitment to healthy, sustainable and locally sourced food.
- Collaboration with schools and hospitals to source from local producers.
- Public education campaigns promoting food justice and waste reduction.

The council's participatory nature enhances shared accountability and transparency. It also builds connections between rural and urban stakeholders, showing that local democracy is a powerful driver of systemic change in food governance.

Read more here.

Reflective Questions

1. How do participatory governance mechanisms, such as Food Policy Councils, enhance farmer and citizen inclusion in food system decision-making?

2. Who is missing from food system decision-making processes in your community, and what barriers prevent their participation or representation?

4.5 Conclusions

The Political Dimension of agroecology reveals that sustainability cannot be achieved without justice and justice cannot thrive without participation. Across Europe, the concentration of power in agribusiness and global value chains has eroded farmers' autonomy, reduced biodiversity and marginalised local voices. Yet, as movements such as CIVAM in France demonstrate, resistance is possible through collective organisation and food sovereignty. These initiatives remind us that the first step toward agroecological transformation is not only changing how we farm, but who decides how we farm.

Policies, too, shape the contours of what is possible in agriculture. The Common Agricultural Policy, while historically central to European farming, often reinforces structural inequality. However, the case of Andalusia's Agroecology Plan show that participatory policymaking can redirect public resources toward ecological and social priorities. When farmers, cooperatives and communities are invited into decision-making, policy evolves from being an external constraint to becoming a tool of empowerment and resilience.

At the heart of agroecological democracy lies the governance of the commons: land, water and seeds that sustain both life and culture. Weak governance and privatisation have jeopardised these shared resources, yet examples such as *Italy's* Rete Semi Rurali prove that collective stewardship can restore equity, biodiversity and trust. Similarly, participatory food governance structures (like the one in Bristol) illustrate that inclusion and collaboration can soften the divide between farmers, citizens and policymakers. Agroecology thus becomes a practice of democracy, where food systems reflect the values of those who nurture them.

Taken together, these lessons form a single truth: agroecology is the art of redistributing power from corporations to communities, from policies to

people and from markets to the commons. Its future depends on the courage to see governance as a shared responsibility and sustainability as a collective right.

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LEARNING UNIT 2

PRACTICING AGROECOLOGICAL PRINCIPLES

Learning Unit 2 translates the theoretical foundations of agroecology introduced in Learning Unit 1 into practice-based learning for vocational education and training (VET). While LU1 clarified key challenges that limit agroecological transitions, LU2 focuses on how some of these challenges can be addressed in real contexts through concrete initiatives, structured activities, and learning methods that make agroecological principles observable, teachable, and transferable.

The unit is organised around the four dimensions of agroecology (environmental, sociocultural, economic, and political) and presents a set of best practices for each dimension. Learners explore how agroecological transitions can be supported through regenerative soil management and biological interactions; community-based seed initiatives that valorise traditional knowledge and strengthen collaboration; short and fair supply chains combined with diversification and cooperative action; and participatory governance and farmer-led training models that democratise knowledge and strengthen territorial engagement.

ENVIRONMENTAL DIMENSION

Introduction to the environmental dimension

These agroecological case studies build directly on the LU1 theoretical module on soil degradation and soil health, which highlighted how the decline of soil organic matter, soil biodiversity, and biological interactions undermines essential soil functions such as nutrient cycling, water regulation, and long-term fertility. LU1 emphasized that soil degradation should be understood not merely as a physical or chemical problem, but as the result of disrupted ecological relationships within agroecosystems.

The present module of LU2 translates these theoretical insights into two complementary experiential learning pathways based on real-world agroecological contexts. The first focuses on agroecological design for soil regeneration, illustrating how landscape reading, species selection, and system integration can prevent and reverse soil degradation. The second emphasizes observation and monitoring, enabling learners to analyze soil biological processes, pest–predator dynamics, and carbon-related functions in an operating agroecological system.

Together, these practices make plant–soil–microorganism interactions directly observable and actionable, supporting a systems-based understanding of the environmental dimension of agroecology and facilitating its integration into vocational education and training.

Learning outcomes

After completing this unit, VET teachers should be able to:

1. Explain soil degradation and soil regeneration using a systems-based agroecological perspective that links soil biology, biodiversity, nutrient cycling, and management practices.
2. Design simple agroecological solutions for soil regeneration, applying landscape reading and functional biodiversity

1. Integrated regenerative agroforestry and pasture system: a case study from Iside Farm (Italy)

Which agroecology principles does this practice embrace?

Based on the HLPE 13 Principles of Agroecology this agroecological practice integrates the following principles:

1. Recycling
2. Soil Health
3. Animal Health
4. Biodiversity
5. Synergy

Iside Farm is a real-world agroecological case study from Northern Italy used in this module to explore the environmental dimension of agroecology. The practice directly addresses the LU1 environmental challenges of soil degradation, in particular the loss of soil organic matter, soil biodiversity and ecological soil functioning associated with input-intensive agricultural systems. By focusing on management approaches that restore soil processes through ecological interactions rather than external inputs, the case provides a concrete reference for linking LU1 theoretical concepts on soil health to applied agroecological practice.

1.1 Description of the Iside Farm

Iside Farm is a regenerative agroecological initiative located in Sulzano, in Northern Italy, operating on approximately seven to eight hectares of hilly terrain overlooking Lake Iseo. Its landscape is characterized by variable slopes, morainic soils with a sandy texture and limited water availability during summer. The farm combines agroforestry, rotational grazing, horticulture, fruit cultivation, beekeeping and mushroom production within a multifunctional design. Since its foundation, Iside has served as a space of experimentation and validation of regenerative techniques, demonstrating how environmental challenges can be addressed through integrated management rather than through isolated practices focused primarily on external inputs.

The foundational design principle of the farm begins with the reading of the landscape. Rather than applying fixed models, the farm analyses ecological constraints and potentials such as solar exposure, soil texture, water flows, slopes and wind patterns to guide the placement of trees, pastures and horticultural areas. This approach uses the landscape itself as the primary decision frame for agroecological design and soil management. In this perspective, soil fertility is understood as an emergent property of interacting biophysical processes. Soil improvements are therefore driven mainly by ecological processes—root systems, microbial communities, organic matter dynamics, water and animal interactions—rather than by external inputs.

Agroforestry diversification is central to the farm's strategy. More than 130 varieties of fruit trees, shrubs, aromatic species, timber and biomass species are cultivated in multi-layered arrangements. The selection of species is guided by ecological function as much as by yield: nitrogen-fixing plants enrich soil nitrogen pools, aromatic plants attract pollinators, deter pests and provide biomass, biomass and timber species contribute shade and

organic inputs, fruit trees generate direct market products. Together, these elements provide continuous soil cover, regulate microclimates, reduce evapotranspiration and foster beneficial insects and microorganisms.

Rotational grazing further reinforces soil regeneration. On selected areas, livestock (sheep, donkeys and poultry) move in a planned sequence, each species contributing distinct ecological services. Sheep consume protein-rich forage, donkeys reduce fibrous vegetation and improve light penetration, poultry redistribute manure and decrease insect pressure. This sequence accelerates nutrient cycling, increases soil organic matter and stimulates pasture regrowth. Moreover, the reduced compaction associated with rotational grazing on slopes improves soil infiltration and aeration. Over time, these mechanisms increase botanical diversity within the pasture, indicating a shift from degraded swards to more complex and resilient grassland communities.

The farm also employs compost, vermicompost and mulching derived from on-farm biomass, closing organic matter cycles and reducing dependency on external inputs. Soil disturbance is limited to specific operations such as initial bed preparation or planting. This low-disturbance regime maintains soil structure and microbial networks, further contributing to fertility. Water harvesting infrastructures complement this system: rainwater is collected through drainage lines, roofs and pathways, stored and redistributed to support soil biology during summer. Water is conceptualized not only as a resource for plant irrigation but as a vector of fertility that activates microbial communities and biomass production, especially in pastures following grazing.

Taken together, these mechanisms illustrate how soil degradation can be addressed through multiple synergies. Agroforestry provides biomass, microclimate and biodiversity, livestock provides nutrient cycling and botanical complexity, water harvesting sustains microbial activity, composting and mulching provide organic matter and carbon and reduced disturbance preserves soil structure. The case demonstrates that soil

regeneration is achieved not through a single technique but through the coupling of ecological processes and the interaction of plants, animals, water and microbes within a diversified production system.

1.1.1 Designing a small-scale regenerative agroforestry plot at school

In this technical exercise, students work in small groups to design an agroecological plot inspired by Iside Farm's agroecological approach. Working with a predefined plot map provided by the teacher, each group proposes a design solution aimed at improving soil health through ecological functions. Students are asked to:

- select plant species based on agroecological functions
- organize spatial arrangements according to landscape constraints
- outline a basic soil fertility strategy (biomass, compost, mulching, cover).

The teacher supports the activity by providing:

- a species-function sheet, to support species selection during the design phase,
- basic environmental constraints (soil texture, slope, sun exposure)
- a checklist of agroecological functions which students will use to justify their decisions based on the ecological interactions between plants and soil.

All groups use the same plot map, but they may produce different solutions. At the end of the activity, designs are shared and discussed collectively. The comparison phase is pedagogically crucial, as students discover trade-offs

and alternative paths, reflecting how agroecological design works in real contexts such as Iside Farm.

Tools and materials for implementation

- simplified plot map
- species-function sheet (provided by teacher)
- environmental constraints sheet (soil + slope + sun + water)
- agroecological functions checklist (for justification)
- pencils + colored markers
- short instruction sheet

Simplified plot map or plot

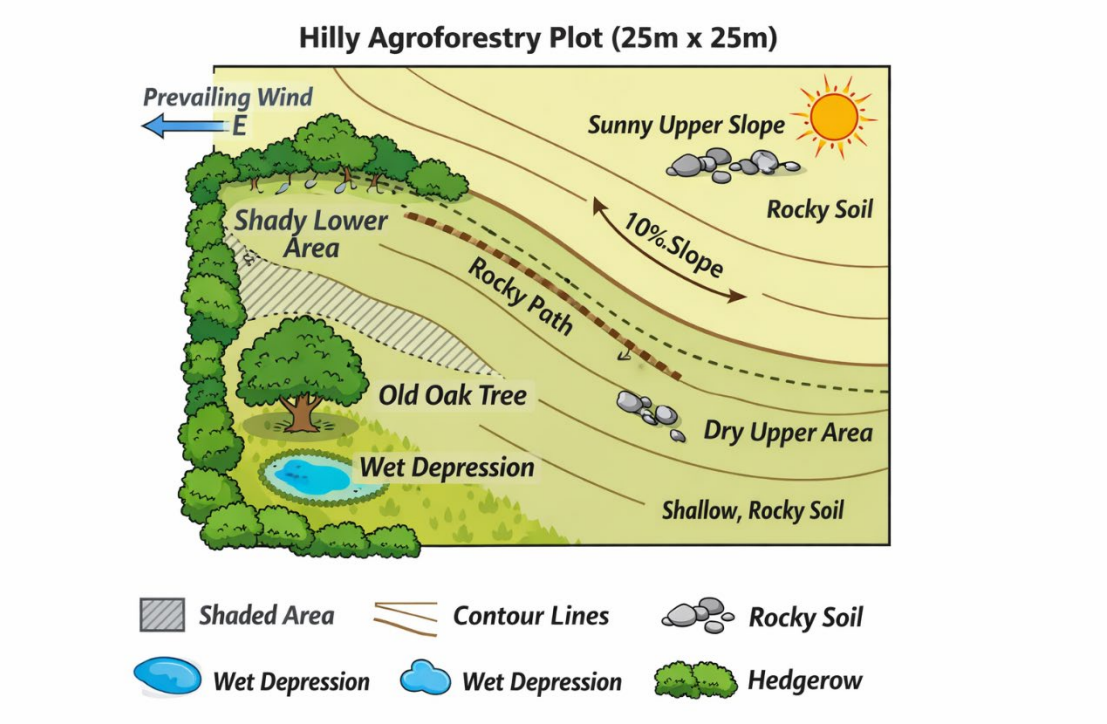
A useful plot map will include information on:

- plot boundaries and approximate dimensions;
- slope direction and degree (simple arrows or contour lines);
- solar exposure (orientation and shading zones);
- dominant wind direction;
- soil type or soil constraints (e.g., sandy, rocky, low organic matter);
- drainage or water-flow indications;
- water access points (or absence of water to simulate stress conditions); (
- access path;
- existing natural or semi-natural elements (e.g., hedge, tree line, shrub patch).

These elements provide sufficient ecological information for students to make justified planting, positioning and management decisions.

Example - Hilly agroforestry plot with differentiated sun and wind exposure

The plot represents a hilly area with an irregular shape and a moderate slope (10–12%) descending from east to west. Simple contour lines indicate two small depressions where water tends to accumulate after rainfall. The upper part of the plot is more exposed to sun and wind, while the lower western section receives partial afternoon shade from a hedgerow located just outside the boundary. Soil is described as shallow and moderately rocky, with low water-holding capacity. The prevailing wind comes from the east. No irrigation infrastructure is present. A narrow access path crosses the plot diagonally, limiting planting density in that area. A single existing mature tree is located near the lower boundary and must be integrated into the design.



