

Agroecological Living Labs as entry points for transition towards sustainable food systems: a novel framework for the evaluation of living labs at different scales

N. Rastorgueva, C.F. Bassignana, E. Angarita, A. Fasso, J. Hassink, M. Goris, U. Schmutz, J. Conroy, S. Dinç, A. Wezel & P. Migliorini

To cite this article: N. Rastorgueva, C.F. Bassignana, E. Angarita, A. Fasso, J. Hassink, M. Goris, U. Schmutz, J. Conroy, S. Dinç, A. Wezel & P. Migliorini (17 Mar 2025): Agroecological Living Labs as entry points for transition towards sustainable food systems: a novel framework for the evaluation of living labs at different scales, *Agroecology and Sustainable Food Systems*, DOI: [10.1080/21683565.2025.2477215](https://doi.org/10.1080/21683565.2025.2477215)

To link to this article: <https://doi.org/10.1080/21683565.2025.2477215>



© 2025 The Author(s). Published with license by Taylor & Francis Group, LLC.



Published online: 17 Mar 2025.



Submit your article to this journal [↗](#)



Article views: 879













View related articles [↗](#)



View Crossmark data [↗](#)

Agroecological Living Labs as entry points for transition towards sustainable food systems: a novel framework for the evaluation of living labs at different scales

N. Rastorgueva ^a, C.F. Bassignana ^a, E. Angarita ^b, A. Fasso^a, J. Hassink ^c, M. Goris ^c, U. Schmutz ^d, J. Conroy ^d, S. Dinç ^e, A. Wezel ^f, and P. Migliorini ^a

^aAgroecology Group, University of Gastronomic Science, Pollenzo, Italy; ^bAgroecology Group, Thuenen Institute of Biodiversity, Braunschweig, Germany; ^cLand Use and Food Security, Wageningen University and Research; ^dCentre for Agroecology, Water and Resilience, Coventry University, UK; ^eAgroecology Group, Istanbul Technical University, Istanbul, Türkiye; ^fAgroecology and Environment research unit, ISARA, Lyon, France

ABSTRACT

Agroecological transitions are vital for creating resilient and sustainable food systems, as they balance ecological processes with social dynamics. Stakeholder engagement and collective innovation are essential drivers of these transitions and Agroecological Living Labs (ALLs) have emerged as promising platforms for inclusive, multi-actor collaboration that foster co-creation and knowledge sharing. This study introduces the ME4ALL framework – a structured tool designed to help ALLs assess their activities and impacts, align their efforts with the 13 principles of agroecology, and support participants in reflecting on their strategies, evaluating interactions, and identifying areas for improvement. Focusing on three ALLs located in Italy, the Netherlands, and the United Kingdom, our evaluation reveals that while ALL activities are linked to multiple agroecological principles, the degree of alignment is shaped more by national context than by scale. Notably, access to funding emerges as a scale-dependent factor, and political impacts – such as policy adjustments and enhanced dialogue with policymakers – are more pronounced at national and regional levels. By advancing our understanding of ALLs – their similarities, diversity and roles in agroecological transitions – this study offers both theoretical and practical contributions, providing a framework for comparing ALLs across local, regional and national scales.

KEYWORDS

Agroecology; sustainable cities and territories; impact evaluation; agroecological principles; co-creation of knowledges; social innovation

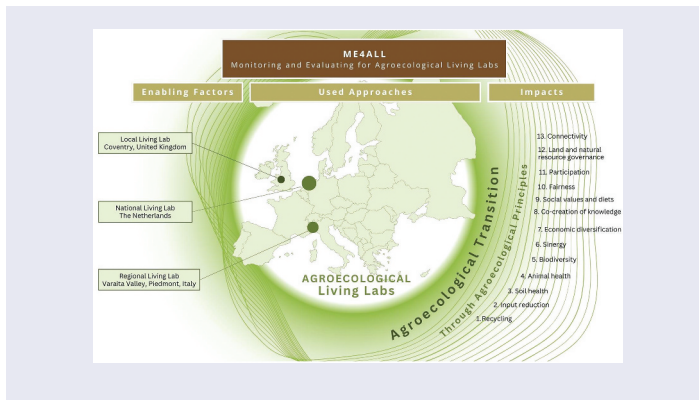
SUSTAINABLE DEVELOPMENT GOALS

SDG 11: Sustainable cities and communities; SDG 13: Climate action; SDG 15: Life on land

CONTACT C.F. Bassignana  c.bassignana@unisg.it  University of Gastronomic Science, Piazza Vittorio Emanuele, 9 – Località Pollenzo, Bra, Cuneo 12042, Italy

© 2025 The Author(s). Published with license by Taylor & Francis Group, LLC.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.



1. Introduction

The current global challenges, including climate change, biodiversity loss, environmental degradation, malnutrition, and food security, underscore the urgent need for substantial changes in developing sustainable agriculture and food systems (Bohan et al. 2022; European Environment Agency 2021; HLPE 2019). Amid these challenges, agroecological approaches emerge as essential prerequisites for sustainable food production and systems, advocating for transitions toward sustainability (IPES-Food 2016; Wezel et al. 2018). While there has been some development in agroecology and an increasing number of studies exploring its facets (Nicholls and Altieri 2018; Wezel et al. 2018), a gap remains in comprehensively understanding transition processes involving all actors in research, innovation, learning, and knowledge creation domains and platforms (El Bilali 2019; Hvitsand et al. 2022; Köhler et al. 2019).

Integral to socioecological systems, agroecological transitions navigate the interplay between ecological processes and social dynamics, shaping the overall sustainability of agricultural landscapes. Stakeholder involvement is pivotal, bringing together diverse actors such as farmers, researchers, policymakers and local communities. Inclusive engagement and creation of coalitions can rapidly foster dissemination of agroecology (Nicholls and Altieri 2018) including facilitating collective decision-making, leveraging the expertise of various stakeholders, aligning transitions with local needs, enhancing biodiversity, promoting food sovereignty, and contributing to increased resilience and adaptability of ecosystems and communities (Tittonell 2020).

However, it is notable that agroecological transitions have predominantly relied on individual producers, potentially exposing them to economic, social, and agricultural vulnerabilities and uncertainties (Tittonell 2020). Addressing these challenges is crucial in ensuring the resilience and success of agroecological transitions on a broader scale, even though agroecology academics do not

provide close definitions of what a sustainable agri-food system should be (Gonzalez De Molina and Lopez-Garcia 2021).

According to studies by Hill and MacRae (1995) and Gliessman (2016), a five-level transition framework to describe and assess food system transitions toward agroecology includes (1) Level 1: increase the efficiency of industrial and conventional practices in order to reduce the use and consumption of costly, scarce, or environmentally damaging inputs; (2) Level 2: substitute industrial/conventional inputs and practices with alternative more sustainable ones; (3) Level 3: re-designing the agroecosystem so that it functions on the basis of a new set of ecological processes; (4) Level 4: reestablish a more direct connection between those who grow our food and those who consume it; and (5) Level 5: build a new global food system, based on equity, participation, democracy, and justice, that is not only sustainable but helps restore and protects earth's life support systems upon which we all depend.

Innovative systems and spaces for the stakeholders' interaction are needed for supporting farmers, rural communities, agricultural associations, policy makers, and other food system stakeholders throughout agroecological transitions, in terms of knowledge sharing and co-creation, facilitation of decision-making, and dialogue between all actors.

Living laboratories (LLs) are gaining more prominence as an approach to strengthen transitions toward agricultural sustainability by promoting various innovations, interdisciplinarity, and actors' participation (ALL-Ready 2022; McPhee et al. 2021). In a broad sense, LLs are defined as a structured user involvement in the innovation process (Schuurman et al. 2013). Rastorgueva et al. (2022) defined them as practice-driven organizations that facilitate real-life environments or arenas where collaborative innovations processes can be studied and experimented with, and new solutions developed. The LLs could be considered as a specific type of operational group, created at different scales and for different initiatives. The operational group approach aims to make the best use of different types of knowledge and skills (e.g., practical, scientific, entrepreneurial, organizational) with an interactive and multi-actor approach, involving, for example, farmers, advisors, researchers, and businesses to build and test new ideas, find focused solutions for specific issues or develop concrete opportunities (Grand 2018),

The LLs share similarities with operational groups; however, they are expected to have a more focused approach on triggering and supporting transformative change in the socioecological systems, crucial for the foundation for achieve agroecological transitions (Bouwma et al. 2022; Gamache et al. 2020; García-Llorente et al. 2019; McPhee et al. 2021).

Numerous studies have focused on agroecosystem living labs which are defined or described as transdisciplinary approaches which involve farmers, researchers and all other actors of the agri-food sector in co-learning, co-design, monitoring, and evaluation to develop innovative solutions aimed at

increasing sustainability and resilience (Gamache et al. 2020; Kobzeva and Knickel 2018; 2019; McPhee et al. 2021), and as a created experimental environment in real-life spaces not only for technological but also for new organizational and institutional forms (Ingram 2015; Nevens et al. 2013; Turner et al. 2020). Despite several studies mentioning agroecological LLs as promising frameworks and approaches toward transformative change in agroecosystems and food systems, there is a lack of a common definition of agroecological LLs and of their defining features (Bouwma et al. 2022; 2019; McPhee et al. 2021).

Agroecological living labs (ALLs) are increasingly recognized as effective platforms for collaborative innovation and sustainable agricultural transformation. Reflecting this potential, the EU Agroecology Partnership¹ – an ambitious initiative funded by Horizon Europe and member states – actively supports the ALL approach by prioritizing the creation of a European Network of Agroecological Living Labs. The Partnership's strategy addresses key knowledge gaps in agroecology by promoting open innovation, user-driven research, and place-based methodologies that reflect the EU's diverse territorial contexts. By linking these participatory living labs with dedicated research infrastructures, the initiative enhances knowledge sharing and fosters multi-stakeholder co-creation of agroecological solutions at local, regional, and national levels.

The growing interest in implementing LLs as a strategy to accelerate the transformation of systems has generated the need to understand, contextualize and develop new approaches, to monitor and evaluate LLs (Bronson, Devkota, and Nguyen 2021; Greve et al. 2021; Schuurman and Leminen 2021). However, it is necessary to consider the features of LLs in order to design appropriate frameworks, for example, plurality of actors, their participation in co-creation activities, the real-life context of operation, the focus on innovation activities, and the iterative character of constant learning (Bronson, Devkota, and Nguyen 2021; Hossain, Leminen, and Westerlund 2019). This could determine the type of methods, tools, and approaches to be used.

Several authors came up with different scales and levels of interpretations, dimensions, and applications of LLs such as the macro, regional, and micro scales (Schuurman 2015), or differences of LLs in scales of policy, strategy and action (Budweg et al. 2011; Gamache et al. 2020; García-Llorente et al. 2019; Hvitsand et al. 2022; 2019; McPhee et al. 2021). Studies which have discussed an application dimension beyond the theoretical discussions have used LLs on a regional scale in the context of wider socioeconomic development (Feche et al., 2021; Hvitsand et al. 2022; Kobzeva and Knickel 2018; Peña-Torres and Reina-Rozo 2022), as well as on a local scale in order to reactivate the agricultural sector in the urban area and its periphery (García-Llorente et al. 2019). However, there is not yet a generally accepted and used comparative evaluation method for

assessing factors contributing to the agroecological transitions in agri-food systems (Bouwma et al. 2022). Furthermore, no studies have yet employed a cross-scale approach to compare LLs at different scales or to evaluate their actual impact in terms of innovation processes, effective adoption, and sustainable changes (McPhee et al. 2021).

