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The transformative potential of Living Labs for biodiversity recovery

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Abstract
Living Labs are increasingly promoted with an aim to support sustainability transitions or transformations. In this article we explore the transformative potential of Living Labs, by interactively assessing three Living Labs for biodiversity recovery in the Netherlands with the aid of an existing reflexive assessment framework. Potentially transformative aspects of Living Labs include their local grounding and their focus on change, their diverse composition and embeddedness in larger networks, the building of bridging social capital, forms of experimentation and knowledge coproduction, their collaborative mode of operation, and actionable outputs. On the basis of this assessment, we propose that the transformative potential of Living Labs lies in their inherent collaborative mode of working, their focus on shifting practices, and their ability to contribute to shifting views through experimentation and learning. However, their transformative potential is also limited because they are less able to challenge, let alone disrupt. In addition, they have a limited focus on shifting structures. We propose that the nature of Living Labs will inherently limit their transformative potential. We conclude with recommendations to enhance the transformative potential of Living Labs in a network of networks. For example, Living Labs may raise their transformative ambitions, and more carefully consider their composition to include stakeholders that can help to achieve change. At the same time, we recommend to not expect too much of Living Labs, but to put complementary transformative strategies in place.

Keywords Transformative change · Agriculture · Transition · Partnerships · Reflexivity · Self-assessment · Biodiversity restoration

Introduction

While there is an increasing scientific consensus on the need for transformative change for 'bending the curve of biodiversity decline', various views exist on how such transformation will come about (IPBES 2024; Scoones et al. 2020; Termeer et al. 2024). Many scholars expect transformative change to start with 'local' initiatives that are 'seeds' of the ultimate transformation (Mommer et al. 2022; Preiser et al. 2024; Termeer and Dewulf 2019). Such initiatives can take many shapes and originate from various sectors of society, for example from civil society or from policy action. While

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many of such 'seeds' have some degree of intentionality and change orientation, Living Labs (LL) are among the initiatives that are purposely set up to spark innovation, transition and/or transformation (Cascone et al. 2024; Pel et al. 2020). Living Labs are partnerships of public, private, knowledge and civil society actors who engage in a collaborative search for ways forward in response to sustainability challenges (Bouwma et al. 2022). In many cases, Living Labs are supported with public funds as part of a sustainability governance strategy. Moreover, 'Living Lab' has become a policy buzzword that appears in numerous calls for research proposals, such as in Horizon Europe. For example, Living Labs are the cornerstone of the Agroecology Partnership, the FutureFoods Partnership and Soil Mission. Such policies seem to have an underlying assumption that Living Labs are a suitable approach to solve societal challenges.

Apparently, the expectations regarding the potential contributions of Living Labs to various policy goals are considerably high. We wonder whether these expectations are justified. Are Living Labs indeed 'the answer to the question' (cf. Burbridge 2017)? Are they the silver bullets through which sustainability transformations can be achieved? What is their transformative potential, and where is that perhaps limited?

In this paper we investigate the transformative potential of Living Labs, by qualitatively assessing three Living Labs aimed at biodiversity recovery in rural areas in the Netherlands, that were funded on the basis of a research grant. As participants in those Living Labs, the authors have engaged in a reflexive self-assessment. This enabled us to identify elements of Living Labs that have transformative potential, as well as elements that lack transformative potential. This is important to arrive at reasonable expectations of, and enabling conditions for Living Labs to contribute to transformative change. In addition, a better insight into the transformative potential of Living Labs may help their participants to join forces with others to compensate for their weaknesses, and governments to put complementary strategies in place, to support transformative change.

In the following section, we explain our main Theoretical concepts: transformative change, Living Labs, and transformative potential. Subsequently, we describe the Methods of collective and reflexive self-assessment and the assessment framework used. In the Results section, we report on the assessment of the three Living Labs to gain more insight into their transformative potential and the diverse pathways by which they may contribute. In the Discussion we reflect on our findings and our methods. Finally, we draw conclusions about the transformative potential of Living Labs, and we close with recommendations for Living Labs with transformative aspirations, for authorities and funders and for further research.

Theoretical concepts

Transformative change

In its recent Transformative Change Assessment (TCA), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) defines transformative change as follows: *"Deliberate transformative change for a just and sustainable world shifts views, structures and practices in ways that address the underlying causes of biodiversity loss and nature's decline*." (IPBES 2024, p. 5). The TCA identifies three key underlying causes of biodiversity loss: 1) disconnection from and domination over nature and people, 2) concentration of power and wealth, and 3) prioritization of short-term, individual, and material gains. Underlying causes are the deep leverage points beneath the indirect drivers of biodiversity loss - such as property rights systems and social norms - that cause direct drivers - such as pollution of water and soil – to persist. Addressing both direct and indirect drivers in order to restore biodiversity was already a main message in IPBES's global assessment report on biodiversity and ecosystem services, calling for transformative change (IPBES 2019). Again, such a profound societal change involves "*fundamental, system-wide shifts in views, structures and practices*" (IPBES 2024, p. 5). Views include beliefs, perspectives, values, forms of knowledge; for example in relation to economy, society and nature. Structures refer to organisation of society: including markets, governance, and rules. Practices include lifestyles, behaviours, and ways of production and consumption. Practices, structures and views influence, enable and constrain each other.