Species-function sheet

Teachers may provide a list similar to this; they can adapt to local species/availability.

Category	**Examples**	**Function**
Fruit trees	apple, pear, peach, fig	yield + shade + leaf biomass
Nitrogen fixers	black locust, clover, lupine	N-fixation + pollinators
Aromatics	thyme, sage, rosemary, oregano	pollinators + pest deterrence
Biomass/timber	paulownia, mulberry, eucalyptus	biomass + shade + fodder
Forage/pasture	ryegrass, fescue, clover mix	grazing + soil cover
Shrubs/pioneers	currants, raspberry, hazelnut	biodiversity + microclimate

Agroecological functions checklist (for students)

Students must justify how species contribute to soil mechanisms, e.g.:

☐ organic matter production
☐ nitrogen fixation
☐ erosion control
☐ microclimate regulation (shade, wind)
☐ pollination services
☐ biodiversity niches
☐ fodder/forage contribution
☐ root depth diversity
☐ water retention
☐ nutrient cycling
☐ weed pressure reduction

This helps transform the exercise from "drawing trees" into agroecological reasoning.

Environmental constraints (teacher-provided)
Teacher can simulate constraints (important in VET):

- Soil: sandy, low organic matter, low CEC
- Slope: gentle slope (5–10%) →erosion risk
- Water: limited irrigation →favors mulching + shade
- Climate: temperate, dry summer
- Space: 20×20 m plot

Constraints reproduce the logic of Iside Farm, where design decisions start from landscape reading rather than the application of "agrarian recipes".

Implementation steps

- Activation (10 min): teacher briefly introduces key elements from Iside Farm

- Context setup (10 min): distribution of plot map + constraints + species/function sheet
- Group design task (45–60 min): students select species, allocate space, and elaborate design solutions for soil regeneration
- Justification phase (15–20 min): groups complete the checklist linking functions →soil mechanisms.
- Presentation & feedback (20–30 min): groups present designs; class compares strategies.

Assessment / Deliverables

Possible deliverables could include:

- plot map (drawing or digital)
- short group reflection (5–8 sentences)

Optional evaluation criteria could include such as:

□ coherence between species + functions
□ relevance to soil health mechanisms
□ feasibility (space, context, climate)
□ clarity of justification
□ creativity/design

Outdoor or hybrid variants

If a school garden or green area is available, students may:

- identify real microclimatic conditions
- measure slope or sunlight exposure
- sample soil texture

- compare field observations with their design assumptions

Reflective Questions

1. Which elements of the landscape do you think are most often overlooked in conventional agricultural planning, and why are they important in an agroecological design approach?
2. Why might two farms located close to each other require very different agroecological solutions, even if they grow similar crops?

1.2 Uka Farm - A Living Laboratory of Agroecology in Albania

This agroecological practice clearly and directly embodies the HLPE agroecology principles of biodiversity, synergy, recycling, soil health and economic diversification.

The practice directly addresses the LU1 dimension by responding to the challenge of transitioning from input-dependent, intensive agriculture toward resilient, knowledge-based agroecological systems.

1.2.1 Description of Uka Farm

Founded in 1996 in Laknas, near Tirana, Uka Farm operates as a hallmark of agroecology in the Balkans and functions as a “living laboratory” where ecological health, social responsibility, and economic viability are treated as inseparable. Designed beyond simple organic certification, the farm prioritizes the complex relationships between plants, insects, fungi, soil organisms, weeds, and the local community through an integrated agroecological system. Biodiversity forms the foundation of this approach,

with diverse crops, native varieties, ecological corridors, hedgerows, and wild strips creating functional habitats that support beneficial insects, enhance biological pest control, and strengthen ecosystem resilience. Pest management relies on continuous field observation and selective biological strategies, including light-based organic traps and pheromone systems, allowing interventions only when ecological thresholds are exceeded, thus minimizing disruption to trophic balance. Soil fertility is maintained through circular practices in which all organic residues from pruning, harvesting, and food preparation are composted or mulched, increasing organic matter, improving soil structure, supporting microbial life and enhancing water retention. Smart irrigation technologies further optimize resource efficiency by regulating water use according to soil moisture and light intensity, reducing nutrient leaching and environmental stress. Knowledge co-creation is central to farm operations, combining traditional knowledge of local varieties with scientific monitoring in a continuous learning-by-doing process that informs adaptive management. Social sustainability is embedded through strong cooperation with over 250 micro-farmers from surrounding rural areas, many cultivating less than one hectare, enabling their inclusion in formal markets and reinforcing rural livelihoods. The integration of agrotourism, education, and an on-site farm-to-table restaurant closes the production-consumption loop, allowing visitors, students and professionals to directly experience agroecological processes while promoting traditional Albanian food culture, seasonal diets, and slow food principles. In this way, Uka Farm demonstrates how agroecology can simultaneously deliver ecological resilience, social inclusion, cultural preservation and economic viability.

1.2.2 Regenerative soil microbiology and carbon sequestration at school

The applied learning practice on regenerative soil microbiology and carbon sequestration is designed as a combined classroom and field-based activity that enables learners to understand soil as a living system rather than an inert growing medium.

The activity begins with a preparatory session of approximately 45 minutes where learners are introduced to the structure and function of the Soil Food Web, with particular attention given to the role of mycorrhizal fungi in nutrient uptake and plant resilience. The trainer explains how no-till or low-till practices preserve soil structure, protect microbial habitats, and contribute to carbon sequestration. Learners are then presented with comparative data on soil organic matter levels from Uka Farm and neighboring conventional plots, which serves as a basis for discussion on how management choices influence soil fertility, water retention, and long-term productivity.

The practical on-farm component lasts approximately 2 to 2.5 hours and is organized as a guided observation exercise. Learners work in small groups and follow a structured sequence of activities:

1. A soil profile pit is opened in a vineyard or cultivated plot, allowing learners to directly observe soil horizons, root depth, aggregation, moisture distribution and the presence of earthworms and other soil organisms. Learners are guided to relate these observations to soil structure, aeration and biological activity.

2. Learners then visit the composting area of the farm, where they examine different stages of compost decomposition. Through sensory evaluation, including smell, texture, and temperature, they distinguish between aerobic and anaerobic processes and discuss how compost quality affects microbial inoculation and soil health.

3. The trainer demonstrates the preparation or application principles of compost tea, explaining its role in introducing beneficial microorganisms into the soil and reinforcing the biological functioning of the Soil Food Web.

The activity concludes with a technical demonstration of the farm's IoT-based soil moisture monitoring system. Learners observe how sensors measure soil humidity and light intensity and how this data is used to guide irrigation decisions, reduce over-watering and prevent nutrient leaching.

The tools and materials required for this module include basic field tools for digging and observing soil profiles, hand lenses, soil observation sheets, compost samples, thermometers for compost analysis, access to soil organic matter data, and visual access to the farm's moisture monitoring system. Protective clothing and safety instructions are provided to ensure safe fieldwork conditions.

The module concludes with a 30-minute reflection and synthesis session. Learners compare observations between groups, link visible soil characteristics to management practices, and reflect on how biological soil management contributes to carbon sequestration and climate resilience. The trainer facilitates discussion on how similar practices could be adapted to different crops, soil types, or regional farming systems.

1.2.3 Integrated pest management and biological control strategies: how to practice at school

The learning activity aims to enable learners to understand trophic cascades and biological control by actively observing pest–predator dynamics and decision-making processes at Uka Farm, using the management of Tuta absoluta as a concrete case study. The activity begins with a short introductory session of approximately 30 minutes, during which

learners are introduced to the concept of trophic cascades and the transition from pesticide-based control to predator-based regulation of pest populations. At the farm, *Tuta absoluta* is managed through an integrated strategy based on continuous monitoring, ecological prevention, and selective biological intervention. Pheromone traps are used to monitor adult populations and establish intervention thresholds, while regular field scouting allows early detection of larval stages. Preventive measures focus on increasing functional biodiversity through crop diversification, flowering strips, hedgerows, and ecological corridors that provide habitat and food resources for natural enemies such as predatory insects and parasitoids. When population thresholds are exceeded, targeted biological control methods are applied, including the selective use of light-based organic traps and approved biocontrol agents, avoiding broad-spectrum treatments that could disrupt beneficial organisms

The practical component takes place in the field and lasts approximately two hours. Learners work in small groups under the guidance of a trainer or farm expert and follow a structured sequence of activities:

1. Learners are provided with scouting sheets, hand lenses, and basic identification guides for pests and beneficial insects and are instructed on how to move systematically through crop rows without disturbing the habitat.

2. Each group conducts a “scout and count” exercise, visually inspecting leaves and plants to record the presence of Tuta absoluta, signs of damage, and observed natural enemies such as predatory insects or parasitoids.

3. Learners record their observations, quantify pest pressure, and compare their findings with predefined economic threshold values to determine whether intervention would be justified.

4. The group then observes the farm's light-based organic traps and pheromone dispensers, discussing their function, placement, and role in monitoring insect populations while minimizing harm to non-target species.

5. A guided inspection of hedgerows, wild strips, and ecological corridors follows, during which learners identify overwintering sites and refuge habitats for beneficial insects and analyze how landscape design supports biological control.

The tools and materials required for this activity include scouting and observation sheets, pencils or tablets, hand lenses, pest and beneficial insect identification cards, access to monitoring traps installed on the farm, and protective field clothing. No chemical products are used, reinforcing the focus on observation and ecological reasoning.

The activity concludes with a 30–45-minute reflection and discussion session. Learners compare data collected by different groups, discuss variations in observations, and reflect on how habitat design and biodiversity influence pest regulation. The trainer facilitates a discussion on how this monitoring-based approach differs from routine pesticide application and how similar strategies could be adapted to other crops or farming contexts.

Reflective questions

1. How do the interactions between soil health, biodiversity, and pest management demonstrate the difference between input-based agriculture and agroecological systems thinking?

2. Based on the observations from the soil microbiology and integrated pest management activities, which agroecological practices do you consider most transferable to your local or vocational context, and what adaptations would be necessary?

1.3 Conclusions

This learning unit translates the environmental dimension of agroecology into practical learning activities focused on soil degradation and regeneration. Building on the LU1 theoretical module, it helps learners link key soil concepts, such as organic matter, biodiversity and ecological regulation, to concrete farming practices and environmental conditions.

By combining a design-based activity inspired by Iside Farm with field observation and monitoring activities at Uka Farm, the unit develops two core agroecological skills. Learners practice designing soil-regenerative solutions adapted to landscape constraints and they learn to observe and interpret soil biological processes, pest–predator interactions, and management effects in real farming systems. This reflects how agroecology works in practice, where soil health depends on both planning and continuous observation.

From a teaching perspective, the learning activities support experiential and competence-based learning suited to vocational education and training. Learners are asked to justify design choices, interpret field observations and discuss management decisions using ecological reasoning rather than fixed technical rules. Tools such as landscape reading, soil profile observation, compost analysis and pest scouting help develop systems thinking and professional judgement. This approach can support VET teachers in guiding observation, discussion and reflection, and help prepare future agricultural professionals to manage soil and agroecosystems as living, adaptive systems rather than input-driven production units.

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SOCIOCULTURAL DIMENSION

Introduction to the sociocultural dimension

Learning Unit 1 (LU1) highlighted the key social challenges that limit agroecological transitions in local communities: erosion of traditional knowledge, loss of dietary diversity and food culture, weak community organisation and collaboration, marginalisation of rural communities and youth, and gender/social inequalities. These challenges undermine farmers' autonomy, reduce intergenerational knowledge transfer, and weaken resilience in local agrifood systems.

Learning Unit 2 (LU2) builds directly on these insights by focusing on practical approaches that strengthen community organisation and collaboration, knowledge exchange and cultural identity. While LU1 provided the theoretical foundation for understanding the social and organisational barriers challenges of present food systems, LU2 demonstrates how some of these challenges can be addressed through participatory practices that are locally grounded, culturally important and inclusive.

The unit examines two real-world initiatives that exemplify these principles:

1. Alternative Community Peliti (Greece): a voluntary, non-profit initiative that preserves traditional seed varieties and valorises local knowledge through community events, fostering intergenerational learning, social cohesion, and cultural identity.

2. FAO Community Diversity Seed Fairs (Tanzania): a structured model for participatory seed fairs that strengthens trust, collaboration and local governance, linking various stakeholders to maintain seed diversity and enhance community organisation and collaboration.

Through these case studies, learners have the chance to explore the application of agroecology principles to address selected sociocultural challenges identified in LU1.

Learning outcomes

After completing this unit, VET teachers should be able to:

1. Understand the connection between HLPE agroecology principles and the valorisation of traditional knowledge and community organisation in local food systems.
2. Recognize real-world agroecological practices, and their role in strengthening collaboration in rural communities and preserving traditional knowledge.
3. Guide learners in documenting, evaluating, and reflecting on participatory agroecology activities to strengthen experiential learning and community impact.
4. Integrate traditional agricultural knowledge with modern agroecological approaches in training sessions to support locally adapted, sustainable farming practices.