This study aims to address these two existing gaps by providing a structured tool for agroecological living labs (ALLs) to assess their activities and impacts, align their efforts with the 13 principles of agroecology, and support participants in reflecting on strategies, evaluating interactions, and identifying areas for improvement. In doing so, it offers both theoretical and practical contributions by advancing our understanding of ALLs – their similarities, diversity, and role in agroecological transitions – and by providing a framework for comparing ALLs across local, regional, and national scales. The primary objective of this study is to conduct a cross-scale comparison of agroecological living labs (ALLs), evaluating their performance and impacts, and to determine their contributions to agroecological transitions across local, regional, and national territories. The study involved three main steps: (i) performing a comparative analysis of three ALLs and defining their roles in agroecological transitions; (ii) assessing the economic, social, environmental, political, and organizational impacts as perceived by the participants of the three ALLs; and (iii) refining the definition of ALLs. The 13 principles of agroecology (HLPE 2019; Wezel et al. 2020) provided a framework for describing the development of ALLs and their contributions to and connections with the agroecological transition.

2. Materials and methods

2.1. Conceptual framework for the analysis of agroecological living labs

The present analysis of ALLs is based on a theoretical model that links different elements affecting activity of the ALLs such as enabling factors, components, impacts, and approaches (Figure 1). The central part of the model is a conceptual framework developed for the analysis of the ALLs provided in this paper, named “Monitoring and evaluation for agroecological living laboratories” (ME4ALL). It contains different elements that play specific roles in the development of the ALLs toward their agroecological transition.

Over a two-year period, the ME4ALL framework was developed through an extensive literature review and continuously refined via an iterative process based on systematic observations and shared experiences with participants in the three ALLs, in which our research teams actively participated.

According to Tiftonell (2020), agroecological transitions have predominantly relied on individual producers, which may expose them to economic, social, and agricultural vulnerabilities and uncertainties. To analyze the

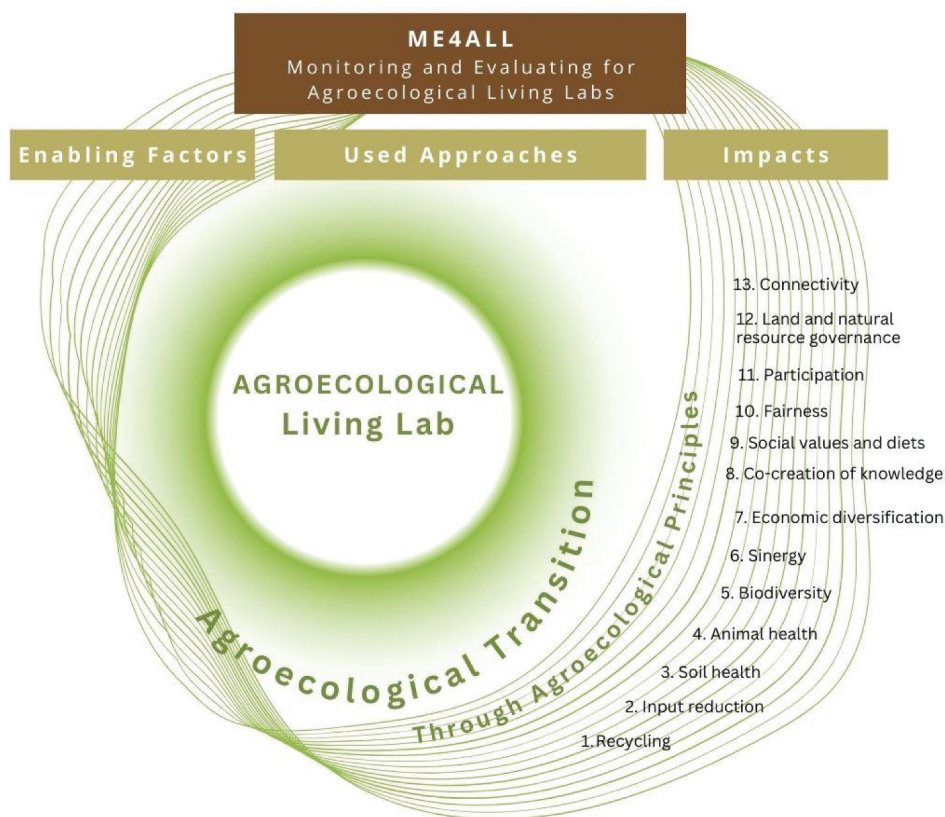


Figure 1. Theoretical model for analysis of agroecological living labs and their contribution to agroecological transition levels.

collaborative efforts of individual producers (e.g., ALL as a network) aimed at fostering agroecological transition, ME4ALL includes a hierarchical structure of indicators and descriptors used for collecting relevant information. The collected textual data is then utilized for further qualitative analysis based on coding the text across 13 agroecological principles. The results of the coding demonstrate the connection of each Living Lab (LL) with the agroecological principles.

Agroecological transitions are described as a series of emerging innovations (FAO 2019) or as the gradual replacement of conventional systems with new sustainable ones (Griffon 2013). These definitions link agroecological transition to the concept of change. In the theoretical model developed in this paper, all potential changes demonstrated by the ALLs are considered in the analysis of impacts (the last block of Figure 1).

The first element of the model is the enabling factors. These are used to understand prerequisites of the creation of ALLs. The main enabling factors for the ALLs selected for the present study are based on elements extracted

from Dorninger et al. (2020), Geels and Schot (2007) and Linnér and Wibeck (2021). Enabling factors include (I) trigger events or external pressures, constraints to agroecological transitions that need to be addressed, (II) sense of urgency to implement changes, (III) interests in agroecology and innovation, (IV) willingness to come together, (V) presence of alternative food networks or interest in developing them, (VI) access to funding/economic resources, and (VII) availability of facilitation, support, and infrastructures.

ME4ALL includes a structure with components and indicators (Table 1). Components are elements that describe the performance of the ALL and reflect transformative changes generated by the ALL's actions in different dimensions. Components are used for mapping a current state of the three ALLs. Indicators and descriptors are used for each component to assess and/or investigate the different components. The components are used for collecting theoretical and practical information. They are clustered into three domains of change: thinking, acting and organizing.

The clusters were established relating back to the theories and definitions of transformation, such as “fundamental changes in structural, functional, relational, and cognitive aspects of sociotechnical–ecological systems that lead to new patterns of interactions and outcomes” (Patterson et al. 2017).

Table 1. Structure of conceptual framework “Monitoring and evaluation for agroecological living labs” (ME4ALL).

Domains	Components	Indicators and descriptors
Organising	Geography	Country Scale Focus
	Communication and network management	Channels of communication within the group Organisation and frequency of dialogue/meeting
	Participants of LL	Type of authorities involved Type of non-academic actors involved Number of participants after three years
	Roadmap	Timeframe Activities within LL
Thinking	Needs and constraints expressed by the participants	Participants' needs for Constraints for development of LL
	Tailored academic framework for the LL work	Key words/concepts Research methods
	Social values and beliefs	Relational/Political Agroecological/thematic
	Knowledge co-creation and sharing	All topics shared within the LL Themes selected for LL actions
	Perspectives on land governance	Land access Food sovereignty
	Objectives of LL/network	Relational Political Objectives for the stakeholders' activities
Acting	Committed actions	Dissemination and co-creation activities Meeting venue, arena for discussions/actions Types of other organized actions Outcomes

The thinking domain includes the cognitive and relational aspects of the lab actors, such as knowledge, values, narratives, paradigms, and beliefs. The acting domain includes functional and managerial aspects. Toffolini et al. (2018) describe action as reciprocal interaction between a human being and nature. However, the acting domain of ME4ALL is more about the function of the ALLs as networks, and does not consider the natural aspect. The organizing domain contains general information about the context of each ALL.

Components, indicators and descriptors demonstrated in Table 1 were selected from Hvitsand et al. (2022), Kiseleva (2020), Kok et al. (2023), Leminen and Westerlund (2019), McPhee et al. (2021), Schneidewind et al. (2018), Mahdavi and Vandenbroucke (2022), and Vandenbroucke et al. (2022). In an iterative process, after running the workshops with the ALL facilitators, the components were adjusted according to their relevance for each context and spatial environment of the ALLs.

For creation and facilitation of the three ALLs, different practical approaches were used. In this research, they are divided into three groups: approaches for creation of the ALLs, approaches for supporting dialogue and co-creation, and approaches for decision making.

The impact dimensions cover social, economic, environmental, political, and organizational ones. Three of them (economic, social, and environmental) were used from SAFA guidelines (FAO 2014), two dimensions (political and organizational) were added in order to describe collaboration with policy makers and organization of the network. Impacts are results of an impact assessment or evaluation, which are referred to as essentially identifying effects of certain actions, decisions, and evaluating a certain change caused by a specific intervention (Ballon, Van Hoed, and Schuurman 2018). In our study, impacts were used for measuring results of the ALLs activities and to describe their agroecological transition. The evaluation of the actual impact of a LL in terms of innovation processes, effective adoption, and sustainable changes is still a notable gap (McPhee et al. 2021). Impact studies of LLs (e.g., Ballon, Van Hoed, and Schuurman 2018) are scarce; there is no unique way for validating and assessing the impact of LLs. The three ALLs studied all function under real-life conditions, with goals and objectives to contribute to the selected problem-solving themes. Their impact will be assessed regarding transformative change of the relationship inside the network, depending on the scale and context of each ALL.

2.1.1. Overview on existing LLs assessment frameworks

A similar framework for evaluation of the LLs was developed by Bouwma et al. (2022). Their research includes seven performance areas for the assessment of living labs: LL interactions, LL actions, LL design and set up, LL motivation, LL image and reputation, LL products and services, and LL outcomes and impacts (Bouwma et al. 2022). Other authors (Criado et al. 2021; Franz, Tausz, and

Thiel 2015; Ley et al. 2015) used different components for comparative analysis of LLs (Table 2); however, they considered LLs of the same scales, while our research provides comparable components that could be used by ALLs at different scales.

According to Schuurman et al. (2013), there is a four-fold classification of LLs based on the actors driving their activities: utilizer-driven, enabler-driven, provider-driven and user-driven. This research is focused on the user-driven type of the LL which is described as established by user communities and focuses on solving users' everyday-life problems (Schuurman et al. 2013). For this research, users of the ALL are called participants in order to highlight their strong participatory approach and contribution to the ALL activities. LLs typically build upon a significant problem or a specific community of interest (Schuurman et al. 2013).

ME4ALL might be seen as a complementary tool for assessing agroecological initiatives alongside tools such as TAPE (FAO 2019) and OASIS (Peeters et al. 2021) that focus on farms, as it focuses on assessing the process and performance of participant-driven ALLs and connecting them to agroecological principles.