2. Valorisation of traditional knowledge (Alternative Community Peliti)

Which agroecology principles does this practice embrace?

Based on the HLPE 13 Principles of Agroecology this agroecological practice integrates the following principles:

1. Biodiversity
2. Co-creation of Knowledge
3. Social Values & Diets
4. Connectivity
5. Participation

Peliti is a voluntary, non-profit community initiative in Greece dedicated to the collection, preservation, and dissemination of traditional seed varieties. Since 2003, its main base has been in Mesochori, Paranesti, Drama Prefecture. Peliti embraces a diverse global community, including local volunteers in Greece and an international branch in the United States (Peliti Idaho). The initiative promotes sharing, cooperation, and the creation of community around traditional seeds, aiming for both food and broader self-sufficiency.

A central event of Peliti is the Peliti Seed Festival, which embodies the community's values of solidarity, intergenerational learning and non-monetary exchange. The philosophy of Peliti emphasizes personal and collective responsibility, mindfulness, and conscious action: each person contributes to solving challenges in their community. Through everyday choices individuals collectively strengthen biodiversity, cultural heritage and sustainable practices. The organisation's main objectives include the collection, preservation and dissemination of traditional seed varieties; exchange of goods and services without monetary mediation; promotion of food and broader self-sufficiency; and the creation of a community centered on traditional seed conservation and shared responsibility (Peliti, n.d.).

Peliti directly addresses the LU1 challenge of erosion of traditional knowledge and farming practices. LU1 highlighted how modern, standardized technical packages, industrialized agriculture, and market-driven crop choices undermine farmer autonomy, local cultural identity, and intergenerational knowledge transfer.

Through its activities, Peliti (ibid) counters this erosion by:

- Preserving and circulating traditional seeds to maintain crop diversity and local adaptation.
- Valorising farmer knowledge and positioning local growers as knowledge holders and innovators rather than passive recipients of external expertise.
- Facilitating intergenerational learning via seed exchanges and festivals, ensuring that traditional practices are passed on to younger farmers.
- Integrating culture with agriculture, linking seed conservation with festivals, storytelling, and community engagement to reinforce food heritage and local identity.
- Supporting community-led innovation, allowing farmers to combine traditional knowledge with experimentation and modern techniques, strengthening agroecological practices based on local needs.

In short, Peliti addresses LU1's core sociocultural challenges by rebuilding community-based knowledge systems, strengthening cultural identity and empowering farmers to actively shape sustainable and locally adapted agricultural practices.

2.1 Description of Peliti Community

Peliti is a voluntary, non-profit community initiative in Greece dedicated to the protection and promotion of agricultural biodiversity through local seed saving. Since its foundation in 1995, Peliti has focused on the collection, cultivation, and free dissemination of traditional and local seed varieties,

positioning seeds not merely as commodities but as shared cultural and ecological knowledge.

A core element of Peliti's work is the valorisation and transmission of traditional knowledge, including cultivation methods, seed selection, and adaptation to local agroecological conditions. This knowledge is circulated through community-based practices, such as seed exchanges, expeditions to collect local varieties, and engagement with amateur and professional growers. To date, Peliti has supplied over 300,000 growers with non-GMO seeds, supporting on-farm experimentation, seed conservation, and farmer innovation.

Peliti also functions as a knowledge dissemination hub, raising awareness in civil society and internationally through conferences, festivals, and public lectures. Its Seed Festivals, including the Peliti Seed Festival and the Olympic Seed Festival, embody the philosophy of non-monetary exchange, collective learning, and intergenerational knowledge sharing. Through a decentralized network of local groups and volunteers across Greece and abroad, Peliti actively mobilizes practical skills, experiential learning, and collective memory to support agroecological transitions and food sovereignty.

The Peliti initiative activates several agroecological mechanisms that strengthen local farming systems, social cohesion, and cultural identity. These mechanisms operate primarily at the community and traditional knowledge-sharing level, presenting agroecology as a community practice:

First, Peliti contributes to the **preservation and circulation of local seed diversity** by collecting, cultivating, and distributing traditional and local seeds. In this way, it maintains crop biodiversity and helps ensure that varieties adapted to local ecological and cultural conditions continue to be cultivated. At the same time, Peliti supports the **co-creation and sharing of local knowledge**, as farmers and other stakeholders collaborate to exchange practical skills as well as agricultural and cultural knowledge. This horizontal learning model empowers farmers as knowledge holders and

innovators, while also ensuring that traditional knowledge is passed on to future generations.

Peliti also strengthens **social cohesion and participation** through community events that create opportunities for collective participation, intergenerational learning, and networking. By involving farmers, schools, and local institutions, the initiative enhances community bonds and promotes cooperation around agroecological practices. Importantly, Peliti encourages the **integration of culture with agroecology** by embedding cultural expressions—such as storytelling, festivals, and local rituals—into agricultural practices. This strengthens local identity and food heritage, and helps ensure that agroecology remains meaningful for the local community.

Finally, Peliti promotes empowerment and community innovation by giving farmers autonomy to experiment and combine traditional knowledge with practical innovations. This enhances farmer agency and horizontal innovation, strengthening resilience against external pressures from industrialized agriculture and external expertise.

2.1.1 School/Training garden seed exchange

In this activity, students cultivate traditional or local crop varieties in the school or training centre garden. They then participate in a mini community agroecological event within the classroom, where they exchange seeds, cultivation tips, and recipes with classmates. This process connects practical farming skills with the valorisation of traditional knowledge, promotes biodiversity, and encourages community building within the classroom.

Duration: 2–3 sessions (1–2 hours each) for planting, exchanging, and reflection.

Format: Small group work for planting and seed exchange.

Materials for implementation:

- Seeds of local/traditional varieties (from local sources)
- Pots, soil, garden plots
- Labels for seeds and plants
- Tables, posters, or recipe cards for the mini seed fair
- Notebooks, cameras, or tablets for documentation

Implementation Steps:

1. Introduce students to local agroecological initiatives and the importance of traditional seed conservation.
2. Assign students to plant and care for different local seed varieties.
3. Organize a classroom agroecological event: students present seeds, share knowledge, and exchange small quantities.
4. Facilitate reflection discussions on biodiversity, cultural heritage, and community cooperation.

2.1.2 Farmer knowledge co-creation workshop

In this activity, local farmers, community activists, or experienced agri-professionals are invited to share traditional farming practices and the culinary uses of local crops. Through this exchange, students document cultivation methods, seed selection criteria, and traditional food practices, capturing both practical details and the cultural context behind them. The activity emphasizes the co-creation of knowledge by integrating

experiential insights from community experts with scientific learning, while maintaining respect for cultural heritage.

Duration: 1 workshop session of 2–3 hours.
Format: Interactive workshop with Q&A, presentations, and documentation tasks.

Materials for implementation:

- Notebooks or tablets for taking notes
- Cameras (optional, for documentation)
- Whiteboard or flipchart for summarizing practices
- Printed materials or examples of traditional seed practices (handouts)

Implementation Steps:

1. Invite local farmers or community experts to share traditional knowledge.
2. Students take notes, ask questions, and document methods.
3. Co-create a knowledge board or booklet summarizing traditional seed practices.
4. Discuss integration of these practices into modern agroecological systems.

Reflective questions

1. How does Peliti's approach to collecting, preserving, and exchanging traditional seed varieties contribute to biodiversity? Can you identify similar practices in your community?

2. How do cultural activities, like the Peliti Seed Festival, strengthen community cohesion, cultural identity, and motivation for agroecological practices? Why is it important to link agriculture with local culture?

2.2 Strengthening community organization and collaboration (FAO Community diversity seed fairs in Tanzania)

Which agroecology principles does this practice embrace?

Based on the HLPE 13 Principles of Agroecology this agroecological practice integrates the following principles:

1. Co-creation of Knowledge
2. Social Values & Diets
3. Connectivity
4. Participation

The FAO Community Diversity Seed Fairs in Tanzania are a concrete example of how participatory, community-based events can strengthen local agrifood systems through collective action and knowledge exchange. They are organised at village level by local committees, with FAO and project teams mainly providing facilitation and technical support, while farmers remain at the centre by displaying, exchanging, selling, and explaining seeds from local, neglected, and improved crop varieties, unlike conventional exhibitions where farmers are often passive recipients. Songs,

dances, and storytelling are included to reinforce links between agriculture, food, and cultural identity. Participation is designed to be inclusive, with particular emphasis on women, older farmers, and youth. Women often play a central role because of their involvement in seed saving and traditional crops, while schools and local institutions support intergenerational knowledge transfer. Reflection meetings after each fair evaluate outcomes, strengthen networks, and encourage continued seed exchange and collaboration, promoting local seed systems, strengthening social ties, and increasing community ownership over agricultural resources and decisions.

This case study responds directly to LU1's barriers of weak community organisation, low trust, and fragmented collective action, which lead to farmer isolation, reduced cohesion, limited knowledge exchange, and weakened resilience. By creating regular, accessible spaces for interaction and shared decision-making, the fairs rebuild trust and cooperation and position farmers as active contributors within a shared learning process. They also reinforce community control over seeds, knowledge, and food systems. Farmers retain ownership of seeds and decide collectively how they are exchanged and conserved, supporting seed sovereignty, while the focus on locally adapted varieties, food practices, and cultural expressions keeps agroecology rooted in community values rather than imposed externally. Finally, participation requires active engagement, shared responsibility, and adherence to agreed rules and objectives, helping communities shift from fragmentation to coordination, from individual decisions to collective governance, and from knowledge loss to the co-creation and valorisation of local knowledge in line with LU1.

2.2.1 Description of the FAO Community diversity seed fairs in Tanzania

Use Seed Fairs, Harvest Festivals or Workshops to bring the Community together around agriculture and food culture

Seed diversity fairs help address this lack of awareness at community level. Unlike large agricultural exhibitions, where farmers usually participate as passive observers, seed fairs are highly participatory and community events. Farmers actively share their own seeds, explain how they cultivate and store them, and exchange knowledge related to processing, cooking, and everyday use. Since many smallholder farmers rely on seeds saved from their own harvests, seed fairs provide an important space for exchanging small quantities of seeds, including rare or forgotten varieties that may be new to others. This process supports crop diversification using varieties adapted to local conditions, contributing to local food security.

At the same time, local, small-scale seed fairs play a key role in strengthening social ties within rural communities. Because they are organised close to home and require minimal travel, they are accessible to a wide range of farmers and encourage the active participation of women, who are often central to seed saving and the preservation of traditional and underutilised crops. The use of locally sourced seeds makes exchanges more meaningful and easier to sustain over time (FAO, n.d.). After the fair, farmers can continue sharing experiences, saving and exchanging seeds, and maintaining contact through informal networks. In this way, seed fairs increase awareness of the value of local food cultures and reinforce a shared community identity, helping ensure that agroecology remains deeply rooted in local customs and traditions.

Based on the Seeds fair organised in Tanzania (FAO, n.d.) the following steps should be taken into consideration when organising a seed fair:

Step 1: Use clear guidelines and define the purpose

Begin by identifying or adopting clear guidelines for organising the seed fair. Clarify the purpose of the event with all involved actors. In this case, the seed fairs aim not only to promote seed diversity but also to test and apply the guidelines in real community settings.

Step 2: Hold initial village meetings

Start with meetings with village leaders to introduce the idea and secure support, then organise a general village meeting where facilitators explain the objectives, benefits, and participation process. During this meeting, the community identifies knowledgeable farmers to display seeds and explain seed management practices, supporting balanced participation (women and men) and avoiding overcrowded displays. Where useful, farmers can form groups and prepare shared displays.

Step 3: Form a village seed fair organising committee

Establish a village-level organising committee for each seed fair to strengthen local ownership, with external facilitators/research teams supporting in an advisory role. The committee should include village leaders, farmers, extension staff, and representatives of local institutions (e.g., schools, churches, community organisations), ensuring participation of both women and men.

Step 4: Define roles and responsibilities

The committee meets well in advance to plan the event and assign responsibilities, covering participant mobilisation, site preparation, logistics and security, entertainment and cultural activities, coordination on the day, and post-event evaluation.

Step 5: Appoint a seed fair coordinator

Select a coordinator from the committee to manage communication with participants, organise planning meetings, report progress, ensure materials and displays are ready on time, and lead post-fair reflection meetings to capture strengths, challenges, and improvements.

Step 6: Plan the location and timing

Choose an open and accessible site with enough space for displays and visitors, such as a community field. Selecting a locally offered site helps build a sense of community ownership. Set the date of the seed fair at a time that suits farmers, ideally after the main harvest, when seeds are available. Coordinate dates so neighbouring villages can also attend.

Step 7: Organise invitations and programme

Decide who to invite from the ward, district, and neighbouring villages, and identify a guest of honour if appropriate, while keeping the focus on farmers rather than formal ceremonies. Prepare a simple programme (opening remarks, cultural elements linked to seed diversity, time for displays/exchange/discussion) and invite local media (radio, press, TV) to increase visibility.

Step 8: Ensure inclusive participation

Invite all farming households and allow anyone to display seeds and crop diversity, while actively encouraging knowledgeable farmers (especially older farmers) to participate. Support group participation to showcase greater diversity and include schools (students display seeds produced under teacher guidance) to strengthen intergenerational learning and youth engagement.