2.2. Case study areas and description of the living labs

As far as contextual thinking is considered as an essential vision of agroecology (Bell and Bellon 2018), three different contexts were used for this paper. Three ALLs were created, within the AE4EU project² at different scales: local (Coventry, England, UK), regional (Varaita Valley in the western Alps, Italy), and national (the Netherlands) (Figure 2).

2.2.1. The National Living Lab (The Netherlands)

Creation of the National Dutch Living Lab (NDLL) is a result of joint activities between the national Federation of Agroecological Farmers, TNI and Wageningen Research (WR) under the umbrella of the AE4EU project. It is in line with the wish of the national Federation of Agroecological Farmers, a recently established organization connecting six organizations of agroecological farmers.

NDLL is targeted at increasing visibility, developing a network of the “willing” including NGOs and pioneering farmers, aligning with policy makers and research. A key topic is developing a joint problem definition and research, innovation, and action agenda to stimulate larger implementation of agroecology in the Netherlands.

The main objectives of NDLL are to strengthen the agroecological movement and support the transition to an agroecological food system in the Netherlands. The strategy to reach these goals is (I) establishing and strengthening connections between practitioners, researchers and NGOs, and (II)

Table 2. Components for comparative analysis of different types of living labs (LL) in comparison to our research.

Authors	Franz, Tausz, and Thiel (2015)	Ley et al. (2015)	Criado et al. (2021)	Our research
Types of LL	Urban	Technological	i-labs	Participant-driven
Components	<ul style="list-style-type: none"> - Objectives - Stakeholders - Involvement - Transferability 	<ul style="list-style-type: none"> - Purposes and methods - Participating users - Geographical and social distribution of households - Heterogeneous roles - Trust and expectations 	<ul style="list-style-type: none"> - Origin - Funding - Lab team - Methods - Operational capacity - Work focus 	<ul style="list-style-type: none"> - Objectives - Themes - Social values and beliefs - Main constraints - Management and leadership - Committed actions and target audience

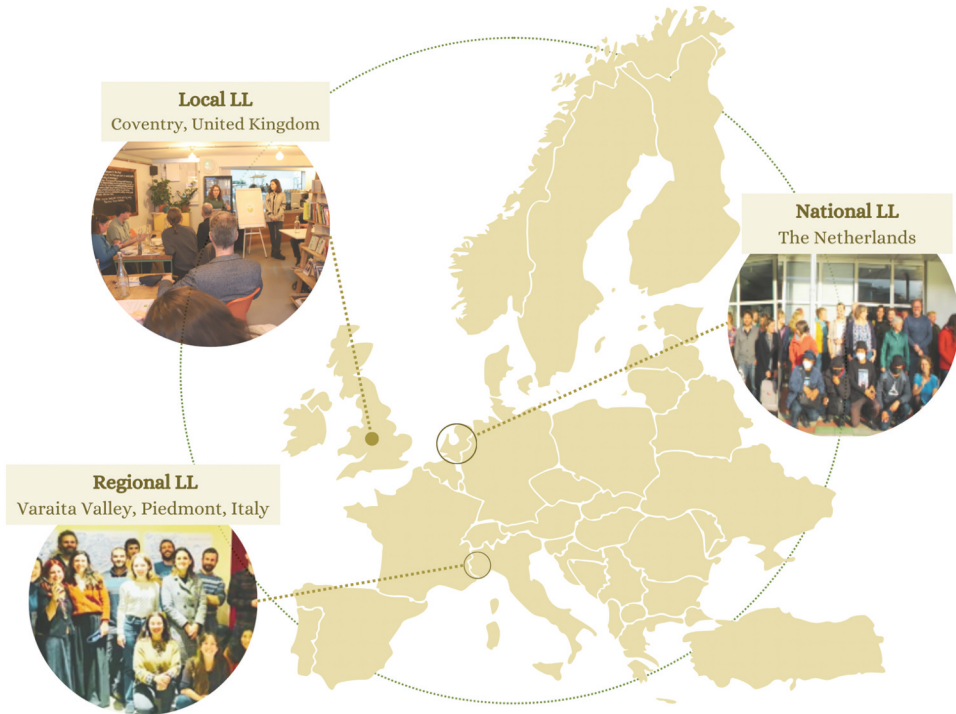


Figure 2. Locations of the ALLs.

developing a plan to deal with the main challenges that agroecological farmers and movements are facing in the Netherlands.

Currently, NDLL has over 60 participants, including agroecological farmers and their organizations, researchers from various knowledge institutions, as well as NGOs and students. It also connects with national policymakers and farmers from other nature-inclusive farming organizations interested in transforming Dutch agriculture.

Four working groups were established, each focusing on one of the four most urgent themes identified to accelerate an agroecological transition in the Netherlands. The themes are (i) knowledge for agroecology; (ii) policy for agroecology; (iii) land security, commons, and solidarity economy; and (iv) movement building.

Four living lab meetings were held annually, organized by one of the working groups with representatives of the Federation, researchers, Transnational Institute (TNI) and representatives from NGOs. There is increasing involvement of environmental and climate activists. They stimulate participation of farmers, researchers, citizens, students, NGOs, educators and others interested in a stronger and more influential agroecology movement in the Netherlands. The challenge is how to ensure farmer participation in an

increasingly mixed group with different interests and time to invest in the network.

All farmers that participate are members of one of the six agroecological farmers' organizations of the Federation of Agroecological Farmers, that are Toekomstboeren, Biodynamic association, CSA Network Netherlands, Organic Gardeners, Biocyclic-vegan agriculture network and Permaculture Farmers Netherlands. They adhere to the agroecological principles at the agroecosystem level (HLPE 2019) and want to contribute to transformative changes at the food system level. In practice the farmers involved in the network are experimenting for instance with no-till, cultivation of seeds, fossil-free agricultural machinery and solidarity payment schemes, to ensure a fair income for farmers and affordable food prices for people with a low-income.

2.2.2. The regional/rural (Italian) living lab context (creation, number of participants, objectives)

The regional Italian LL (RILL) has also been initiated within the AE4EU project by the researchers of the University of Gastronomic Science (UNISG, Italy). The RILL is located in Varaita Valley, in the Province of Cuneo, Piedmont. The primary motivation for selecting the Varaita Valley as the location for the ALL establishment was the fact that in the last decade Varaita Valley saw the flourishing of a variety of agricultural and food related initiatives.

To identify the territory and stakeholders for the RILL development, the following actions were taken: (i) a preliminary meeting in May 2020, (ii) stakeholder identification from May to October 2021, and (iii) a questionnaire submitted in October 2021 to discern the needs and expectations of potential participants. The preliminary meeting involved key stakeholders, identified through previous research by the UNISG agroecology group on new farmers in the valley. A list of potential participants was compiled, expanded through a snowball effect and online searches. Participants were contacted, presenting the LL process as a means to strengthen the Varaita Valley network through collaborative agroecological innovation.

Prior to the first workshop, a questionnaire addressed participants' resources, skills, key agroecological topics of interest, reasons for network creation, and potential constraints.

The first workshop in November 2021 was attended by 35 participants among which there were: food processors (e.g., beer producers, beekeepers), farmers (agroecological, conventional, organic, biodynamic), community supported agriculture, ONG, agricultural associations, networks of farmers, policy makers, citizens, researchers, and students. The workshop lasted 3 hours and was facilitated by UNISG researchers and the association *Limone Lunare*. The

workshop was followed by a community dinner. Participants shared dreams, obstacles and resources relating to agriculture, food production and food systems in the valley. Table discussions, led by UNISG researchers, centered on the four main topics of interest that emerged from the questionnaire: food sovereignty and land access, local grain production, relational economy and low-season tourism. Post-workshop, several meetings aimed at collectively writing an agroecology manifesto for the LL, and enhancing the dialogue between the RILL participants and the regional policy makers. A meeting with the representatives of local authorities (municipalities of the Mountain Union³) was organized in order to introduce the project and to engage them in LL activities. In July 2022, during the second official RILL workshop, the agroecological Manifesto of RILL was presented and signed by participants and local policymakers. Monthly meetings continued to work on LL objectives, leading to a third workshop in November 2022 to disseminate the LL process to a wider audience. Since 2022, monthly meetings have focused on the objectives identified by the participants, with the first action being the establishment of a local farmer market in August 2023.

Before engaging in the RILL, the majority of participants had already applied different agroecological practices, particularly those related to the first six agroecological principles (HLPE 2019), adopting a wide diversity of crops at field level, applying mulches and other agroecological soil fertility practices as well as the implementation of ecological infrastructures such as semi-natural landscape elements (Wezel et al. 2014). Some participants had already been exploring alternative short supply chains and ways of economic diversification such as Community Supported Agriculture and vegetable box schemes.

2.2.3. The local/urban and peri-urban living lab in the United Kingdom

Coventry University came together with other stakeholders at Ryton Organic Gardens (its rural campus, 8 km from central Coventry), including CU Social Enterprise (CUSE), CSA 5 Acre Community Farm and horticultural research charity Garden Organic. Several researchers at the University were previously employed by Garden Organic, so had a long history of working at the Ryton site, which the University purchased in 2019 but Garden Organic had owned since 1985.

The vision to establish an agroecological living lab stems from a legacy of practical activities, pioneering ideas on citizen science (a series of “Members” Experiments’ begun in the 1950s) and the desire to work more closely with partners from within urban and peri-urban Coventry. CALL (Coventry Agroecological Living Lab) brought together a range of organizations and initiatives that had some existing connections and facilitated more targeted collaboration. Bringing the participants together in a more structured format led to better communication and cooperation,

particularly the sharing of resources like seeds and cuttings, but also improved skills and knowledge sharing. Support for community initiatives such as food banks has increased, and a network has developed that is better equipped to participate in decision making and discussion around policy.

CALL comprises a wide range of participants, including commercial producers but also smaller scale growers attached to organizations such as community centers and social/therapeutic initiatives. Prior to CALL, the participants were already strongly aligned to organic and agroecological principles, some having organic certification and use of external inputs was minimal among growers. Soil health and biodiversity conservation were high on people's agendas, with all of the food produced being consumed locally as part of short food chains within Coventry and its immediate surroundings. Of great concern for all CALL participants is climate change, in particular, the more erratic extremes of weather being experienced in the UK. As a result, from the very early stages of CALL, there was a focus on agroecological advancement by improving crop diversity as a mechanism to cope with climate change.

2.3. Data collection and analysis

The data collected through a series of workshops (three workshops were organized in each ALL) included brainstorming posters, notes from plenary sessions, and working group sessions. Further details of this can be found in the Rastorgueva et al. (2022). During 2022 and 2023, three online interviews were conducted with the researchers in charge of the facilitation of the three ALLs in order to collect data about all the indicators and components of the ME4ALL framework. The online interviews with the facilitators were recorded, transcribed and organized in the ME4ALL framework using Microsoft Word and Excel®. The results collected from the interviews were then coded and analyzed with Nvivo software. In order to identify the connections of the ME4ALL components with the 13 agroecological principles (HLPE 2019), a qualitative data analysis based on thematic analysis was applied. A similar qualitative method (lexical analysis) was used by Mujtar et al. (2023) in order to describe the agroecological transition. In this paper, the thematic analysis was performed with NVIVO 28 software by two researchers in order to decrease subjectivity within the coding. The 13 codes (one code for each agroecological principle) were created in order to categorize the text provided in each ME4ALL component. Two separate coding processes were run for each ALL: one for the thinking components and one for the acting components. The results displayed how many references of each ALL were connected to the agroecological principles; the numbers produced for the references were represented in spider diagrams (one for the thinking dimension and one for action).

2.3.1. Impact evaluation

The UNRISD (2016) describes transformative change as changes in social structures and relationships, or changing norms and institutions both formal and informal, that shape the behavior of people and organizations in the social, environmental and political spheres (UNRISD 2016). In order to assess the impact dimensions (social, environmental, economic, political, organizational) of ALLs, a survey involved all stakeholders. Each dimension was subdivided into two parts: action (participants' commitments) and learning (participants' acquired knowledge). An online questionnaire, available in English and Italian on Qualtrics, was distributed among stakeholders from April to July 2023. The 15-question survey included five for action changes, five for learning evaluation, and five open-ended queries for feedback. A Likert scale ranging from 1 to 5 was used to indicate results ranging from “no changes” to “strong improvement.” The responses were processed in SPSS 28, including a t-test. A one-way ANOVA with Tukey post-hoc analysis identified connections between ALL scales and evaluations, revealing differences between the three ALLs.

Survey questions addressed specific ALL-related topics within each dimension. The environmental dimension was evaluated by questioning the level of adoption of agroecological practices. Social impacts included inquiring about network creation, reducing isolation and enhancing support for participants. Economic effects focused on assessing shifts in food chain dynamics and new value chain creation. The political dimension was explored by asking about dialogue with policymakers and the emergence of collaborative initiatives. The organizational dimension was examined through questions about the (improved) collaboration and cooperation between stakeholders.

3. Results

The results include two major sections. First, the enabling factors and their relevance to the ALLs, used approaches and cross-scale comparison of the ALLs in terms of their connection with the 13 principles of agroecology. Second, the self-evaluation of impact by the ALLs.

3.1. Enabling factors, the framework and approaches

3.1.1. Enabling factors

The enabling factors influencing the development of each of the ALLs, are shown in Table 3. The three ALLs all have common enabling factors, except for the “Presence of alternative food networks” (for the national ALL in The Netherlands), and for “Access to funding/economic resources” and “Infrastructure” (for the UK local ALL). All enabling factors played an important role in the establishment of the three ALLs except “Access to funding” and “Infrastructure.” The first one was important only to the national ALL (in the

Netherlands) and the second one affected the creation of the national and regional ALLs.

A constraint that had been considered as a crucial enabling factor in the regional ALL in Italy was access to land in the Varaita valley. In this territory there is plenty of abandoned land that could potentially be farmed, but land-owners are often unknown or difficult to contact, and therefore, it is very difficult to rent or buy this land. The factor of “willingness to come together” means people’s need for social inclusion/cohesion. In marginal areas (RILL) this is caused by a lack of appropriate social services and infrastructures, and as a consequence a “sense of loneliness” is widespread. In the case of CALL, the lack of economic resources and infrastructure has not been detrimental as CALL members used their own existing infrastructure (field sites, meeting rooms, cafes, social supermarkets) in rotation. Coventry University has funded some activities, as has the charity Garden Organic and its Heritage Seed Library; however, ongoing economic funding is still a challenge. For the NDLL, there was a great sense of urgency to change the Dutch agricultural and food system, and to increase awareness and support from the ministry of agriculture.

Access to funding (in RILL and CALL) was not a decisive factor in establishing ALLs, as participants were primarily driven by other strong motivations to initiate living lab activities. While additional funding may enhance the labs’

Table 3. Enabling factors for creation of the three ALLs and examples from the ALLs: National Dutch living lab (NDLL), Regional Italian LL (RILL), CALL (Coventry agroecological living lab). v – present factor in the LL.

Enabling factors	Examples from the ALLs	NDLL	RILL	CALL
Trigger events or external pressures, constraints to agroecological transitions that need to be addressed	Land tenure conditions, presence of industrial agriculture, lack of knowledge, climate change	v	v	v
Sense of urgency to changes	Need of improvement of territorial development/quality of life	v	v	v
Interests in agroecology and innovation	Participants’ interest in exploring and adopting agroecological knowledge and practices, and interest in the agroecological values.	v	v	v
Willingness to come together	Sense of loneliness or solitude, need to connect and explore together	v	v	v
Presence of alternative food networks or interest in developing them	Community Supported Agriculture, local farmers markets, vegetable box scheme	v	v	v
Access to funding/economic resources	Private funds from foundations or NGOs for ALL coordination, participants with high income contribute more to costs of meetings, joint applications for research with member organizations within ALL	v	-	-
Availability of facilitation and support	Academia: the researchers working on the AE4EU project had facilitated and supported the ALLs establishment	v	v	v
Infrastructure	Presence of venues for the ALL activities, advising offices, agricultural infrastructures	v	v	-

resilience, it is not essential for their creation. Moreover, funding appears to be scale-dependent, with higher-level contexts offering a broader range of financial instruments.

3.1.2. Used approaches

The creation and support of ALLs involved a variety of approaches aimed at fostering engagement, dialogue and co-creation among diverse stakeholders. The three ALLs showed many similarities in approaches used, but also differences, for instance regarding decision making there had been LLs adopting more institutional approaches and others more creative approaches (Table 4).

The initial stages of the creation of LLs encompassed for instance, in the RILL an explorative workshop to identify the context and potential participants, along with a preliminary survey to discern the needs and interests of potential contributors. Shared meals played a crucial role in RILL as convivial occasions providing an informal setting for interaction. Personal correspondence through phone calls, messages, e-mails, and social media was a core aspect to keep the participants engaged. A multi-actor approach in network creation was undergone at all stages of the creation of LLs as inviting participants from different stakeholder groups, ensuring a comprehensive perspective.

To support ongoing dialogue and co-creation within ALLs, participatory approaches were shown to be key. Workshops, run in all three ALLs, used methods such as round tables, small group discussions, and shared brainstorming sessions. In each of the three ALLs, the development of a joint

Table 4. Used approaches for the all-creation, supporting dialogue and co-creation, and decision making. National Dutch living lab (NDLL), Regional Italian LL (RILL), CALL (Coventry agroecological living lab). Regional Italian LL (RILL), CALL (Coventry agroecological living lab).

Used approaches		NDLL	RILL	CALL
Approaches for creation of ALLs	Explorative workshop – to identify the context and potential participants	v	v	v
	Preliminary survey – to identify needs and interests of potential participants		v	
	Shared meals – convivial occasions		v	v
	Personal correspondence by phone calls, messages, e-mails and social media	v	v	v
	Multi-actor approach in the network creation – inviting participants from different stakeholder groups	v	v	v
Approaches for supporting dialogue and co-creation	Participatory approach in workshops – round tables, small groups discussions, shared brainstorming	v	v	v
	Development of a joint agreement for all participants of ALL	v	v	v
	Maieutic approach		v	
	Theatre play	v		
	Field visits			v
	Shared meals – convivial occasions		v	v
Approaches for decision making	Personal correspondence by phone calls, messages, e-mails and social media	v	v	v
	Consensus decision making		v	v
	Steering committee (farmers have a majority)	v		

agreement among all ALL participants established a shared understanding and commitment. In each ALL an agreement was developed in different ways: a manifesto in RILL, a working document in NDLL, and a business plan in CALL. Some ALLs engaged in creative approaches to foster dialogue and to envision new initiatives for their territories. For instance at RILL the collaboration with the association *Limone Lunare*⁴ brought a maieutic approach in the facilitation of the workshops. The term maieutic historically referred to a method of teaching by question and answer used by Socrates to elicit truths from his students. Among others, the pedagogist Danilo Dolci further developed a maieutic approach focused on the deep needs and the visionary skills of his students in imagining their future (Longo 2020). The approach involved using creative maps to provide the participants with a space for portraying ideas for possible futures. In the NDLL theater plays had stimulated the participants' creative thinking and had been used to visualize the agroecological principles. Moreover, the NDLL had the opportunity to work with Zapatistas communities visiting Europe, to reflect as a group and increase awareness of the peasants' struggles. Field visits at CALL offered firsthand experiences, contributing to a deeper understanding of the context. Eventually, shared meals and personal correspondence continued to play an integral role in maintaining a sense of community and fostering ongoing collaboration.

Regarding the decision-making approaches, the NDLL relies on a steering committee with a majority of farmers, while the RILL and CALL methods rely on consensus decision-making. So far, the facilitation of the decision-making processes in both RILL and CALL has been guided by researchers involved.

3.1.3. Components of the ALLs for the domains thinking, action and organisation

The ME4ALL framework gathered results for components and indicators falling in the three domains of organizing, thinking and acting. In this section key results from the ME4ALL will be highlighted, the complete results are available in [Table A1](#).

Regarding the organizing domain, the results highlight how the focus of all three ALLs had been very different according to their different scale of development. The focus had been on developing a movement that could advocate and advise at the national policy level for the national NDLL, on territorial development for the regional RILL, and on food growing in urban and peri-urban areas in the local CALL. The main communication means were emailing and WhatsApp groups for all the ALLs. The frequency of meetings had been generally monthly for all three ALLs across the three years. The activities organized by the three ALLs spanned from creating occasions for farmer-activist meetings (NDLL), or meetings to foster the dialogue with policy makers (NDLL and RILL); from field visits, seed exchanges and

biodiversity walks (CALL) to social dinners and dissemination activities on the themes of agroecology, land access and alternative food networks.

Within the thinking domain the participants in the living labs expressed a spectrum of needs and constraints, reflecting the diverse challenges inherent in developing new approaches to organize and redesign the food system toward agroecology. Their needs encompassed funding for agroecology, policies supporting agroecological practices and the establishment of a multifunctional valley network. Participants sought opportunities for skill and knowledge exchange, access to land, financial assistance, and alternative food networks. They emphasized the importance of awareness-building, making growing food more accessible and inclusive, and adapting to a changing climate. On the other hand, constraints had to revolve around time limitations, a need for recognition, and organizational issues, with a common challenge being the lack of sufficient available funds. Overcoming these constraints will be crucial for the living labs to thrive and progress in their agroecological initiatives.

The research methodology, rooted in action research, focuses on farmers' needs and movement dynamics, incorporating action learning, participation, facilitation, and dialogue within the network for a comprehensive exploration of agroecological practices.

Regarding the social values and beliefs domain, the LLs value diverse forms of protest and activism, fostering reciprocity across various actors, promoting horizontal collaboration, and encouraging networking and participation. Grounded in the principles of the Nyéléni declaration, the LLs value ecological food production, collective rights, knowledge diversity, solidarity economy, feminism, youth engagement, the promotion of local food products and connecting consumers with producers.

The chosen themes for LL actions encompass a broad spectrum: NDLL focuses on land access, movement building, places of hope, regional food networks, and effective strategies with an eye on future vision; RILL addresses land access, relational economics, biodistrict development and the promotion of low seasonal tourism; while CALL revolves around diverse methods and practices for cultivating Heritage Seed Library varieties and “forgotten legumes.”