Step 9: Support interaction during the fair

Structure the fair to encourage exchange and dialogue. Farmers share seeds, crops, and experiences. Farmers explain local varieties, storage methods, and ethnobotanical uses. Researchers and extension staff share information on improved varieties. Visitors can buy or exchange seeds and fruits. This interaction creates mutual learning among farmers, researchers, and other stakeholders.

Step 10: Encourage participation through incentives

If participation is low, introduce simple incentives such as prizes for the best displays. Clearly communicate the evaluation criteria in advance so farmers know how displays will be assessed.

Step 11: Evaluate and give recognition

Recognise all exhibitors with participation certificates and evaluate displays using agreed criteria (e.g., number of crops, varieties per crop, display quality, innovativeness, presentation quality). Ensure the evaluation team is gender-balanced and includes both farmers and technical experts and provide small cash prizes for top displays to allow flexible use of the reward.

Step 12: Reflect and follow up after the fair

Hold a review meeting with participants and the organising committee to discuss how the fair was received, what worked well, and what can be improved. Encourage continued contact and seed exchange, and strengthen local networks formed during the event.

More information on FAO guidelines for seed fairs can be found here.

The FAO Community Diversity Seed Fairs activate several agroecological mechanisms:

They rebuild cooperation, coordination, and trust among community members, creating regular opportunities for interaction that reduce isolation and **strengthen collective action and trust** over time. Farmers exchange practical knowledge on seeds, cultivation, storage, and food practices through horizontal, farmer-to-farmer learning, ensuring that agroecological knowledge responds to local needs while valuing farmers as knowledge holders and supporting intergenerational transfer through **co-creation and sharing of local knowledge**.

At the same time, the exchange of local, neglected, and traditional varieties supports crop diversification, maintains locally adapted seeds, and contributes to food security and ecological resilience by promoting

enhanced seed diversity and resilience, while also protecting genetic resources that might otherwise disappear under commercial seed systems. Village organising committees and shared guidelines strengthen local decision-making and shared responsibility over seeds, knowledge, and agricultural practices, reinforcing **community-led governance and ownership** through transparency and community control over key agricultural resources and related choices.

By linking agriculture with cultural expression and local food traditions, the practice ensures that agroecology remains rooted in community values and identity, supporting **reinforced cultural identity and food culture** and making agroecological practices feel locally relevant rather than externally imposed. Finally, the active involvement of women, youth, and elderly farmers recognises diverse knowledge holders and strengthens the social foundation of sustainable local agrifood systems, advancing **inclusive and equitable participation** and increasing the visibility of groups that often play central roles in seed saving and traditional food practices.

2.2.2 Integrate the practice as a learning unit or module

Where it fits

- Programmes in Agriculture, Agroecology, Sustainable Farming, Food Processing, Rural Development, Environmental Studies
- Modules on Community Development, Local Food Systems, Cultural Heritage

Learners are able to:

1. Plan and organise a community seed fair or harvest festival
2. Facilitate knowledge exchange among farmers and local stakeholders

3. Apply agroecological principles to seed diversity and local food systems
4. Demonstrate inclusive and gender-sensitive community engagement

Duration: 1–2 weeks

Format: Classroom-based, with optional practical simulation

Materials: FAO guidelines, seed catalogues, posters, planning templates, notebooks

Implementation steps:

1. Introduce the LU1 challenge of weak community organisation and the FAO seed fair model.

2. Learners study the steps to organise a seed fair and identify roles and responsibilities.

3. Plan the learning unit/module including objectives, participation strategies, and expected outcomes.

4. Discuss evaluation methods and reflective practices for learners.

2.2.3 Use seed fairs as a Work-Based Learning (WBL) activity

Learners participate in real seed fairs or festivals as part of:

- internships,

- apprenticeships,
- community placement hours

Typical learner roles

- Member of the seed fair organising committee
- Seed fair coordinator assistant
- Community liaison with farmers, women's groups, or schools
- Documentation and evaluation assistant

Duration: 2–4 weeks depending on WBL placement schedule

Format: Field-based, hands-on learning in real seed fairs

Materials: Seeds, display tables, registration sheets, evaluation forms, notebooks/cameras for documentation

Implementation steps:

1. Learners are assigned to a real community seed fair under supervision.

2. Roles and responsibilities are clarified, e.g., coordination, facilitation, or documentation.

3. Learners actively support event preparation, participant engagement, and knowledge-sharing activities.

4. Post-event reflection and evaluation are conducted, with learners reporting on outcomes and lessons learned.

Reflective questions

1. How does the exchange of seeds and knowledge during the fairs support the conservation of traditional and underutilised crop varieties?

2. After the seed fair, what mechanisms or follow-up actions help maintain the networks, seed exchange practices, and knowledge flows created during the event?

2.3 Conclusions

The two case studies in Learning Unit 2 show that agroecological transitions depend on restoring social relations, knowledge systems, and collective organisation within rural communities. Both Peliti and the FAO Community Diversity Seed Fairs respond to LU1's challenges by countering the erosion of traditional knowledge and weak community organisation through participatory, culturally appropriate practices, treating seeds and knowledge as common social goods sustained through cooperation and collective responsibility.

Peliti supports traditional knowledge by placing farmers and communities at the centre of knowledge creation and transmission. Through seed saving, exchanges, and community events, cultivation practices, seed selection methods, and food knowledge are preserved and shared across generations in ways that remain relevant to local ecological and cultural conditions, reinforcing farmers as knowledge holders and strengthening cultural identity. The Tanzanian seed fairs similarly rebuild trust and cohesion by creating regular spaces for interaction, cooperation, and shared decision-making, supported by local organising committees, inclusive participation rules, and follow-up reflection meetings that sustain community governance and collaboration.

Together, these cases demonstrate that principles such as biodiversity, participation, and co-creation of knowledge become practical tools when integrated in community events and collective learning. Overall, LU2 highlights agroecology as a social process in which resilient agrifood

systems emerge from strong communities, strong traditional knowledge, and collective ownership of local food systems.

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ECONOMIC DIMENSION

Introduction to the economic dimension

Learning Unit 2 (LU2) builds on the theoretical foundations of LU1 by translating the economic principles of agroecology into practical, real-world applications. While LU1 examined key challenges such as dependence on external inputs, market concentration, and unequal value distribution LU2 focuses on concrete practices that help farmers strengthen their economic resilience and autonomy. This unit highlights two best practices: short and fair supply chains, and diversification combined with cooperative action. Together, these practices demonstrate how agroecology can create fairer markets, stabilize farm incomes, and promote community-based food systems.

LU2 aims to support VET providers in integrating these practices into teaching through examples, field-based activities, and stakeholder engagement. By linking theory with hands-on learning, the unit equips learners with practical tools to understand and apply agroecological approaches that enhance sustainability, equity, and resilience in local agricultural systems.

Learning outcomes

After completing this unit, VET teachers should be able to:

1. Explain and teach the economic benefits of short and fair supply chains, including how direct sales, local markets and public procurement can increase farm income and reduce dependency on intermediaries.
2. Design practical learning activities on farm diversification and cooperative action, enabling learners to understand how value-adding activities and collective organization strengthen farmers' economic resilience.

3. Integrate real-world agroecological practices into VET curricula, using case studies, field visits and stakeholder collaboration to link theory with hands-on experience.
4. Support learners in analysing local food systems, helping them identify opportunities for fair value distribution, community-based marketing and sustainable rural development.

3. Short and fair supply chains

Which agroecology principles does this practice embrace?

Based on the HLPE 13 Principles of Agroecology this agroecological practice integrates the following principles:

1. Connectivity
2. Fairness
3. Economic diversification
4. Participation
5. Co-creation of knowledge

Mrizi i Zanave is an agritourism enterprise located in Fishtë, northern Albania, established in 2007. It is frequently described as a flagship model of locally embedded agritourism that combines farming, processing, and hospitality while building strong local sourcing relationships (European & Me, 2023; Slow Food, 2021). Evidence-based sources report that the enterprise works with 400+ local families/farmers who supply the restaurant and related activities through direct and ongoing partnerships (Slow Food, 2021; Dionizi, 2025). How this case links to the economic challenges in this module:

- **Market concentration and unequal value distribution** (including low farm-gate prices): Mrizi i Zanave illustrates how a short and locally anchored supply chain can rebalance value in favor of farmers. By purchasing directly from nearby producers for its restaurant and agritourism activities, it reduces reliance on intermediary-dominated

channels and creates a more favorable market outlet for small farms (Slow Food, 2021; Dionizi, 2025).

- **Dependence on external inputs and credit**: The model is associated with the promotion of local, seasonal, and lower-input production practices and local procurement, which can reduce farmers' exposure to volatile imported input markets and lower upfront cash needs at the start of the season (Slow Food, 2021; Dionizi, 2025). While this does not eliminate structural credit constraints, it illustrates a pathway for reducing input dependency through locally embedded production and marketing practices.
- **Unfair trading practices and income instability**: The enterprise's direct relationships with suppliers and emphasis on long-term local collaboration are presented as mechanisms that can improve predictability for producers and reduce exposure to common buyer-dominated risks such as sudden cancellations or unstable demand (Dionizi, 2025; Slow Food, 2021).

3.1 Description of the agrotourism Mrizi i Zanave

Mrizi i Zanave is an agritourism enterprise located in Fishtë, northern Albania, established in 2007, which integrates sustainable agriculture, local food systems and rural tourism into a single locally embedded model. The enterprise collaborates with more than 400 nearby farmers and artisans, sourcing seasonal vegetables, dairy products and meat produced using traditional and low-input methods (Slow Food, 2021; Dionizi, 2025). Through this extensive local network, Mrizi i Zanave operates as a short and fair supply chain, linking producers directly to a stable and high-value local market.

By combining on-farm production with hospitality services namely a restaurant and guest accommodation, the model creates direct and reliable outlets for local farmers while also diversifying income sources across food, tourism and processing activities (European & Me, 2023; Dionizi,

2025). This integration reduces farmers' exposure to volatile wholesale markets and buyer-dominated retail chains, allowing them to retain a larger share of the final food value and benefit from more predictable demand (Slow Food, 2021).

At the same time, the emphasis on traditional, seasonal and agroecological practices helps lower dependence on imported seeds, chemical fertilizers and pesticides, which are major cost drivers in conventional farming systems. By sourcing locally and relying on low-input production methods, both the enterprise and its suppliers reduce their exposure to global input price shocks and the need for high-interest credit to finance each production cycle (Slow Food, 2021; Dionizi, 2025). Trust-based, long-term relationships between the enterprise and its suppliers further strengthen income stability, replacing anonymous spot markets with transparent and negotiated arrangements that support fair pricing and shared responsibility.

Overall, Mrizi i Zanave illustrates how short supply chains, economic diversification and community-based partnerships can work together to address several of the economic challenges faced by small and medium farmers. By embedding food production within a locally rooted tourism and hospitality system, the model demonstrates how farmers can increase their share of value, reduce input dependency and build more resilient rural livelihoods through cooperation and locally controlled value chains.

3.1.1 From Farm to Table: Designing a local agroecological food network

Purpose: This activity helps learners understand how short supply chains, diversification, cooperation and agroecological practices can work together in a real-world business model to improve farmer incomes, reduce dependency on external inputs and credit, and strengthen rural economies.

Background: Mrizi i Zanave (Fishtë, Albania) is an agritourism enterprise founded in 2007 that combines a farm-to-table restaurant, guest

accommodation, local processing of cheese, preserves, bread etc and regional supplier network of 400+ small fermers and artisans. It sources vegetables, dairy and meat from nearby farmers mostly through direct, long-term relationships using traditional, seasonal and low-input production methods. Instead of selling to supermarkets or wholesalers, farmers sell directly to Mrizi i Zanave at negotiated, stable prices. The enterprise then sells food through its restaurant and tourism services, capturing more value locally and distributing it back to producers. This model connects several economic and agroecological mechanisms as short supply chains (few or no intermediaries), economic diversification (farming + food processing + tourism), input reduction (local, traditional, low-input practices), collective local networks (many farmers supplying one local hub) and fairness & trust-based relations.

Activity 1: Mapping the Mrizi i Zanave Model

- **Duration**: 90–120 minutes
- **Format**: Group work + plenary discussion
- **Materials**: Case study text, flipchart or whiteboard, markers, internet (optional)

Step 1 – Understanding the model (20 min)

Teacher reviews the key elements with the class:

- Who are the actors? (farmers, Mrizi i Zanave, tourists, local community)
- What flows between them? (food, money, services, knowledge)
- How is this different from supermarket-based chains?

Step 2 – Mapping the value chain (30 min)

In small groups, students draw a simple diagram showing:

- Where food is produced
- How it reaches consumers

- Who gets paid at each step

They should highlight where intermediaries are avoided and where value is created (restaurant, tourism, processing).

Step 3 – Linking to economic challenges (30 min)

Groups answer on how does Mrizi i Zanave help address:

- Market concentration & low farm-gate prices?
- Dependence on external inputs and credit?
- Income instability for small farmers?