The LL/network objectives were twofold, emphasizing relational and political aspects. On the relational side, NDLL aimed to connect farmers and inspire social innovations, while RILL focused on social inclusion and community building among local stakeholders. CALL contributed to safe spaces and improved connections. Politically, NDLL aimed at influencing policies, RILL at strengthening regional dialogue, and CALL at enhancing communication with local authorities. The objectives for the LLs' activities aligned with these goals: fostering agroecology, increasing awareness, and promoting diverse crops and knowledge sharing for climate adaptation.

The committed actions of the LLs involved dissemination and co-creation activities, with NDLL participating in demonstrations and collaborating on a Green farmers plan. RILL organized and engaged in local events and communication flyer distribution, while CALL shared recipes, farming practices and seeds to promote knowledge exchange. Organized actions included NDLL's "Places of Hope" program fostering collaboration and recognition among activists working on agroecological farms. RILL participated in local institutional events and CALL established experimental plots for growing heritage varieties and collecting genetic resources like "forgotten legumes." The outcomes of these activities are notable, with NDLL producing a foundational document and translating Nyeleni principles for the Dutch context. RILL established a new farmers market, and CALL secured continued funding through Coventry University, branching out into food storage, processing and diet research, and forming connections for public food procurement in the West Midlands metropolitan region.

3.1.4. Cross-scale analysis of the ALLs in terms of their connection with the 13 agroecological principles

In this section we present for each agroecological principle the results of the indicators and components of the ME4ALL framework that are linked with them, based on the analysis through the Nvivo coding process. The connections of the ALL performances in terms of thinking and action with the agroecological principles are provided in [Figures 3 and 4](#).

A major finding is the lack of the coded references regarding the first seven principles in the components included in the "acting" domain, therefore connected to the main actions performed by each ALL. The CALL presents the only exception since some actions performed are connected to the 5th principle of biodiversity, for instance, the implementation of seed exchange activities.

3.1.5. Agroecosystem principles (1–6)

The components that had been connected to the agroecosystem principles of recycling, input reduction, soil health, animal health and synergy concerned solely the thinking domains of the three ALLs. These five principles had been mainly touched by the themes addressed in the LLs' knowledge exchanges, by the participants' needs for activities to be implemented and practices to develop as LLs, and by the key concepts and values that were identified as common by the participants of a LL. Regarding the principle of input reduction, the CALL shared practices and knowledge about how to valorize and spread the adoption of varieties of "forgotten legumes" that present characteristics of higher resilience in their territory. In the RILL, knowledge and practices regarding soil health were mentioned as one of the most important and interesting aspects for many participants. The principle of biodiversity,

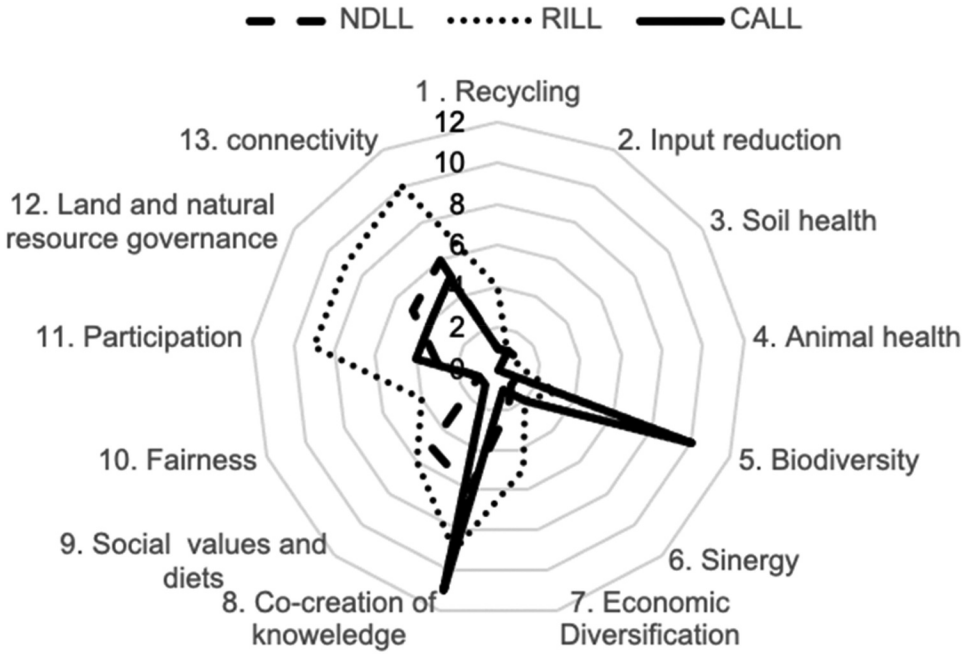


Figure 3. Agroecological principles related to the three ALLs coded in thinking dimension). National Dutch living lab (NDLL), regional Italian LL (RILL), CALL (Coventry agroecological living lab).

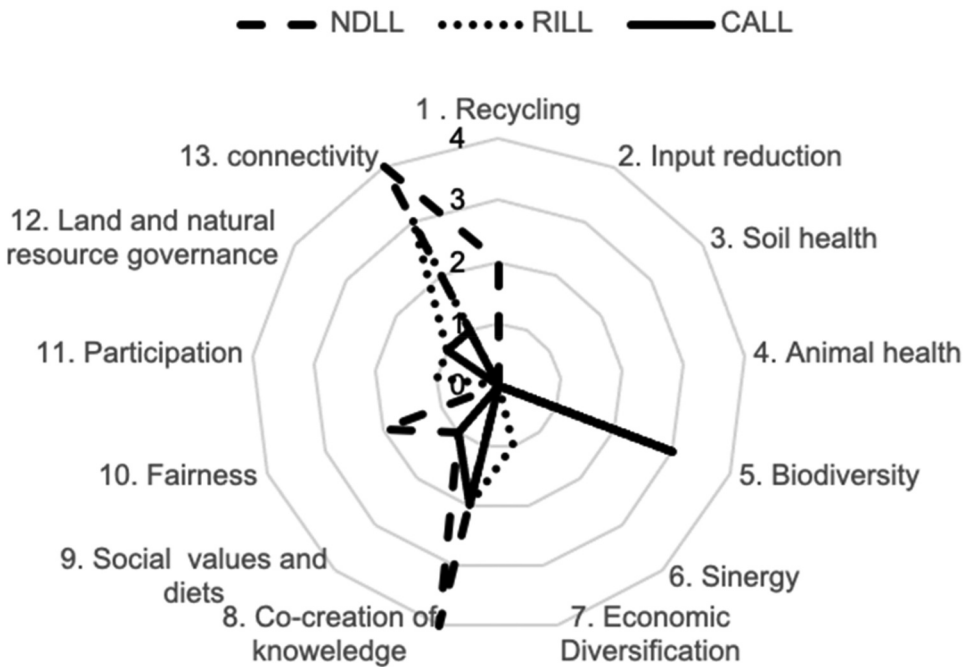


Figure 4. Agroecological principles related to the three ALLs coded in the action dimension. National Dutch living lab (NDLL), Regional Italian LL (RILL), CALL (Coventry agroecological living lab).

instead, had been connected to the “acting” domain for the CALL. There the main organized actions concern specifically this principle: the establishment of experimental plots for growing heritage varieties, the creation of a seed bank for collecting seeds and vegetative material of “forgotten legumes” as well as the organization of seed exchange events for supporting the sharing of diverse crops and novel vegetables varieties.

The principle of biodiversity was connected differently with the LL activities; in general for NDLL, only to the thinking domain for the RILL, and described in detail by the CALL. Thus, this principle has been addressed by participants by broadening the range of crops they grow. On a smaller scale, organic grower participants were already cultivating spaces highly diversified in terms of crops and ecological infrastructures but through the LL network (in particular, the Heritage Seed Library), a greater recognition of the importance of cultivated genetic resources has developed. By growing novel and multicultural crops as well as “forgotten” heritage and heirloom varieties, participants have diversified what they grow to be more resilient.

The principle of economic diversification was mentioned by the LLs only in their thinking domain. In the RILL the economic diversification was addressed through developing a new local food chain and providing access to the new market channel, creating an additional income for the LL participants. The CALL has pursued the principle of economic diversification through extensive work to discover and trial new crops. Growers are increasingly concerned by climate change and it was felt important to reduce economic risk by reducing reliance on a limited range of varieties. Cultivating a range of crops from other, non-UK cultures has also given participants the opportunity to reach a new group of consumers.

Access to land is a common issue of co-creation and knowledge sharing for both national and regional ALLs, while only diverse seeds and shared seeds were discussed by the local ALL. Besides, other topics and activities of the two ALLs were connected with the principle of co-creation and knowledge sharing including “Connecting to other farmers and giving them inspiration, developing social innovations toward agroecology” in the NDLL; and “Local public events (WSs), disseminating communication flyers” in the RILL.

Social values and beliefs. Social values related to agroecology are different in the three ALLs. For the NDLL it was a consideration of all principles of the Nyéléni Declaration on Agroecology (CIDSE 2018; Nyéléni Declaration 2015). In the RILL this principle was addressed through horizontal collaboration and networking activities of the ALL participants. The network’s relational objectives include community building for increased social inclusion, strengthening of the connections between local stakeholders and providing different mutual benefits. Coventry and the wider West Midlands region has a truly multicultural population; Garden Organic, a local NGO participating in the CALL,

provided inspiration by sharing work done to identify unusual and multi-cultural crops being grown in the region. By diversifying what they grow, participants have embraced the culture and identities of communities that have migrated to the region, as well as rediscovering heritage and under-utilized crops.

Land and resource governance. The issue of access to land as a part of land governance differs and depends more on the territories where the ALLs are located, rather than on their scale. Thus, for the Netherlands, the issue of land access is focused on the high price of land and short-term land lease contracts for new farmers. In the NDLL this principle was expressed through identifying the needs of family farmers and peasant food producers, and providing support. In Italy and particularly in Piedmont, the issue of land access and resource governance is related to abandoned lands, to unclear conditions of their management and to collaboration with policy makers on this issue. Thus, for the RILL, this principle was one of the most important issues of the ALL due to numerous abandoned lands in the valley, as it directly affects regional food sovereignty. In the CALL, it was expressed through “access to land” and “need to improve dialogue with the City Council” with the view to get more access to land used or owned by the city.

The principle of participation was common for the three LLs. In the NDLL examples related to this principle include: a bottom up participation; new proposals at national level for participation of AE farmers in policy making; proposals for creating safe spaces for farmers and other stakeholders to participate in community oriented types of farming. Activities of the RILL and of the CALL were addressed through encouraged involvement of the different stakeholders into the LL activity and through their collaboration with policy makers. This was expressed in the workshops conducted in different locations, to share leadership and co-responsibility of organizational activities with the LL participants.

The principle of fairness was interpreted by the three LLs in a similar way. For the NDLL this was by creating links between actors generating recognition of the work and values of both groups working on land security; discussions on fair income for farmers; present examples of solidarity payments. In the RILL, it was addressed through a fair engagement of different small-scale food producers and consumers at the same time and space, where LL producers took part in the fair remuneration across all the steps of the food chain. For the CALL, it was about making growing food more accessible/inclusive.

Connectivity is one of the common principles related to the activities of the three LLs. Thus, for the RILL, a contribution to this principle was expressed through the creation of a new farmers market for the local food producers, while the CALL evidenced as produced surplus shared with other LL participants and the distribution of soft fruit plants as an underutilized crop. An activity related to the connectivity principle of the NDLL included work on the

PGS system to increase trust, confidence and an interaction with the ministry for more trust-based systems of control.

3.2. Evaluation of impact

The respondents evaluated changes happening during their activities and impacts in the ALLs in terms of (a) action (what was done, practices for an agroecological transition) and (b) learning (what they learned) along five levels of change from a minimum (1) to a maximum (5). Impact change ratings in the three ALLs have a high level of diversity (Figure 5). For the NDLL, participants mentioned greater changes in all impact dimensions except the “environmental” impact. In contrast, the CALL was newly established and not based on any existing network compared to NDLL. In the first year (2021), the CALL needed time to establish a network and to start ALL activities. Therefore, several of its participants mentioned a short timeframe for the ALL activities and lower changes in all impact dimensions.

The RILL and CALL participants highly rated the social and organizational impact change, both in action and learning. Thus, the Italian and English participants assessed impact on action from “slightly improved” (2) to “moderately improved” (3). Participants of the NDLL specified the highest impact on the political dimension both in terms of action Figure 5(a) and learning Figure 5(b). These average evaluations are between “moderately improved” to “considerably improved” changes. This result of NDLL is in line with its strong focus on political activity.

The results of an ANOVA analysis demonstrates a connection between the evaluated impact on the political dimension and scale of the ALLs (Table 5). This is the case for both actions ($p < 0.001$), and learning ($p < 0.01$). There are further statistically significant differences between the three ALLs: evaluations

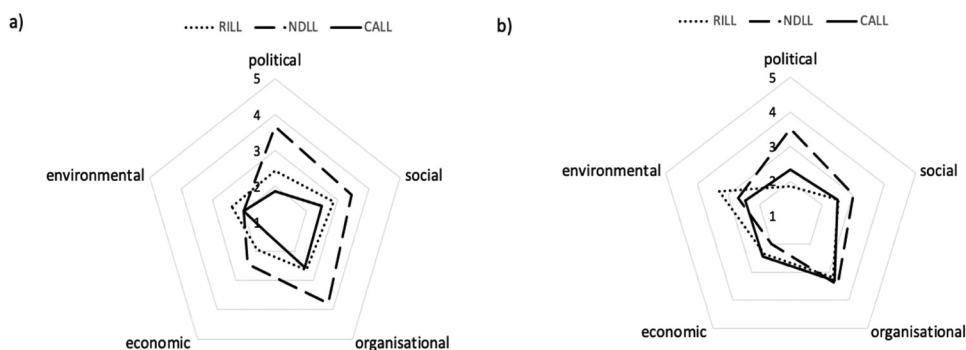


Figure 5. Results of self-evaluation of political, social, organizational, economic, and environmental impact changes rated from 1-min to 5-max. Impact changes were rated in terms of (a) action and (b) learning. RILL ($n = 16$), NDLL ($n = 14$), CALL ($n = 10$). National Dutch living lab (NDLL), Regional Italian LL (RILL), CALL (Coventry agroecological living lab).

Table 5. Connection between scales and evaluated impacts in different dimensions and statistical significance.

Dimensions	Action	Learning
Political	***	**
Social	n.s.	n.s.
Environmental	n.s.	n.s.
Economic	n.s.	n.s.
Organisational	**	n.s.

*** $p < 0.001$, ** $p < 0.01$, n.s. - not significant.

of the national ALL (NDLL) are significantly higher compared to impact changes reported on the regional ($p < 0.01$) and local ($p < 0.01$) ALL level. In addition, political impact changes within learning are statistically significantly higher in national than in the regional pilot ALLs ($p < 0.01$). In the local, urban CALL political impact change was in between the other two ALLs.

4. Discussion

This research is focused on three participant-driven ALLs and their role for agroecological transition. One of the main results of this paper is a definition of the agroecological living laboratories. We defined ALL as transdisciplinary approaches which involve farmers, researchers and other actors of the agri-food sector into co-learning, co-design, monitoring, and the evaluation of agroecological practices in order to develop innovative solutions aimed at fostering agroecological principles in the communities and in food systems at different levels. This definition is in line with agroecosystem LLs described by McPhee et al. (2021), and with statements of other authors (Ingram 2015; Nevens et al. 2013; Turner et al. 2020) that consider LLs as a mechanism for creating an experimental environment in real-life spaces not only for technological research but also for new organizational and institutional forms. However, our definition points more specifically to agroecological principles referring to co-learning and co-design and foods systems level inclusion for ALLs. Moreover, each ALL could develop different strategies and prioritarian actions toward certain agroecological principles in order to answer the needs and constraints of the territory they are embedded in.

This research contributes to an emergent issue such as delineating appropriate evaluation criteria for LLs, considering their experimental nature pointed out by Cascone et al. (2024). As a result of this research a new conceptual framework ME4ALL was developed for qualitative analysis of the ALLs. The framework is not based on a quantitative assessment; as for small-scale farmers and new networks, it might be difficult to provide precise numerical information. ME4ALL could be considered as a tool for qualitative data collection that might be used by the networks or LLs at all scales. This makes ME4ALL different from

similar frameworks already in use such as TAPE (FAO 2019) or OASIS (Peeters et al. 2021). Qualitative analysis of ME4ALL is focused more on the ALL performance rather than on the stakeholders' background described in the paper of Robayst et al. (2023), and it considers agroecological context, rather than urban. Similarly to the assessment framework by Bouwma et al. (2022), ME4ALL was raised from the realities of the new ALLs, and due to its user-friendly approach in terms of the required information, it could be used as a quick scan. ME4ALL can be applied both for the comparison of collected data and for its further connection with the agroecological principles.

One of the key findings of this paper is that, within our context, the activities of regional and national ALLs are primarily aligned with the principles of agroecology, which include economic diversification, social values and diets, fairness, connectivity, and participation. In contrast, local ALLs also exhibit connections to agroecosystems related principles. This insight contributes to the understanding of socioeconomic issues in agroecology, a topic that often receives limited attention in existing literature (Dumont et al. 2016).

ALLs play a vital role not only in facilitating agroecological transitions within food systems but also in promoting and preserving biocultural diversity by fostering the exchange of local knowledge, practices, and innovations. To enhance their effectiveness, ALLs require suitable monitoring and evaluation tools to better articulate their performance and organizational structure. In this regard, ME4ALL could serve as a valuable resource for improving the understanding and comparison of different ALLs.

ALLs can offer an opportunity for farmers to have a stronger and common voice in negotiations with suppliers, retailers and landowners (Gliessman 2023; James and Sulemana 2014; Valdivia et al. 2014). With collaborative action, the isolation of farmers can be overcome, and existing relationships can be changed. This is confirmed by our results as the qualitative data analysis shows that two common principles related to the activities of the three ALLs, are the principles of co-creation of knowledge and of participation. This is in line with statements of Gliessman (2023) concerning both these principles for strengthening farmers and scaling up agroecology. Moreover, a participatory approach with social movements can develop a translation of agroecology from the grassroots to policy that is more relational and avoids a drastic hybridization that strips it of its more political dimensions (Gonzalez, Thomas, and Chang 2018).

As for impact on the political dimension in our case, after analysis of the self-evaluated impacts in the three ALLs, we found that it depends on the scale of the ALLs. At a larger scale this impact is reported higher and respondents think that farmers and other ALL actors have more opportunities to be considered in the political decision making. This finding echoes the result from the previous paragraph about the consideration of farmers'

voices and contradicts the statement of Gliessman (2023) about the grass-roots and community-based scales where the voices have more power. At the same time, different scales of interaction between policy and agroecology are not often taken into account by several scientists (Gonzalez, Thomas, and Chang 2018; Richardson et al. 2021), as well as the need for engaging different stakeholders into political decision making and for democratic discussions.

In terms of transformative changes within the studied ALLs, the most significant impact is observed in the organizational dimension. This improvement can be attributed to the enhanced organizational skills that participants have developed over three years of internal collaboration.

Currently, none of the activities from the three ALLs are registered with ENoLL (The European Network of Living Labs), and their future registration remains uncertain. Consequently, they have not undergone the structured process required for registration.

Additionally, the three ALLs are situated in different countries, leading to variations not only in scale but also in local contexts. To better address these differences, the hierarchical structure of ME4ALL – which connects Domains, Components, and Indicators – may need to be adjusted in future applications. This adjustment would help distinguish between context-based issues specific to each country and performance-related factors, thereby enhancing cross-scale comparability.

According to Lopez-Garcia et al. (2021), the process of agroecological transition is non-linear, particularly at the larger scales. Therefore, our results after 3 years are preliminary. To assess the transition, a longer time frame is needed. The self-evaluation of impact might change, if e.g., the same participants are asked again in a further 3 years. As transition is not-linear, acceleration or deceleration could happen and further research is needed to study this later in time and would be best done in comparison with a larger sample of ALLs.

5. Conclusion

ALLs could contribute to agroecological transitions by fostering and supporting: i) connectivity and participation between farmers, food producers and other stakeholders and policy makers; ii) the sharing and co-creation of agroecological knowledge and practices; and iii) the development of alternative food networks that can feed and support the economic diversification and resilience of the participants and their territories.

One important consideration is what do our results mean for the new ALLs established under the Partnership on Agroecology⁵ from 2024 to 2030? We could see from the statistical analysis that changes in the political dimension

depend on the scale of the ALLs. Therefore, for new ALLs, changes in existing policies and in the dialogue with policy makers could be one of the potential transformative changes, particularly at the national or regional governance scale.

The three pilot ALLs demonstrated a connection with the agroecosystem agroecological principles and the socioeconomic – food systems related principles. Both categories of principles together, not separate from each other, are a conditional causality for the agroecological transition of new ALLs.

Cross-scale analysis – national, regional, local/urban provided a lot of diversity in the results, but it is also a research limitation. Further studies with more examples of ALLs at the same scale are necessary and the Agroecology Partnership over the next 7–8 years should give opportunities for this.

ME4ALL seeks to link the activities of the three distinct ALLs with the 13 principles of agroecology, thereby bridging the gap between existing agroecological literature and the practical realities faced by these ALLs. To facilitate further analysis and cross-scale comparisons, a more suitable theoretical framework specifically designed for ALLs may be necessary. This presents an additional avenue for future research.

In our research, only participant-driven ALLs were discussed, however for future studies, the other three types (utilizer-driven, enabler-driven, provider-driven) of ALLs could be considered for identifying a contribution to agroecological transitions.

Notes

1. <https://www.agroecologypartnership.eu>.
2. AE4EU – Agroecology for Europe H2020 project, <https://www.ae4eu.eu/>.
3. <http://www.unionevallevaraita.it/>.
4. <https://www.illimonelunare.it/>.
5. https://research-and-innovation.ec.europa.eu/research-area/agriculture-forestry-and-rural-areas/ecological-approaches-and-organic-farming/partnership-agroecology_en.


Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This research was supported by the AE4EU project funded from the European Union's Horizon 2020 research and innovation programme under grant agreement [No101000478].