Students should connect the model to direct sales → higher farmer share, dtable demand → less need for risky credit and local sourcing → lower input dependence.

Step 4 – Local adaptation (20–30 min)

Each group chooses one environement (ex. A school canteen, a farm shop, a local market or a small agritourism site). They design a mini-version of the Mrizi i Zanave model:

- Who supplies food?
- Who buys it?
- How is value shared?
- What changes compared to supermarkets?

Groups present briefly.

Reflective questions

1. How does Mrizi i Zanave reduce farmers' dependence on external inputs and credit?

2. Why do short supply chains improve farmers' income compared to selling through supermarkets?

3.2 Resilient livelihoods through diversification and cooperative action (Bio-Distretto Cilento)

Which agroecology principles does this practice embrace?

Based on the HLPE 13 Principles of Agroecology this agroecological practice integrates the following principles:

1. Connectivity
2. Fairness
3. Economic diversification
4. Participation
5. Co-creation of knowledge

Bio-Distretto Cilento is a cooperative bio-district in southern Italy where dozens of small organic farms work together to reduce their dependence on supermarket-dominated value chains and to strengthen their position in the market (Pugliese, 2015a; Pugliese, 2015b). Farmers jointly market a basket of regional products—including vegetables, cheese, wine, olive oil, jams and chestnuts—under a shared territorial brand, allowing them to differentiate their products and gain visibility beyond what they could achieve individually. Around 30 farms in the district have invested in on-farm processing facilities, enabling them to transform raw agricultural products into higher-value foods such as preserves, cheese and olive oil (Pugliese, 2015a). In parallel, approximately 75% of production is sold through short supply channels, including farmers' markets, community buying groups, farm shops, schools, restaurants and online sales, rather than through large retailers (Pugliese, 2015b). The district has also diversified into agritourism, food festivals and farm visits, further expanding income sources and strengthening the link between food, territory and consumers.

This cooperative and territorially branded model directly addresses the challenges of market concentration and unequal value distribution. By

bypassing large retail chains and selling collectively under a shared label, farmers can negotiate better prices, retain control over branding and marketing, and capture a higher share of the final food value (Pugliese, 2015a; Pugliese, 2015b). Short supply chains further reduce the number of intermediaries, allowing more of the consumer price to remain within the farming community. The Bio-Distretto also helps reduce farmers' exposure to unfair trading practices and low farm-gate prices. Collective marketing and direct sales to consumers, schools and restaurants limit farmers' dependence on powerful buyers who often impose strict conditions, late payments or price pressures. Instead, the district relies on transparent and locally embedded trading relationships, which improve price stability and income predictability (Pugliese, 2015a). Overall, Bio-Distretto Cilento demonstrates how cooperation, short supply chains and value-added processing can strengthen small farmers' bargaining power, improve income stability and build resilient local food economies in the face of highly concentrated agri-food markets.

3.2.1 Description of Bio-Distretto Cilento

Bio-Distretto Cilento is a cooperative bio-district in southern Italy where dozens of small organic farms collaborate to regain control over their markets and incomes in a food system dominated by large retailers and intermediaries (Pugliese, 2015a; Pugliese, 2015b). Farmers jointly brand and market a basket of regional products—including organic vegetables, cheese, wine, olive oil, jams and chestnuts—under the Bio-Distretto Cilento label, allowing them to differentiate their products and act collectively in the market.

Around 30 farms in the district have developed on-farm processing facilities such as jam kitchens, dairies and olive mills, which enable them to sell value-added foods instead of low-priced raw commodities (Pugliese, 2015a). At the same time, approximately 75% of total production is sold through short supply chains including farmers' markets, community buying groups, farm shops, online platforms, and direct sales to schools and restaurants, rather than through supermarket chains (Pugliese, 2015b). The

district has also expanded into agro-tourism activities such as food festivals, farm trails and educational visits, strengthening links between producers, consumers and the territory.

These strategies directly address the challenges of market concentration and unequal value distribution. By selling collectively under a territorial brand and bypassing large retailers, farmers increase their bargaining power and retain a larger share of the final food price (Pugliese, 2015a; Pugliese, 2015b). Cooperative marketing reduces farmers' dependence on powerful buyers who normally dictate prices and conditions, while short supply chains keep more value within the local economy.

The Bio-Distretto also helps reduce exposure to unfair trading practices and low farm-gate prices. Joint marketing, direct sales and long-term relationships with schools, restaurants and consumers limit farmers' vulnerability to late payments, price squeezing and contract uncertainty typical of large retail chains (Pugliese, 2015a). In addition, knowledge-sharing among farmers on organic production, processing, tourism and marketing strengthens collective capacity and reinforces trust-based cooperation across the district.

3.2.2 Building a local bio-district: From theory to practice

Activity 1: Designing a Local Bio-District

Purpose: This activity helps learners understand how cooperation, short supply chains, territorial branding and value-added processing can help small farmers overcome market concentration, low farm-gate prices and unfair trading conditions. Learners apply the Bio-Distretto Cilento model to their own local or regional context.

Background for teachers and students: A bio-district (Bio-Distretto) is a territorial cooperation model in which farmers, processors, public institutions, tourism actors and consumers work together to promote

sustainable farming, local food systems and rural development. In the case of Bio-Distretto Cilento (Italy), small organic farms cooperate to jointly market and brand regional food products, sell mainly through short supply chains (markets, schools, restaurants, farm shops), process raw products locally (cheese, olive oil, jams, wine) and link food production to tourism and education. By doing so, farmers avoid supermarket-dominated value chains, negotiate collectively, and keep a larger share of the final food price.

Activity: Design a Bio-District for Your Region

- **Duration:** 120 minutes
- **Format:** Group work + presentations
- **Materials:** Flipchart or whiteboard, markers, internet access (optional), templates

Step 1 – Understanding the Bio-District model (20 minutes)

The teacher briefly reviews what a bio-district is, how Bio-Distretto Cilento works and why cooperation and short supply chains matter for small farmers. Key questions for learners:

- Who controls prices in supermarket chains?
- How does cooperation change farmers' bargaining power?

Step 2 – Identify local potential (30 minutes):

In groups, learners list:

- Local farmers, producers or food processors
- Typical regional products (vegetables, cheese, honey, fruit, wine, bread, etc.)
- Potential buyers (schools, markets, restaurants, tourist sites)

Groups think about which actors could realistically be part of a local bio-district.

Step 3 – Design the value chain (45 minutes)

Each group designs a simple mini bio-district, showing:

- How farmers cooperate
- How products are processed and sold
- Which short supply chains are used
- Where income is generated

They should explain how their model would:

- Reduce dependence on supermarkets
- Improve farmer incomes
- Keep value in the local economy

Step 4 – Present and discuss (25 minutes):

Groups present their bio-district concept. The class discusses:

- Which ideas seem most realistic
- Which would best help small farmers

Reflective questions

1. How does the Bio-Distretto model help farmers overcome low farm-gate prices and supermarket dominance?
2. Which elements of this model could realistically be applied in your local agricultural, training or community context?

3.3 Conclusions

Together, the two best practices presented in LU2, short and fair supply chains and diversification with cooperative action, offer practical and robust solutions to the economic challenges identified in LU1. Short supply chains redistribute value toward farmers and reduce dependence on volatile global markets. Diversification and cooperative action stabilize farm incomes, strengthen community networks, and reinforce agroecological resilience. Collectively, these practices embody agroecological principles by integrating economic fairness, community participation, ecological regeneration, and local empowerment.

Their incorporation into VET education ensures that learners are equipped with both theoretical and practical understanding of sustainable, resilient, and equitable farming models. These practices contribute meaningfully to the transformation of agri-food systems and prepare future practitioners to engage constructively with the complexities of economic sustainability in agriculture.

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POLITICAL DIMENSION

Introduction to the political dimension

The transition toward sustainable and democratic food systems in Europe depends not only on ecological innovation but also on the capacity to restructure governance, knowledge and participation across rural territories. Agroecology, as emphasised in Learning Unit 1 (Political Dimension), is inherently political as it challenges unequal power relations, policy biases and the exclusion of small-scale producers from decision-making. Building on this foundation, Learning Unit 2 moves from analysis to application. It introduces participatory and practice-based approaches that enable Vocational Education and Training (VET) providers to translate political principles into tangible learning experiences, strengthening their role as facilitators of collective action, equity and empowerment.

The two practices explored in this unit, i.e. Participatory Policy and Territorial Learning for Agroecological Governance and Farmer-Led Participatory Training for Agroecology, derive directly from the insights of LU1, applying them within real-world educational and governance contexts. The first, illustrated through the Andalusian Agroecology Hubs (Spain), demonstrates how education can diminish the divide amongst farmers, municipalities and policies, turning territorial learning into a participatory governance process. The second, inspired by the CIVAM Network (France), shows how farmer-led education decentralises authority and redefines agricultural knowledge as a shared social and political resource.

These practices affirm that education is not neutral but a form of governance in itself. When farmers, students and educators collaborate to design and deliver learning, they enact the very principles of food sovereignty and shared responsibility that underpin agroecology. Through participatory methods, VET providers can move beyond the transmission of

technical skills to cultivate civic, ethical and transformative competences, empowering learners to become active contributors to sustainable, just and inclusive territorial food systems across Europe.

Learning outcomes

After completing this unit, VET teachers should be able to:

- Understand agroecology as a political and governance process linked to participation, equity, and power relations.
- Integrate participatory agroecological practices into VET curricula through concrete, real-world teaching activities.
- Facilitate co-creation of knowledge involving farmers, learners, and local stakeholders.
- Design learning activities that connect education with territorial governance and European policy frameworks.

4. Participatory policy and territorial learning for agroecological governance (Andalusian Agroecology Hubs)

Which agroecology principles does this practice embrace?

Based on the HLPE 13 Principles of Agroecology this agroecological practice integrates the following principles:

1. Participation
2. Co-creation of knowledge
3. Land and Resource Governance
4. Connectivity
5. Fairness

The Andalusian Agroecology Hubs are territorial learning and governance platforms developed in southern Spain to support agroecological transitions at the local and regional level. Emerging from collaborations between VET centres, municipalities, farmer cooperatives, civil society organisations, and research institutions, these hubs aim to align agroecological practices with public policies and territorial development strategies. This practice directly builds on the Political Dimension developed in Learning Unit 1 (LU1), particularly the challenges of:

- Policy bias, where subsidies and regulatory systems favour industrial agriculture (Omar & Thorsøe, 2024);
- Limited representation, where small-scale farmers lack voice in decision-making; and
- Power concentration, where agribusiness shapes food and land policies.

Participatory policy and territorial learning counter structural imbalances by embedding inclusive, place-based governance and collective learning within educational and territorial systems. Grounded in the **HLPE agroecological principles**, this approach supports agroecological transition as a systemic socio-ecological transformation by promoting recycling and input reduction, improving soil and animal health, and enhancing biodiversity through locally adapted practices. It strengthens synergy and connectivity across territories by linking production, education, markets, and governance in circular feedback loops, while fostering economic diversification and resilience in rural economies. Central to this model is the co-creation of knowledge through horizontal, multi-actor participation involving farmers, educators, researchers, civil society, and public authorities, recognising scientific, experiential, and traditional knowledge equally. At the same time, it integrates social values and sustainable diets, advances fairness and inclusion, and reinforces participatory land and resource governance, ensuring that all stakeholders are legitimate contributors to learning, decision-making, and territorial development.

In Andalusia, these principles are operationalised through territorial learning spaces, namely physical and institutional platforms where agroecological practices, local policy innovation and education intersect. Such hubs show how EU sustainability policies (Green Deal, CAP 2023–2027 and the Rural Pact) can be localised through participatory processes that bridge policy with pedagogy.

4.1 Description of the Andalusian Agroecology Hub initiative

Participatory policy and territorial learning is implemented through structured, multi-actor processes that integrate education, governance, and agroecological practices. In Andalusia, territorial learning hubs operate as both physical meeting spaces and institutional platforms. They host workshops, field visits, policy dialogues and collaborative planning sessions focused on locally identified priorities such as biodiversity conservation, water management, land access and short food supply chains.

A defining feature of the initiative is its horizontal governance model. Decision-making regarding learning themes, activities, and outputs is shared among participating actors. VET institutions do not act as sole knowledge providers but as facilitators of collective inquiry, ensuring that educational activities remain closely connected to real governance questions and territorial needs.

4.1.1 Territorial agroecology policy lab (VET activity)

This VET activity operationalises Participatory Policy and Territorial Learning for Agroecological Governance through a pedagogical path composed of two complementary activities inspired by the Andalusian Agroecology Hubs. The activities are designed to be feasible in a school or training context and

progressively introduce learners to territorial governance, participation and power relations in food systems.

At the outset, the teacher introduces the territorial context (real or fictional) using a short narrative, map or visual prompt and explains the learning objectives, expected outputs and basic rules of participation. Learners are informed that they will assume the role of territorial actors involved in a collective decision-making process related to agroecological transition. Emphasis is placed on respectful dialogue, shared responsibility and the legitimacy of diverse perspectives.

Activity 1: From Theory to Governance Practice (Classroom-Based)

Learners work with a concrete territorial scenario inspired by the Andalusian context, such as a municipality seeking to revise its food procurement policy to support local agroecological producers. The scenario outlines the policy objective, existing constraints (e.g. budgetary limits, regulatory frameworks, competing interests) and the decision to be taken.

Students are divided into small groups, each representing a territorial actor (e.g. small-scale farmers, municipal authorities, school canteen managers, consumers or environmental NGOs). Each group receives a short role description detailing priorities, constraints and relative decision-making power. Groups prepare a brief position note identifying their key demands, potential alliances and acceptable compromises.

The classroom is then organised as a policy meeting. Groups present their positions and engage in a facilitated negotiation aimed at reaching a shared policy proposal. The teacher moderates the process, ensures balanced participation and introduces guiding questions to stimulate reflection on power relations, inclusion, representation and trade-offs. The activity concludes with a short debrief linking the simulation to agroecological principles and the role of participation in territorial governance.

Activity 2: Participatory Territorial Diagnosis (applied classroom activity)

Building on the simulation, learners conduct a simplified participatory territorial diagnosis inspired by methods used in the Andalusian Agroecology Hubs. Working in small groups with provided materials (maps, short texts, simplified data or case summaries), learners identify key food system actors, governance gaps and existing agroecological initiatives in a local or hypothetical territory.

Groups synthesise their analysis into a simple visual output (map, table or diagram) highlighting main challenges (e.g. land access, biodiversity loss, market inclusion) and opportunities for participatory governance and agroecological transition. During a plenary discussion, groups compare findings and reflect on how such diagnoses can inform local policy-making. The teacher facilitates reflection on the potential role of VET institutions as neutral spaces for dialogue and as facilitators of territorial learning processes.

Methodological notes

- **Total duration:** 8–12 hours (Activity 1: 4–6 hours; Activity 2: 4–6 hours)
- **Format:** Classroom-based group work, role play and applied analysis
- **Materials:** Territorial scenario description, actor role cards, policy brief template, maps or data sheets
- **Outputs:** Group position notes, negotiated policy proposal, territorial diagnosis map/table

Reflective questions

1. How does participatory territorial learning reshape power relations within food system governance?

2. What responsibilities and opportunities do VET institutions have as actors in territorial governance?

4.2 Farmer-Led participatory training for agroecology (CIVAM Network)

Which agroecology principles does this practice embrace?

Based on the HLPE 13 Principles of Agroecology this agroecological practice integrates the following principles:

1. Participation
2. Co-creation of Knowledge
3. Fairness
4. Connectivity
5. Land and Resource Governance

In many European countries, vocational education in agriculture has historically been shaped by top-down knowledge transfer, where experts or institutions dictate best practices to farmers.

Agroecology challenges this paradigm by recognising farmers as co-creators of knowledge and custodians of local ecosystems and social networks. This practice, Farmer-Led Participatory Training for Agroecology, positions education as a democratic process in which farmers, students and educators collaborate to co-design, implement and evaluate agroecological training.

The CIVAM Network (Centres d'Initiatives pour Valoriser l'Agriculture et le Milieu Rural) in France offers one of Europe's most successful models of such participatory training. Founded in the 1950s by rural farmers and educators, CIVAM has evolved into a national federation of over 130 local groups promoting sustainable agriculture, short supply chains and rural empowerment. Its approach embodies agroecology as both a technical

transition and a political process, reclaiming the agency of farmers in shaping knowledge, policy and rural development.

4.2.1 Description of the CIVAM Network

This practice builds directly on the Political Dimension of Learning Unit 1 by responding to several structural challenges embedded in contemporary agricultural education and governance systems. These include the concentration of power within agribusiness-driven and expert-led education models, policy frameworks that privilege industrial productivity and market competitiveness over social inclusion, and the persistent under-representation of small-scale farmers and rural citizens in both educational design and decision-making processes.

Farmer-Led Participatory Training for Agroecology offers a transformative counter-model that actively redistributes knowledge, responsibility and authority across the agricultural learning landscape. Rather than positioning farmers as recipients of externally defined expertise, this approach recognises them as legitimate knowledge holders and political actors. Education thus becomes a tool for empowerment and governance reform, enabling farmers, educators and learners to collectively shape learning objectives, influence decision-making processes and reclaim agency within food and knowledge systems.

In practice, Farmer-Led Participatory Training is organised around peer-to-peer learning, collective experimentation and shared reflection. Training initiatives are co-designed by farmers and educators, and in some contexts involve local policymakers or advisory bodies. Learning activities take place primarily on farms or within community spaces, reinforcing the principle that knowledge is generated through practice, interaction and situated experience rather than transmitted in a top-down manner. This spatial and social reconfiguration of learning shifts authority away from centralised institutions toward local communities.

Educators within this model adopt the role of facilitators rather than instructors. Their function is to support processes of reflection, documentation and synthesis, helping learners articulate experiential knowledge and connect it with scientific frameworks and policy contexts. Farmers host field demonstrations, workshops and discussion groups, sharing experiential knowledge while engaging in collective problem-solving with peers and learners. This redefinition of roles weakens traditional hierarchies between "experts" and practitioners and strengthens farmers' autonomy over both learning content and learning processes.

The impact of this approach lies in its capacity to decentralise knowledge governance and strengthen civic capacity within rural territories. As highlighted in Learning Unit 1, the concentration of power in expert-led and agribusiness-oriented knowledge systems undermines the autonomy of small producers. Farmer-Led Participatory Training translates this theoretical concern into a practical strategy by enabling farmers to influence not only what is taught, but why and for whom. Through co-created curricula, peer-to-peer learning and collective evaluation, education becomes a shared political resource rather than a technocratic service.

The CIVAM Network exemplifies this shift in practice. Each local CIVAM group operates according to democratic principles, collectively identifying training priorities based on community needs such as soil health, biodiversity restoration, short supply chains or gender equality in agriculture. These locally defined priorities are then communicated through regional and national CIVAM working groups that engage in dialogue with public authorities. In this way, knowledge produced through farmer-led learning feeds into policy discussions at multiple levels, ensuring that education contributes directly to governance and rural development debates.

Design of learning content within CIVAM reflects this participatory and political orientation. Farmers, educators and, in some cases, local

policymakers collaborate to define training needs. Topics are grounded in locally experienced challenges, including crop diversification, seed saving, local marketing strategies or renewable energy use. Training materials deliberately combine scientific research with traditional and experiential knowledge, emphasising adaptation to local conditions rather than standardised solutions.

Peer-to-peer learning is central to this process. Farmers host workshops, field demonstrations and roundtables within their own communities, creating learning environments based on trust, mutual recognition and shared experience. Learning is experiential, problem-based and collaborative, with students and teachers participating as equal learners who contribute analytical frameworks, facilitation skills and evaluation tools.

Finally, the outcomes of local training activities are documented and shared with regional or national authorities, supporting reflective policy dialogue and evidence-based advocacy. This process reinforces links between VET institutions, farmer networks and governance frameworks such as the Common Agricultural Policy and the Rural Pact. In doing so, CIVAM's model illustrates how education becomes a form of governance: a participatory process that shapes both individual learning trajectories and the public policies guiding agroecological and rural transformation.

4.2.2 Farmer-Led agroecology learning pathway (VET activity)

This VET activity translates Farmer-Led Participatory Training for Agroecology into a simple and feasible pedagogical path, inspired by the CIVAM model. It consists of two complementary classroom-based activities that progressively introduce learners to horizontal learning, shared authority and the political dimension of agricultural knowledge.

At the beginning of the pathway, the teacher introduces the CIVAM approach using short case descriptions, videos or testimonies from farmer networks. Learning objectives, expected outputs and basic rules of participation are clarified, emphasising equality between knowledge holders, collective responsibility and respectful dialogue.

Activity 1: Analysing Farmer-Led Knowledge Production (classroom-based)

Learners work in small groups using concrete examples of farmer-led agroecological practices documented by CIVAM or similar networks (e.g. soil regeneration, crop diversification, seed saving, short supply chains). Each group analyses one example by addressing three guiding questions:

What agroecological practice is being developed and why?

How is knowledge produced and shared (who teaches, who decides, how learning occurs)?

What power relations or governance aspects are visible (autonomy, collective action, links to policy)?

Groups summarise their analysis in a short table or poster. A plenary discussion follows, facilitated by the teacher, focusing on how farmer-led learning challenges traditional hierarchies between experts, teachers and farmers, and how education can function as a political and collective process.

Learning focus:

- Recognising farmers as knowledge holders and co-educators
- Understanding horizontal learning and power relations in education
- Linking agroecology with democracy and social inclusion

Activity 2: Simulating a Farmer-Led Training Session (applied classroom activity)

Building on the analysis, learners simulate a farmer-led training session inspired by CIVAM practices. Each group acts as a local farmer group and co-designs a short training outline on an agroecological topic of their choice.

Groups define:

- learning objectives,
- key discussion questions,
- methods for sharing experience and collective reflection,
- simple criteria for participatory evaluation (e.g. engagement, relevance, collaboration)

Groups present their training outlines to the class. The teacher facilitates reflection on how this model redistributes authority, supports empowerment and strengthens links between education and governance.

Learning focus:

- Co-creation of knowledge and shared responsibility
- Education as a tool for empowerment and governance
- Collective reflection and participatory evaluation

Methodological notes:

Total duration: 8–12 hours
(Activity 1: 4–6 hours; Activity 2: 4–6 hours)

Format: Classroom-based group work, analysis and simulation

Materials: CIVAM case descriptions, short videos or testimonies, analysis templates

Assessment: Integrated throughout activities through group work, reflection and peer discussion

Outputs: Practice analysis table/poster, co-designed farmer-led training outline

Reflective questions

1. How does farmer-led training challenge traditional hierarchies in agricultural education?
2. In what ways can participatory learning strengthen food sovereignty and rural empowerment?

4.3 Conclusions

The two practices presented in this unit (i.e., Participatory Policy and Territorial Learning for Agroecological Governance and Farmer-Led Participatory Training for Agroecology) demonstrate that the political transformation of food systems is inseparable from the transformation of education itself. Both practices reveal that sustainable farming cannot thrive within hierarchical structures of governance or learning. Instead, it requires horizontal, participatory relationships where farmers, students, educators and policymakers engage as equals in defining, producing and governing knowledge. When VET institutions become facilitators of this dialogue, they move beyond technical instruction to establishing critical awareness, collective intelligence and civic responsibility.

For VET trainers, these practices offer a concrete pathway to reimagine pedagogy as a democratic process. The Andalusian model illustrates how educators can create spaces where learning feeds directly into local policy. The CIVAM example, on the other hand, demonstrates how teachers can decentralise authority by integrating farmers as co-educators and by

validating experiential knowledge alongside scientific expertise. Both models encourage trainers to act not as transmitters of information but as curators of collective learning, capable of linking local realities with European policy frameworks.

For learners, these participatory frameworks provide more than technical skills; they nurture the capacity to question, negotiate and innovate within real governance contexts. Students exposed to such learning environments acquire a deep understanding of the interconnectedness between ecological sustainability, political participation and community well-being. They become active contributors to the co-creation of resilient food systems rather than passive observers of change. Thus , Learning Unit 2 invites both trainers and learners to see agroecology as a shared civic endeavour, a continuous process of collaboration that blends education, policy and practice in pursuit of a more just, inclusive and sustainable rural future.

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LEARNING UNIT 3

PARTICIPATORY AND COMMUNITY-ENGAGEMENT APPROACHES

Learning Unit 3 presents participatory and community-engagement approaches for integrating agroecology into Vocational Education and Training (VET). It shows how agroecological learning becomes more relevant and effective when educators, learners, farmers, and local actors co-create training content based on local needs and territorial priorities, following the SEEDS bottom-up approach. The unit introduces a set of practical participatory formats showing how they support co-design, experiential learning, and continuous improvement. It also emphasises the role of appropriate tools and monitoring practices to document stakeholder engagement, reflect on outcomes, and evaluate results in a structured way.

1. Introduction

The development of agroecological education within vocational education and training (VET) systems represents a transformative approach to aligning agricultural learning with sustainability, inclusiveness, and territorial resilience. Agroecology, as both a science and a set of practices, emphasizes ecological principles, social equity, and participatory innovation—making it a crucial framework for rethinking how future generations of farmers, educators, and rural entrepreneurs are trained. Integrating these principles into VET curricula not only supports environmental objectives such as soil regeneration, biodiversity conservation, and climate adaptation, but also strengthens rural economies and community cohesion.

The SEEDS project serves as a key initiative aimed at strengthening VET institutions' capacities to integrate agroecology into their curricula. Through collaborative partnerships among institutions from Italy, France, Albania, Kosovo, and Bosnia and Herzegovina, SEEDS seeks to bridge the gap between theoretical knowledge and practical, place-based learning. The project supports educators in designing innovative teaching modules, experiential field activities, and participatory learning spaces that respond to the diverse agroecological contexts of the participating countries. thus enabling students to better understand and apply the principles of agroecology.