ORCID

N. Rastorgueva  <http://orcid.org/0000-0001-6427-2476>
 C.F. Bassignana  <http://orcid.org/0000-0001-6331-6481>
 E. Angarita  <http://orcid.org/0000-0003-4553-9942>
 J. Hassink  <http://orcid.org/0000-0001-9591-6473>
 M. Goris  <http://orcid.org/0000-0002-2149-1617>
 U. Schmutz  <http://orcid.org/0000-0002-5426-8219>
 J. Conroy  <http://orcid.org/0000-0001-5996-5753>
 S. Dinç  <http://orcid.org/0000-0003-2226-3234>
 A. Wezel  <http://orcid.org/0000-0001-5088-5087>
 P. Migliorini  <http://orcid.org/0000-0002-8573-0381>

References

- ALL-Ready. 2022. About ALL-Ready. Accessed March 7, 2023, <https://www.all-ready-project.eu/all-ri/mapping.html>.
- Ballon, P., M. Van Hoed, and D. Schuurman. 2018. The effectiveness of involving users in digital innovation: Measuring the impact of living labs. *Telematics and Informatics* 35 (5):1201–14. doi: [10.1016/j.tele.2018.02.003](https://doi.org/10.1016/j.tele.2018.02.003).
- Bell, M. M., and S. Bellon. 2018. Generalization without universalization: Towards an agroecology theory. *Agroecology & Sustainable Food Systems* 42 (6):605–11. doi: [10.1080/21683565.2018.1432003](https://doi.org/10.1080/21683565.2018.1432003).
- Bohan, D. A., A. Richter, M. Bane, O. Therond, and M. J. O. Pocock. 2022. Farmer-led agroecology for biodiversity with climate change. *Trends in Ecology & Evolution* 37 (11):927–30. doi: [10.1016/j.tree.2022.07.006](https://doi.org/10.1016/j.tree.2022.07.006).
- Bouwma, I., S. Wigboldus, J. Potters, T. Selnes, S. van Rooij, and J. Westerink. 2022. Sustainability transitions and the contribution of living labs: A framework to assess collective capabilities and contextual performance. *Sustainability* 14 (23):15628. doi: [10.3390/su142315628](https://doi.org/10.3390/su142315628).
- Bronson, K., R. Devkota, and V. Nguyen. 2021. Moving toward generalizability? A scoping review on measuring the impact of living labs. *Sustainability* 13 (2):502. doi: [10.3390/SU13020502](https://doi.org/10.3390/SU13020502).
- Budweg, S., H. Schaffers, R. Ruland, K. Kristensen, and W. Prinz. 2011. Enhancing collaboration in communities of professionals using a living lab approach. *Production Planning and Control: The Management of Operations* 22 (5–6):594–609. doi: [10.1080/09537287.2010.536630](https://doi.org/10.1080/09537287.2010.536630).
- Cascone, G., A. Scuderi, P. Guarnaccia, and G. Timpanaro. 2024. Promoting innovations in agriculture: Living labs in the development of rural areas. *Journal of Cleaner Production* 443:141247. doi: [10.1016/j.jclepro.2024.141247](https://doi.org/10.1016/j.jclepro.2024.141247).
- CIDSE. 2018. *The principles of agroecology, towards just, resilient and sustainable food systems*. Brussels: CIDSE.
- Criado, J. I., T. F. Dias, H. Sano, F. Rojas-Martín, A. Silvan, and A. I. Filho. 2021. Public innovation and living labs in action: A comparative analysis in post-new public management contexts. *International Journal of Public Administration* 44 (6):451–64. doi: [10.1080/01900692.2020.1729181](https://doi.org/10.1080/01900692.2020.1729181).
- Dorning, C., D. J. Abson, C. I. Apetrei, P. Derwort, C. D. Ives, K. Klanięcki, D. P. M. Lam, M. Langsenlehner, M. Riechers, N. Spittler, et al. 2020. Leverage points for sustainability

- transformation: A review on interventions in food and energy systems. *Ecological Economics* 171 (December 2019):106570. doi: [10.1016/j.ecolecon.2019.106570](https://doi.org/10.1016/j.ecolecon.2019.106570).
- Dumont, A. M., G. Vanloqueren, P. M. Stassart, and P. V. Baret. 2016. Clarifying the socio-economic dimensions of agroecology: Between principles and practices. *Agroecology & Sustainable Food Systems* 40 (1):24–47. doi: [10.1080/21683565.2015.1089967](https://doi.org/10.1080/21683565.2015.1089967).
- El Bilali, H. 2019. The multi-level perspective in research on sustainability transitions in agriculture and food systems: A systematic review. *Agriculture* 9 (4):74. doi: [10.3390/agriculture9040074](https://doi.org/10.3390/agriculture9040074).
- European Environment Agency. 2021. Global climate change impacts and the supply of agricultural commodities to Europe. *EEA report*. European Environment Agency. <https://op.europa.eu/en/publication-detail/-/publication/50b2ca9d-6f3b-11eb-aeb5-01aa75ed71a1>.
- FAO. 2014. SAFA. Sustainability assessment of food and agriculture systems. *Guidelines Version 3.0*.
- FAO. 2019. TAPE tool for agroecology performance evaluation 2019 – process of development and guidelines for application. Test version. Rome.
- Fèche, R., C. Noûs, and F. Barataud. 2021. Building a transformative initiative for a territorialized agri-food system: Constructing a living-lab and confronting norms? A case study from mirecourt (Vosges, France). *Journal of Rural Studies* 88:400–09. doi: [10.1016/j.jrurstud.2021.07.026](https://doi.org/10.1016/j.jrurstud.2021.07.026).
- Franz, Y., K. Tausz, and S. K. Thiel. 2015. Contextuality and co-creation matter: A qualitative case study comparison of living lab concepts in urban research. *Technology Innovation Management Review* 5 (12):48–55. doi: [10.22215/timreview/952](https://doi.org/10.22215/timreview/952).
- Gamache, G., J. Anglade, R. Feche, F. Barataud, C. Mignolet, and X. Coquil. 2020. Can living labs offer a pathway to support local agri-food sustainability transitions? *Environmental Innovation and Societal Transitions* 37:93–107. doi: [10.1016/j.eist.2020.08.002](https://doi.org/10.1016/j.eist.2020.08.002).
- García-Llorente, M., I. Pérez-Ramírez, C. Sabán de la Portilla, C. Haro, and A. Benito. 2019. Agroecological strategies for reactivating the agrarian sector: The case of Agrolab in Madrid. *Sustainability* 11 (4):1181. doi: [10.3390/su11041181](https://doi.org/10.3390/su11041181).
- Geels, F. W., and J. Schot. 2007. Typology of sociotechnical transition pathways. *Research Policy* 36 (3):399–417. doi: [10.1016/j.respol.2007.01.003](https://doi.org/10.1016/j.respol.2007.01.003).
- Gliessman, S. 2016. Transforming food systems with agroecology. *Agroecology & Sustainable Food Systems* 40 (3):187–89. doi: [10.1080/21683565.2015.1130765](https://doi.org/10.1080/21683565.2015.1130765).
- Gliessman, S. 2023. Strengthening the voices for agroecology. *Agroecology & Sustainable Food Systems* 47 (3):327–29.
- Gonzalez, R., J. Thomas, and M. Chang. 2018. Translating agroecology into policy: The case of France and the United Kingdom. *Sustainability* 10 (8):2930. doi: [10.3390/su10082930](https://doi.org/10.3390/su10082930).
- Gonzalez De Molina, M., and D. Lopez-Garcia. 2021. Principles for designing Agroecology-based local (territorial) Agri-food systems: A critical revision. *Agroecology & Sustainable Food Systems* 45 (7):1050–82. doi: [10.1080/21683565.2021.1913690](https://doi.org/10.1080/21683565.2021.1913690).
- Grand A. Brochure ‘Collaborate to innovate. Operational Groups networking across the EU’. 2018. Pictures: ArboNovateur, EIP-AGRI Service Point, EuroDairy. Rede Rural Nacional (RRN) Portugal, Shutterstock, Smart AKIS, UNAC (União da Floresta Mediterrânica) More information. March.
- Greve, K., R. D. Vita, S. Leminen, and M. Westerlund. 2021. Living labs: From niche to mainstream innovation management. *Sustainability* 13 (2):791. doi: [10.3390/su13020791](https://doi.org/10.3390/su13020791).
- Griffon, M. 2013. *Qu’est-ce que l’agriculture écologiquement intensive ?* M. Griffon. France: Editions Quae. <https://www.quae.com/produit/1160/9782759219483/qu-est-ce-que-l-agriculture-ecologiquement-intensive>.

- Hill, S. B., and R. J. MacRae. 1995. Conceptual framework for the transition from conventional to sustainable agriculture. *Journal of Sustainable Agriculture* 7 (1):81–87. doi: [10.1300/J064v07n01_07](https://doi.org/10.1300/J064v07n01_07).
- HLPE. 2019. Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition. A report by the high level panel of experts on food security and nutrition of the committee on world food security. Rome.
- Hossain, M., S. Leminen, and M. Westerlund. 2019. A systematic review of living lab literature. *Journal of Cleaner Production* 213:976–88. doi: [10.1016/j.jclepro.2018.12.257](https://doi.org/10.1016/j.jclepro.2018.12.257).
- Hvitsand, C., R. K. Raanaas, S. Gjøtterud, and A. M. Nicolaysen. 2022. Establishing an Agri-food living lab for sustainability transitions: Methodological insight from a case of strengthening the niche of organic vegetables in the Vestfold region in Norway. *Agricultural Systems* 199:103403. doi: [10.1016/j.agsy.2022.103403](https://doi.org/10.1016/j.agsy.2022.103403).
- Ingram, J. 2015. Framing niche-regime linkage as adaptation: An analysis of learning and innovation networks for sustainable agriculture across Europe. *Journal of Rural Studies* 40:59–75. doi: [10.1016/j.jrurstud.2015.06.003](https://doi.org/10.1016/j.jrurstud.2015.06.003).
- IPES-Food. 2016. From uniformity to diversity: A paradigm shift from industrial agriculture to diversified agroecological systems. *International Panel of Experts on Sustainable Food Systems*.
- James, H. S., and I. Sulemana. 2014. Case studies on smallholder farmer voice: An introduction to a special symposium. *Agriculture and Human Values* 31 (4):637–41. doi: [10.1007/s10460-014-9554-y](https://doi.org/10.1007/s10460-014-9554-y).
- Kiseleva, M. 2020. Agroecology living labs: Defining characteristics and key components of their successful orchestration. *Digital Living Lab Days 2020*, 102–25. <https://openlivinglabdays.com>.
- Kobzeva, M., and K. Knickel. 2018. Instead of just talking we are actually doing it! *Initial Insights into the Use of Living Labs in the EU-Funded ROBUST Project*.
- Köhler, J., F. W. Geels, F. Kern, J. Markard, E. Onsongo, A. Wiczorek, F. Alkemade, F. Avelino, A. Bergek, F. Boons, et al. 2019. An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions* 31:1–32. doi: [10.1016/j.eist.2019.01.004](https://doi.org/10.1016/j.eist.2019.01.004).
- Kok, K. P. W., M. G. van der Meij, P. Wagner, T. Cesuroglu, J. E. W. Broerse, and B. J. Regeer. 2023. Exploring the practice of labs for sustainable transformation: The challenge of ‘creating impact’. *Journal of Cleaner Production* 388 (February):135994. doi: [10.1016/j.jclepro.2023.135994](https://doi.org/10.1016/j.jclepro.2023.135994).
- Leminen, S., and M. Westerlund. 2019. *Living labs: From scattered initiatives to a global movement*. POL: Innovation & Strategy (Topic). doi: [10.1111/caim.12310](https://doi.org/10.1111/caim.12310).
- Ley, B., C. Ogonowski, M. Mu, J. Hess, N. Race, D. Randall, and V. Wulf. 2015. At home with users: A comparative view of living labs. *Interacting with Computers* 27 (1):21–35. doi: [10.1093/iwc/iwu025](https://doi.org/10.1093/iwc/iwu025).
- Linnér, B. O., and V. Wibeck. 2021. Drivers of sustainability transformations: Leverage points, contexts and conjunctures. *Sustainability Science* 16 (3):889–900. doi: [10.1007/s11625-021-00957-4](https://doi.org/10.1007/s11625-021-00957-4).
- Longo, A. 2020. The reciprocal maieutic approach (RMA) in practice. In *Danilo Dolci. SpringerBriefs in Education*. Cham: Springer. doi: [10.1007/978-3-030-51853-0_4](https://doi.org/10.1007/978-3-030-51853-0_4).
- Lopez-Garcia, D., M. Cuellar-Padilla, A. de Azevedo Olival, N. P. Laranjeira, V. E. Méndez, S. P. Y Parada, and G. Tendero-Acin. 2021. Building agroecology with people. Challenges of participatory methods to deepen the agroecological transition in different contexts. *Journal of Rural Studies* 83:257–67. doi: [10.1016/j.jrurstud.2021.02.003](https://doi.org/10.1016/j.jrurstud.2021.02.003).
- MACS-G20. 2019. Agroecosystem living laboratories. April. https://www.macs-g20.org/fileadmin/macs/Annual_Meetings/2019_Japan/ALL_Executive_Report.pdf.