This module focuses on practical activities, including a collaborative design phase implemented through workshops, focus groups, World Café sessions, the Village Vision Fair, living labs, and pilot testing, while also addressing integration and outcomes, target groups and stakeholders, as well as the tools and resources required for effective implementation.

Participatory and community engagement methodologies within agroecology ensure that educators, farmers, policymakers, and local actors co-create educational content grounded in real-world needs. The SEEDS framework builds on the LEADER method and the bottom-up principle of local empowerment. This approach promotes dialogue between multiple stakeholders—ranging from public authorities to civil society and rural communities—to develop contextually relevant, equitable, and practical educational content that reflects both global sustainability agendas and local socio-ecological realities (SEEDS Roadmap, 2025). In doing so, it highlights the importance of learning processes that are not only technically sound but also socially embedded, inclusive, and adaptable to local challenges and opportunities.

Ultimately, this module aims to deliver measurable learning outcomes, enabling participants to:

- Understand participatory and community-based methodologies for curriculum co-design.
- Facilitate SEEDS Labs and Living Labs using inclusive engagement tools.

- Apply co-creation and reflection methods for agroecological training.
- Evaluate stakeholder participation and impact using SEEDS M&E indicators.

The SEEDS methodology is based on co-creating knowledge and integrating agroecological principles into both formal and informal education. It brings together educators, farmers, and local communities so that theory and real-world practice inform each other.

The project combines desk research and field work. Desk research examined agroecological education systems, national and EU policies such as the Green Deal and CAP, and more than 30 good practice examples. This helped identify effective models, teaching methods, and ways for different actors to cooperate. Field work included interviews and focus groups with educators, farmers, young people, civil society, and local authorities, revealing key challenges and opportunities such as access to training, funding, inclusion, and rural entrepreneurship.

Based on this, SEEDS follows four main steps: assessing local needs, mapping and involving key stakeholders, jointly designing learning modules through participatory workshops, and testing and evaluating these modules in vocational education centers to improve their quality and impact.

2. The Collaborative Design phase

The Collaborative Design phase represents a core participatory process in the SEEDS methodology, integrating different modes of engagement to jointly develop and validate agroecological learning content. It connects research-based evidence from the SEEDS Manual with the structured roadmap phases—from needs assessment and design to pilot testing and evaluation.

2.1 Workshops

Workshops function as structured participatory learning environments which enable students to better understand how to apply agroecological principles. Each workshop begins with a review of the results of the participatory needs assessment and the mapping of local actors. Participants are guided through facilitated discussions to define learning outcomes linked to agroecological principles and sustainability competencies.

The implementation process follows a sequence of preparation, execution, and synthesis. During preparation, facilitators identify local challenges, gather case studies, and develop guiding materials based on the SEEDS Roadmap. The execution stage involves collaborative group sessions where participants analyze local agroecological practices and translate them into learning objectives. In the synthesis stage, facilitators consolidate all insights into a curriculum outline and share it through the SEEDS network for validation and cross-country comparison.

In continuation there is a list of possible workshop topics that can be applied:

Workshops on soil health and regenerative agriculture

Participants learn how to analyze soil, make compost, use green manures, mulching, and cover crops. On-site comparisons between healthy and degraded soil teach restoration techniques.

Workshops on agroforestry

Participants learn combinations of trees, shrubs, and crops (e.g., fruit trees + vegetables + bee forage), plot planning, soil and microclimate protection, and ways to increase biodiversity.

Workshops on seed conservation and propagation

Participants learn how to grow, store, and exchange local varieties of vegetables, grains, and fruit. These often include seed-swap events and seed banks.

Workshops on organic plant protection

Preparing natural remedies (nettle, comfrey, horsetail), biological pest control, promoting beneficial insects, and avoiding pesticides.

Workshops on integrated food production

Examples like “vegetable garden + chickens,” “orchard + grazing,” or “fish + vegetables (aquaponics)” teach how to connect systems to reduce costs and waste.

Workshops on water management in agriculture

Rainwater harvesting, swales, drip irrigation, protecting water sources, and preventing erosion.

Workshops on permaculture farm design

Learning how to design a farm to make the most of natural processes, sunlight, wind, and water.

Workshops on short food supply chains and direct sales

How farmers can sell directly: CSA models, farmers' markets, agro-tourism, online sales.

Workshops on biodiversity and pollinators

Creating flower strips, insect hotels, preserving meadows, and protecting wild species.

However, in fields such as agroecology, one can encounter numerous challenges that may affect the overall success of the workshops, and these are some of the most common:

- Resource constraints

  Some workshops require significant materials, tools, seeds, or access to land, which can be costly or difficult to organize, especially in rural or underfunded areas.

- Seasonal and climatic limitations

  Hands-on activities like planting, soil analysis, or water management

depend on weather conditions and growing seasons, which can limit scheduling and learning opportunities.

- Knowledge and skill gaps

  Participants may have varying levels of prior knowledge, making it challenging to balance content for beginners and advanced learners. Facilitators need to adapt quickly.

- Limited follow-up and continuity

  Without ongoing support or mentoring, the skills and knowledge gained may not be applied consistently after the workshop ends.

- Cultural and local context differences

  Some agroecological practices may not be suitable for all regions due to soil type, climate, or local farming traditions, limiting transferability.

- Engagement and participation challenges

  Motivating diverse participants (farmers, students, educators) to fully engage can be difficult, particularly if workshops are long or require intensive physical work.

- Access to funding and policy support

  Implementing some techniques, like water management systems or

permaculture design, may require external funding or alignment with local policies, which can be a barrier.

- Monitoring and evaluation difficulties
  Measuring the impact of practical skills workshops on actual farming practices or learning outcomes can be challenging, especially when results are long-term or gradual.

These risks can be mitigated through careful planning, flexible scheduling, and the use of locally available resources and partnerships. Adapting activities to seasonal conditions, participants' knowledge levels, and local contexts helps ensure relevance and inclusiveness. Continuous mentoring, participatory learning methods, alignment with policy frameworks, and clear monitoring and evaluation mechanisms further support sustained impact and effective implementation.

2.1.2. Focus groups

Focus groups provide an in-depth qualitative method to refine workshop findings and explore stakeholder perceptions in more detail.

The process begins with the identification of key informants and representatives of different stakeholder groups. Sessions are moderated using semi-structured questions to elicit critical feedback about the curriculum content, practical training components, and community engagement aspects. The results are then thematically analyzed, identifying common priorities, concerns, and opportunities for improvement.

These insights directly inform the adaptation of modules before pilot testing, ensuring that learning content aligns with both labor market needs and local socio-ecological contexts.

Possible challenges of focus groups:

- Participant bias – Some voices dominate while others stay silent, affecting the balance of feedback.
- Recruitment difficulties – Engaging a representative group of stakeholders can be challenging, especially in rural areas.
- Logistical and resource constraints – Organizing sessions, providing venues, and analyzing data can be time- and resource-intensive.
- Group dynamics issues – Conflicts or dominance by certain participants can limit open discussion and diversity of perspectives.
- Limited generalizability – Findings from small local groups may not reflect broader communities or contexts.

2.1.3. World Café sessions

World Café sessions foster multi-actor dialogue and participatory reflection throughout the design process. They are organized to bring together diverse participants—teachers, policymakers, NGOs, and students—to share perspectives and link curriculum development with broader agroecological transition goals.

Implementation begins with defining thematic discussion tables on issues such as sustainable land management, food sovereignty, and circular economy. Participants are seated in small groups of 4–6 people around

café-style tables. The atmosphere is informal, often with tablecloths, markers, and paper for notes, to encourage open conversation and creativity. The facilitator introduces 1–3 open-ended, thought-provoking questions related to the topic of interest. Questions are designed to encourage reflection, sharing of experiences, and brainstorming of new ideas. Participants discuss the questions in their small groups for a set period (usually 15–30 minutes). One person may act as the table host to take notes and summarize key points. After each discussion round, most participants move to a new table while the table host remains. This mixing allows ideas to cross-pollinate between groups, broadening perspectives and generating diverse insights. After several rounds, all participants gather to share and reflect on the key themes, insights, and patterns that emerged during discussions. This can be done through plenary sharing, visual mapping, or other creative documentation techniques. Facilitators compile the collected ideas into a summary of common priorities, innovative solutions, and actionable recommendations. These outputs can directly inform decision-making, curriculum design, or community projects.

This iterative format allows each stakeholder group to contribute equally while ensuring transparency in decision-making and knowledge exchange.

Great example of World Cafés is YPARD (Young Professionals for Agricultural Development) World Café sessions (YPARD, 08/01/2024), organized periodically throughout the year in different countries, often aligned with key agricultural or environmental events (e.g., World Soil Day, local agroecology fairs, or youth conferences). They typically take place in community centers,

training facilities, universities, or outdoor venues where small-group discussions can be held comfortably. The exact timing and location depend on local partners, participant availability, and the focus topic of each Café.

Possible challenges that can be encountered when organizing World Café sessions:

- Dominance of certain participants – Some voices may overshadow others, limiting diversity of input.
- Time constraints – Complex topics may require more discussion time than a typical session allows.
- Facilitation dependency – Skilled facilitators are crucial to guide discussions and capture insights effectively.
- Logistical challenges – Organizing tables, spaces, materials, and rotations can be resource-intensive.

2.1.4. Village Vision Fair

The Village Vision Fair, as described in the SEEDS Roadmap (2025), is a participatory foresight activity aimed at engaging community members in envisioning the future of agroecological education and rural territories. It combines elements of public consultation, creative facilitation, and participatory mapping to encourage dialogue among local actors and link education with sustainable territorial development.

The Village Vision Fair is carried out in three main phases. First, organizers identify and invite diverse participants from VET institutions, farming communities, local authorities, and civil society, ensuring balanced

representation, and prepare the venue with thematic stands, maps, and facilitation materials. During the event, participants rotate among the stands, discussing curriculum improvement, rural innovation, and future learning, sharing experiences, identifying challenges, and proposing solutions. Facilitators guide the conversations and collect key inputs, which are then consolidated and analyzed to produce recommendations for curriculum development, local strategies, and policy support. The results are shared with participants for feedback and validation, linking community aspirations with actionable steps for agroecological education and rural development.

Possible challenges in preparation and implementation of Village Vision Fairs can be:

- Limited representativeness – Some groups, such as marginalized farmers, women, or youth, may be underrepresented.
- Resource and logistical constraints – Organizing space, materials, and facilitation can be challenging, especially in rural areas.
- Dominance of certain participants – More vocal individuals may overshadow quieter participants, reducing diversity of input.
- Time limitations – Complex topics may require more discussion than a single event allows.
- Follow-up challenges – Recommendations and ideas may not be implemented without structured monitoring and support.

2.1.5 Living Labs

Living Labs serve as real-life learning and experimentation spaces where learners, educators, and farmers test agroecological practices within authentic settings. They embody the principles of co-learning and co-innovation, emphasizing continuous feedback and joint problem-solving.

Implementation involves selecting suitable pilot locations—such as VET school gardens or local farms—where the curriculum is tested through hands-on activities. Each lab includes a co-design stage, where facilitators and participants agree on the scope of activities (e.g., composting systems, soil restoration, biodiversity monitoring), followed by implementation and reflection sessions. Data from these experiments are collected through participatory monitoring templates. Findings are discussed collectively and documented in SEEDS evaluation reports to refine both pedagogy and technical content.

Among examples of successful living labs is Agroecology Living Lab is Flanders (LLAEBIO) which brings together farmers (conventional and organic), advisors, processors, consumers, researchers, NGOs, and policymakers. Stakeholders collaboratively define priorities, organize participatory working groups, and choose tools such as field visits and webinars to support innovation and knowledge exchange in agroecology and organic farming. (Agroecology Partnership, n.d.)

Croatia also has great activities, such as the Interreg *Bioeco-Up* project, in which a Living Lab workshop at Stanka Ožanić Agricultural, Food and Veterinary School tested bio-based products (e.g., apple energy bars from

unused apple chips) with users who evaluated usability, environmental impact, and market potential through questionnaires and interactive discussions (BIOECO-UP, 02/12/2024) or Podravlje Permaculture Living Lab, a permaculture and sustainable agriculture site dedicated to regenerative farming, biodiversity, and community education. It functions as a co-creation hub where practitioners, youth, and local residents share knowledge, co-design activities, and apply citizen science approaches in real outdoor settings. (Marušić, 01/2025)

Same as other practical activities, Living Labs also can face challenges such as:

- Complex coordination – Managing multiple stakeholders with different roles and priorities can be difficult.
- Resource intensity – Field trials, workshops, and real-world testing require significant time, funding, and materials.
- Stakeholder engagement – Sustaining active participation over time, especially from farmers or community members, can be challenging.
- Scalability – Solutions developed in one local context may not easily transfer to other regions or communities.
- Conflict of interests – Diverging goals and priorities among participants can slow down co-creation and decision-making.

2.1.6. Pilot testing

Pilot testing represents the culmination of the collaborative design phase. It validates the developed modules within selected VET institutions, enabling the evaluation of their pedagogical effectiveness and practical relevance.

Implementation unfolds through a structured sequence: curriculum prototypes are introduced into partner schools, where students and teachers apply them during real or simulated learning activities (e.g., fieldwork, practical sessions on farms, or laboratory exercises). Continuous observation and participatory evaluation are carried out using SEEDS monitoring and evaluation indicators. Feedback is gathered from both learners and trainers through surveys and focus groups to assess clarity, applicability, and impact. The data collected are synthesized into evaluation reports that guide the final adaptation and scaling-up of the curriculum across the SEEDS network.

Possible problems and challenges when it comes to pilot testing may be:

- Limited sample size – Results from a small number of schools or classes may not reflect all learner needs.
- Resource constraints – Lack of materials, field plots, or facilitator support can affect implementation.
- Time limitations – Students and teachers may have insufficient time for practical activities.
- Variability in teaching quality – Differences in experience with agroecology can influence outcomes.
- Resistance to change – Some participants may be hesitant to adopt new methods or practices.

2.2. Integration and outcomes

The organization of workshops, focus groups, living labs, world café sessions, and pilot testing ensures an iterative, local-based, and community-driven curriculum development cycle. Each component contributes uniquely: workshops initiate co-creation; focus groups deepen understanding and validation; living labs ground theoretical content in practice; world cafés connect education with territorial dialogue; and pilot testing verifies effectiveness and sustainability.

Together, these processes reinforce the commitment to participatory and context-sensitive vocational education. The resulting curricula not only align with EU policies such as the Green Deal and CAP eco-schemes but also strengthen territorial resilience, stakeholder ownership, and long-term community learning ecosystems (SEEDS Manual, 2025; SEEDS Roadmap, 2025).

This participatory process ensures that the resulting curricula and learning modules are not only academically robust but also socially anchored and context-responsive. The LEADER-inspired framework (SEEDS Roadmap, 2025) promotes a strong sense of ownership among participants, encouraging them to act as co-creators rather than passive recipients of knowledge. By emphasizing territorial approaches, the methodology ensures that learning processes reflect the specific ecological, cultural, and economic conditions of each region—supporting the emergence of resilient,

place-based agroecological systems and the empowerment of rural communities.

2.3. Target groups/Stakeholders/Actors

The SEEDS Roadmap identifies four main stakeholder groups as central to the participatory development of agroecological curricula within vocational education and training (VET): farmers, VET providers, community leaders, and students. Each group plays a distinct yet interconnected role in ensuring that the curriculum reflects local realities, promotes sustainability, and supports the transition toward agroecology through inclusive and practice-oriented learning.

Farmers are key actors because they represent the practical foundation of agroecological transformation. They bring field-based knowledge and experience that make the curriculum grounded in real agricultural contexts. Through participation in living labs, workshops, and focus groups, farmers contribute to identifying real challenges and testing innovative solutions. Their involvement ensures that the learning process integrates practical and context-specific knowledge, bridging the gap between theory and practice while enhancing the relevance of training to rural and farming realities.

VET providers, including schools, trainers, and educational institutions, act as the main implementers of the agroecological curriculum. They transform knowledge from research and field experience into structured teaching materials. Their participation in workshops and co-design sessions helps

align curriculum content with both educational standards and labor market needs. They require innovative pedagogies and relevant materials to support green skills development. By leading the integration of agroecology within formal programs, VET providers ensure that education remains up to date, applicable, and adaptable.

Community leaders, such as representatives of civil society, local authorities, and rural organizations, play a crucial role in ensuring legitimacy, inclusiveness, and territorial relevance. They connect the curriculum design process with local development strategies and policies, in line with the LEADER approach. Their participation guarantees that the perspectives of marginalized groups, including women and youth, are represented and that the curriculum aligns with local governance and sustainability priorities. They also strengthen the link between educational institutions and the communities they serve.

Students are the primary beneficiaries of the curriculum, and their feedback and level of engagement in agroecological school activities are crucial indicators for continuously refining and improving both the curriculum and teaching approaches. Their active engagement ensures that learning is practical, experiential, and relevant to their personal and professional aspirations. Through participation in living labs, co-design activities, and pilot testing, students experiment, provide feedback, and help shape the learning content. This involvement builds their green competencies, confidence, and entrepreneurial thinking—skills essential for employability and active participation in sustainable local economies.

Together, these four stakeholder groups embody the participatory and systemic vision of the SEEDS project. Their interaction ensures that the curriculum is scientifically informed, socially inclusive, and environmentally sustainable, reflecting a true bottom-up approach to agroecological education.

2.4. Tools and resources

The implementation of participatory methodologies in the SEEDS project requires a combination of physical and digital tools that support collaboration, knowledge exchange, and experiential learning. These tools are used throughout the different phases of curriculum design, from stakeholder engagement and co-creation to pilot testing and evaluation, ensuring that the process remains inclusive, practical, and adaptable across contexts.

Physical tools play an essential role in facilitating face-to-face interaction and experiential learning. Workshops and living labs rely on tangible materials such as flipcharts, posters, and whiteboards to organize group discussions, record ideas, and visualize collective thinking. Printed handouts, questionnaires, and feedback forms are used to collect participant input and reflections during participatory sessions. For outdoor and field-based learning, demonstration plots, school gardens, and community farms provide spaces where participants can test agroecological practices, conduct observations, and carry out experiments. Simple field instruments—such as soil kits, plant identification guides, and composting tools—help link

theory with real-life applications. Additionally, exhibitions or community fairs can use display tables, information panels, and printed visual materials to present outcomes to a wider public, promoting transparency and engagement.

Digital tools are equally important in supporting communication, coordination, and knowledge sharing. Online platforms such as Google Drive and Moodle allow for sharing of draft materials, and storage of curriculum documents and reports. Video conferencing tools such as Zoom and Microsoft Teams enable meetings, participatory workshops, and capacity-building sessions in a virtual setting. Digital learning environments host online modules, case studies, and reflection journals, while surveys and feedback forms help gather structured input from participants even after in-person activities, ensuring continuous dialogue and improvement.

In addition to these, multimedia tools—such as short instructional videos, digital infographics, and recorded training sessions—support blended learning approaches by making content accessible and engaging. Visual storytelling and photo documentation help record participatory processes and highlight the human dimension of agroecological education.

Together, these physical and digital tools create an environment where participatory methodologies can be effectively implemented. They enable interactive learning, collective reflection, and the co-creation of knowledge among farmers, educators, students, and community actors. By combining practical field tools with modern digital platforms, it is ensured that

agroecological education remains dynamic, accessible, and responsive to both local realities and international collaboration.

Stakeholder and community engagement are essential components of the SEEDS curriculum implementation process. Local actors such as farmers, seed keepers, agroecology activists, and municipal representatives are actively involved as guest lecturers and facilitators, ensuring that learning remains grounded in real community experience. Open community days are organized to showcase student projects and foster intergenerational dialogue, while continuous feedback from stakeholders—collected through surveys and focus groups—helps refine the delivery of the curriculum.

At the same time, VET providers are responsible for documenting and reporting progress through work logs, reflective journals, and competency checklists. They regularly share results, best practices, and challenges with the SEEDS network and participate in cross-border learning exchanges. This collaborative approach ensures transparency, mutual learning, and the ongoing improvement of agroecological education.

3. Reflection

The SEEDS Roadmap identifies several key challenges in integrating agroecology into VET systems and proposes practical and strategic solutions to address them. These challenges range from structural and institutional barriers to gaps in teaching practices and infrastructure, and they reflect both local and systemic issues across partner countries.

One of the main challenges is the limited integration of agroecology into existing VET curricula. In most SEEDS countries, especially those in the Western Balkans, agroecology is not yet recognized as a distinct discipline. It is often included indirectly through subjects such as organic farming or sustainable development, which rarely capture its full ecological, social, and economic dimensions. To address this, the Roadmap proposes the development of new theoretical modules that reflect the holistic nature of agroecology, as well as the participatory revision of existing curricula. By engaging teachers, farmers, and students in co-creation, the process ensures that the content becomes more context-relevant and better aligned with sustainability goals.

Another critical issue concerns the lack of practical learning opportunities and infrastructure. Many VET institutions lack access to demonstration farms, laboratories, and other spaces for hands-on training. Without such facilities, students struggle to connect theory to real-life agricultural practices. The Roadmap therefore recommends the creation of school gardens, composting areas, and seed-saving corners, as well as partnerships with local farms and cooperatives to enable field-based learning. The establishment of SEEDS Living Labs is particularly emphasized as a long-term mechanism for experimentation, collaboration, and community engagement.

Teacher training also emerges as a central challenge. Many educators lack both the technical understanding of agroecology and the methodological skills to apply participatory teaching approaches. To overcome this, the

project suggests organizing Training of Trainers (ToT) sessions that focus on agroecological principles, participatory pedagogy, and reflective practice. Farmers, researchers, and civil society actors are encouraged to participate as co-trainers to ensure that learning remains grounded in local knowledge and practice. Continuous professional development and peer-learning networks are also promoted as a means to build long-term capacity among VET educators.

The Roadmap highlights that weak cooperation between educational institutions and local communities further limits the effectiveness of agroecological education. VET centers often operate in isolation, detached from the real socio-economic context of the rural areas they serve. To strengthen this connection, the document recommends involving community actors—farmers, local authorities, and NGOs—in curriculum delivery, organizing open days and fairs, and establishing feedback mechanisms through surveys and focus groups. This ensures that community voices are reflected in educational content and that learning outcomes are relevant to local needs.

Institutional and policy barriers represent another structural challenge. In several Western Balkan countries, agricultural and educational policies still prioritize intensive, input-based production models, while agroecology lacks formal recognition. The Roadmap calls for stronger policy alignment, including the official validation of new modules by ministries of education and agriculture. It also advocates linking local educational initiatives with

the LEADER approach and promoting regional cooperation through cross-border training and exchange programs within the SEEDS network.

Resource limitations and dependence on short-term donor projects pose additional risks to the sustainability of these initiatives. Many pilot programs lose momentum after funding cycles end. To ensure continuity, the Roadmap suggests building long-term partnerships among schools, municipalities, and the private sector, and accessing EU funding mechanisms such as the Common Agricultural Policy (CAP). Establishing a strong monitoring and evaluation (M&E) system helps to document impact and secure ongoing investment.

The lack of systematic monitoring is itself a challenge. Without proper evaluation, it is difficult to measure progress or adapt learning approaches. The SEEDS M&E framework proposes clear indicators—such as the number of laboratories, trained teachers, and participating students—combined with qualitative insights drawn from reflections, field stories, and case studies.

Finally, broader environmental and social pressures such as climate change, rural depopulation, and migration undermine the resilience of rural areas. The Roadmap addresses these through curriculum content that focuses on climate adaptation, sustainable resource management, and community resilience. Encouraging the participation of youth and women, and supporting short supply chains and local food systems, are seen as ways to strengthen both livelihoods and ecological sustainability.

In summary, the SEEDS Roadmap recognizes that the transition to agroecological education requires both bottom-up and systemic change. It combines concrete measures—like the creation of living labs and teacher training—with strategic policy alignment, cross-sector cooperation, and inclusive evaluation. Through these complementary approaches, the project seeks to ensure that agroecological learning becomes a living, evolving process, rooted in local realities yet aligned with broader European sustainability objectives.

4. Conclusions

The implementation of participatory and community-based approaches within the SEEDS project demonstrates that agroecological education can be successfully integrated into VET systems when learning processes are rooted in local realities, grounded in multi-actor collaboration, and supported by cycles of co-creation. The combined use of workshops, focus groups, living labs, world café sessions, and pilot testing shows that effective curriculum development cannot rely solely on theoretical frameworks; it must also draw on experiential learning, stakeholder dialogue, and continuous adaptation. This holistic approach strengthens both the pedagogical relevance of the curriculum and the sense of ownership among farmers, educators, students, and community organizations.

Findings indicate that the shift toward agroecology requires addressing structural challenges such as limited institutional recognition, insufficient

practical infrastructure, and gaps in teacher training. Through collaborative design and transnational exchange, SEEDS partners have demonstrated viable pathways for overcoming these barriers—ranging from the creation of school gardens and living labs to the development of Training of Trainers programs that enhance participatory facilitation skills. The process has also underscored the importance of linking local educational practices with wider territorial development strategies, ensuring that VET institutions serve as active contributors to rural resilience and sustainability.

A key outcome of the module is the establishment of dynamic learning ecosystems where learners are empowered to act as co-creators of knowledge rather than passive recipients. By integrating agroecological principles with inclusive engagement tools, the module supports the development of green competencies, entrepreneurial thinking, and community-oriented problem-solving—skills essential for navigating ecological transition and strengthening local food systems. The emphasis on monitoring and evaluation further ensures that innovations introduced through SEEDS remain evidence-based, scalable, and adaptable to diverse contexts. Overall, this learning unit suggests that participatory methodologies are not an optional addition to agroecological education, they are a prerequisite for meaningful transformation. By aligning pedagogy with the values of sustainability, cooperation, and territorial cohesion, SEEDS contributes to the emergence of VET practices that are both future-oriented and deeply rooted in local socio-ecological landscapes. The collaborative processes developed through the project lay a foundation for long-term

institutional change, fostering educational models that can support resilient rural communities and strengthen Europe's transition toward a more sustainable and equitable agrifood system.

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