- Mahdavi, P., and P. Vandenbroucke. 2022. Project deliverable report 2.1 - draft inventory of LLs, RI and Agroecology-territories <https://doi.org/10.5281/zenodo.7326537>.
- McPhee, C., M. Bancarz, M. Mambrini-Doudet, F. Chrétien, C. Huyghe, and J. Gracia-Garza. 2021. The defining characteristics of agroecosystem living labs. *Sustainability* 13 (4):1718. doi: [10.3390/su13041718](https://doi.org/10.3390/su13041718).
- Mujtar, V. A., R. Zamor, F. Salmerón, A. Del Socorro Guerrero, L. Laborda, P. Tittonell, and R. Hogan. 2023. Lexical analysis improves the identification of contextual drivers and farm typologies in the assessment of transitions to agroecology through TAPE—A case study from rural Nicaragua. *Agricultural Systems* 209:103686. doi: [10.1016/j.agsy.2023.103686](https://doi.org/10.1016/j.agsy.2023.103686).
- Nevens, F., N. Frantzeskaki, L. Gorissen, and D. Loorbach. 2013. Urban transition labs: Co-creating transformative action for sustainable cities. *Journal of Cleaner Production* 50:111–22. doi: [10.1016/j.jclepro.2012.12.001](https://doi.org/10.1016/j.jclepro.2012.12.001).
- Nicholls, C. I., and M. A. Altieri. 2018. Pathways for the amplification of agroecology. *Agroecology & Sustainable Food Systems* 42 (10):1170–93. doi: [10.1080/21683565.2018.1499578](https://doi.org/10.1080/21683565.2018.1499578).
- Nyéleni Declaration. 2015. Declaration of the international forum for agroecology. Nyéleni, Mali. Accessed February 27, 2015. doi: [10.17058/redes.v24i1.13035](https://doi.org/10.17058/redes.v24i1.13035).
- Patterson, J., K. Schulz, J. Vervoort, S. van der Hel, O. Widerberg, C. Adler, M. Hurlbert, K. Anderton, M. Sethi, and A. Barau. 2017. Exploring the governance and politics of transformations towards sustainability. *Environmental Innovation and Societal Transitions* 24:1–16. doi: [10.1016/j.eist.2016.09.001](https://doi.org/10.1016/j.eist.2016.09.001).
- Peeters, A., K. Škorjanc, A. Wezel, and P. Migliorini. 2021. OASIS, the original Agroecological survey indicator system. *A Simple and Comprehensive System for Agroecological Transition Assessment*.
- Peña-Torres, J. A., and J. D. Reina-Rozo. 2022. Agroecology and communal innovation: LabCampesino, a pedagogical experience from the rural youth in Sumapaz Colombia. *Current Research in Environmental Sustainability* 4:100162. doi: [10.1016/j.crsust.2022.100162](https://doi.org/10.1016/j.crsust.2022.100162).
- Rastorgueva, N., A. Fasso, P. Migliorini, U. Schmutz, J. Conroy, T. Bandakova, S. Dinc, and Project Deliverable report 4.3. 2022. Project AE4EU - Action agenda report.
- Richardson, M., R. Coe, K. Descheemaeker, B. Haussmann, K. Wellard, M. Moore, and R. Nelson. 2021. Farmer research networks in principle and practice. *International Journal of Agricultural Sustainability* 20 (3):247–64. doi: [10.1080/14735903.2021.1930954](https://doi.org/10.1080/14735903.2021.1930954).
- Robayst, B., N. Van Hansewyck, B. Baccarne, and D. Schuurman. 2023. A qualitative analysis of the value creation of urban living labs. *International Journal of Innovation Management* 27 (5):2340007. doi: [10.1142/S1363919623400078](https://doi.org/10.1142/S1363919623400078).
- Schneidewind, U., K. Augenstein, F. Stelzer, and M. Wanner. 2018. Structure matters: Real-world laboratories as a new type of large-scale research infrastructure: A framework inspired by Giddens' structuration theory. *GAIA - Ecological Perspectives for Science and Society* 27 (1):12–17. doi: [10.14512/gaia.27.S1.5](https://doi.org/10.14512/gaia.27.S1.5).
- Schuurman, D. 2015. Bridging the gap between open and user innovation? Exploring the value of living labs as a means to structure user contribution and manage distributed innovation. Doctoral thesis, Ghent University. Ghent University Communication Sciences.
- Schuurman, D., and S. Leminen. 2021. Living labs past achievements, current developments, and future trajectories. *Sustainability* 13 (19):10703. doi: [10.3390/su131910703](https://doi.org/10.3390/su131910703).
- Schuurman, D., D. Mahr, L. De Marez, and P. Ballon. 2013. A fourfold typology of living labs: An empirical investigation amongst the ENoLL community. *2013 International conference on engineering, technology and innovation (ICE) & IEEE international technology management conference*, The Hague, Netherlands, 1–11, IEEE.

- Tittonell, P. 2020. Assessing resilience and adaptability in agroecological transitions. *Agricultural Systems* 184:102862. doi: [10.1016/j.agsy.2020.102862](https://doi.org/10.1016/j.agsy.2020.102862).
- Toffolini, Q., A. Cardona, M. Casagrande, B. Dedieu, N. Girard, and E. Ollion. 2018. Agroecology as farmers' situated ways of acting: A conceptual framework. *Agroecology & Sustainable Food Systems* 43 (5):514–45. doi: [10.1080/21683565.2018.1514677](https://doi.org/10.1080/21683565.2018.1514677).
- Turner, J., A. Horita, S. Fielke, L. Klerkx, P. Blackett, D. Bewsell, and W. Boyce. 2020. Revealing power dynamics and staging conflicts in agricultural system transitions: Case studies of innovation platforms in New Zealand. *Journal of Rural Studies* 76:152–62. doi: [10.1016/j.jrurstud.2020.04.022](https://doi.org/10.1016/j.jrurstud.2020.04.022).
- UNRISD. 2016. Policy innovations for transformative change: Implementing the 2030 agenda for sustainable development. Policy Innovations for Transformative Change.
- Valdivia, C., M. K. Danda, D. Sheikh, H. S. James, V. Gathaara, G. Mbure, and W. Folk. 2014. Using translational research to enhance farmers' voice: A case study of the potential introduction of GM cassava in Kenya's coast. *Agriculture and Human Values* 31 (4):673–81. doi: [10.1007/s10460-014-9536-0](https://doi.org/10.1007/s10460-014-9536-0).
- Vandenbroucke, V., B. Grard, W. Buckner, and Project Deliverable Report 2.4. 2022. Agroecology territories as targets of agroecological transformation in Europe.
- Wezel, A., M. Casagrande, F. Celette, J. F. Vian, A. Ferrer, and J. Peigné. 2014. Agroecological practices for sustainable agriculture. A review. *Agronomy for Sustainable Development* 34 (1):1–20. doi: [10.1007/s13593-013-0180-7](https://doi.org/10.1007/s13593-013-0180-7).
- Wezel, A., J. Goette, E. Lagneaux, G. Passuello, E. Reisman, C. Rodier, and G. Turpin. 2018. Agroecology in Europe: Research, education, collective action networks, and alternative food systems. *Sustainability* 10 (4):1214. doi: [10.3390/su10041214](https://doi.org/10.3390/su10041214).
- Wezel, A., M. Goris, J. Bruil, G. F. Félix, A. Peeters, P. Bàrberi, S. Bellon, and P. Migliorini. 2018. Challenges and actions points to amplify agroecology in Europe. *Sustainability* 10 (5):1598. doi: [10.3390/su10051598](https://doi.org/10.3390/su10051598).
- Wezel, A., B. G. Herren, R. B. Kerr, E. Barrios, A. L. R. Gonçalves, and F. Sinclair. 2020. Agroecological principles and elements and their implications for transitioning to sustainable food systems. A review. *Agronomy for Sustainable Development* 40 (6). doi: [10.1007/s13593-020-00646-z](https://doi.org/10.1007/s13593-020-00646-z).

ANNEXES**Table A1.** Elements of TF (Figure 1).

Element	Description
Enabling factors	<ul style="list-style-type: none"> – Trigger events or external pressures, constraints to agroecological transitions that need to be addressed (e.i. land tenure conditions, industrial agriculture presence, lack of knowledge, climate change) – Sense of urgency to changes/Need of improvement of territorial development/quality of life – Interests in agroecology & innovation (practical, scientific, technical, organizational, social, etc.) – Willingness to come together/sense of loneliness solitude/needs to connect and explore together – Presence of alternative food networks or interest in developing them – Access to funding/economic resources – Availability of facilitation and support (e.i. academia) – Infrastructure (presence of venues for the LL activities/advising offices/agricultural infrastructures . . .)
Used approaches	<ul style="list-style-type: none"> – Participatory workshops – Creation of a network between local stakeholders, policy makers and academia – Development of a Manifesto of each LL – Action-learning approach and Participatory research – Transdisciplinarity – Co-creation of knowledge and practices – Social inclusiveness – Activism and cooperation
Components	<ul style="list-style-type: none"> – Geography – Communication and network management – Participants of LL – Roadmap – Needs and constraints expressed by the participants – Tailored academic framework for the LL work – Social values and beliefs – Knowledge, co-creation and sharing – Objectives of the LL/network – Management – Committed actions and target audience – Outcomes
Impact dimensions	<ul style="list-style-type: none"> – Social – Economic – Environmental – Political – Organisational