The concept of transformative change is based on a large and broad literature, which combines the schools of thought of transitions and transformations (Hölscher et al. 2018). Both strands of literature are based on the idea that fundamental qualitative changes are necessary to achieve social and ecological sustainability (Fèche et al. 2021; Feola 2015; Fisher et al. 2022; Hölscher et al. 2018; Visseren-Hamakers et al. 2022). According to (Stirling 2015), transitions are aimed at managing socio-technical changes, and transformations are more about 'culturing' broader societal change that originates from social movements. However, he acknowledges that the differences are subtle. In recent publications the strands of literature are coming together (Fisher et al. 2022; Loorbach 2022). In this paper, we use concepts from both schools of thought.

Scoones et al. (2020) differentiate between structural, systemic, and enabling theoretical approaches to transformative change. Though these approaches can be seen as complementary, they do represent different ideas about what transformative change is, and how it can be brought about.

Structural approaches refer to changes in the governance of production and consumption systems and the economic and political processes that stabilize the current situation. Systemic approaches refer to deliberate changes in the interrelationships between elements of social-technological-ecological systems, such as technologies, actors, and institutions. Enabling approaches are, in comparison to the previous approaches, more focused on the change processes rather than any specific outcome. Enabling approaches are focused on enhancing the agency of actors to contribute, collectively, to transformative changes. Living Labs can probably be seen as an operationalisation of an enabling approach to transformation.

The extent to which institutional change can be regarded as transformative according to Strasser et al. (2019) depends on the depth of change that is accomplished, the width of the change, and the extent to which the changes are being reproduced, thus the length or durability of the change. According to Termeer and Dewulf (2019)transformative changes cannot be at the same time in-depth, system-wide and fast. The basic idea of their 'small wins' theory is that relatively small changes can add up to large-scale change, if they have concrete outcomes, represent in-depth changes, are of moderate importance (e.g., happening at the local level), and represent a step forward in a shared (sustainability) ambition. A relatively quick and in-depth change ('small win') can be amplified later to system-wide change. More recently (Termeer et al. 2024) complemented the 'small wins' pathway with two others: 'big plans' (combining system-wide with in-depth change, accelerating later) and 'rule changes' (combining quick and system-wide change, before deepening the change). All three pathways have strengths and weaknesses that need to be addressed. Living Labs can be seen as a 'small wins' approach.

Living labs

A Living Lab is, depending on the author and perspective, a collaborative platform or a transdisciplinary research project in which different types of actors within a dedicated region or sector work together on a sustainability transition or transformation, such as towards nature-inclusive agriculture (Bouwma et al. 2022; Fèche et al. 2021; Hossain et al. 2019; Moruzzo et al. 2026). Originally, most Living Labs focused on technological innovations, which is in line with the focus of sustainability transitions research (which used to focus on socio-technological systems before expanding its scope to socio-(technical)-ecological systems) (Geels 2002; Nelson et al. 2007; Patterson et al. 2017). A Living Lab can be seen from different perspectives, for example, one could regard it as a concrete change initiative, an experiment or a partnership (Bouwma et al. 2022). Here, we study three partnerships that have been financed as part of a research programme; however, how they define 'their' Living Lab is one of the questions we raise in this study.

Living Labs can be seen as an 'instrument' to contribute to transformative change, facilitating the emergence of a 'niche' that is fundamentally different from the status quo (Fèche et al. 2021). Living Labs are aimed at co-developing and studying solutions to sustainability issues in a real-world setting. By engaging different types of stakeholders, such as scientists, policy makers and practitioners, Living Labs can draw from different types of knowledge (e.g. scientific and practical knowledge (Steins et al. 2022)), different strands of literature, and different perspectives (Bernstein 2015; Fèche et al. 2021; Marselis et al. 2024). This requires building social capital (relations of trust) between participants of these different groups. Capacity building, empowerment, and social learning are some of the processes that are regarded as necessary to realize transformative change for biodiversity, and in which Living Labs could potentially play a role (de Koning et al. 2023; Gamache et al. 2020). However, there are also critical issues, such as the lack of generalizability of the knowledge created in Living Labs (Beaudoin et al. 2022; Bronson et al. 2021), the challenge of being truly 'transdisciplinary' and sharing decision-making power, and dealing with power asymmetries (Galway et al. 2022). These latter two issues are especially important for transformative change, which is essentially about power shifts and challenging the status quo (Stirling 2015; Visseren-Hamakers et al. 2022).

Transformative potential

For change to be transformative, both the process and the outcome must be sustainable (Frantzeskaki et al. 2012). While there is a broad consensus that transformative change for biodiversity refers to the indirect drivers and underlying causes of biodiversity loss through changing *views*, *structures*, and *practices*(Fig. 1) (IPBES 2019, 2024), the way these are addressed matters (Turnheim et al. 2015; Visseren-Hamakers et al. 2022; Westerink et al. 2026). Using metaphors such as leverage, much transformative change literature assumes that transformative change can be deliberately influenced (Abson et al. 2017; Shrivastava et al. 2020). To influence transformative change, frameworks have been developed that describe 'transformative governance approaches' with specific principles that are deemed necessary, such as reflecting diverse values, addressing power asymmetries, and mediating across sectors and scales (Hölscher 2020; Pascual et al. 2022; Visseren-Hamakers et al. 2021).

Transformative potential of actions has dimensions of both process and (an orientation on) outcomes (Avelino

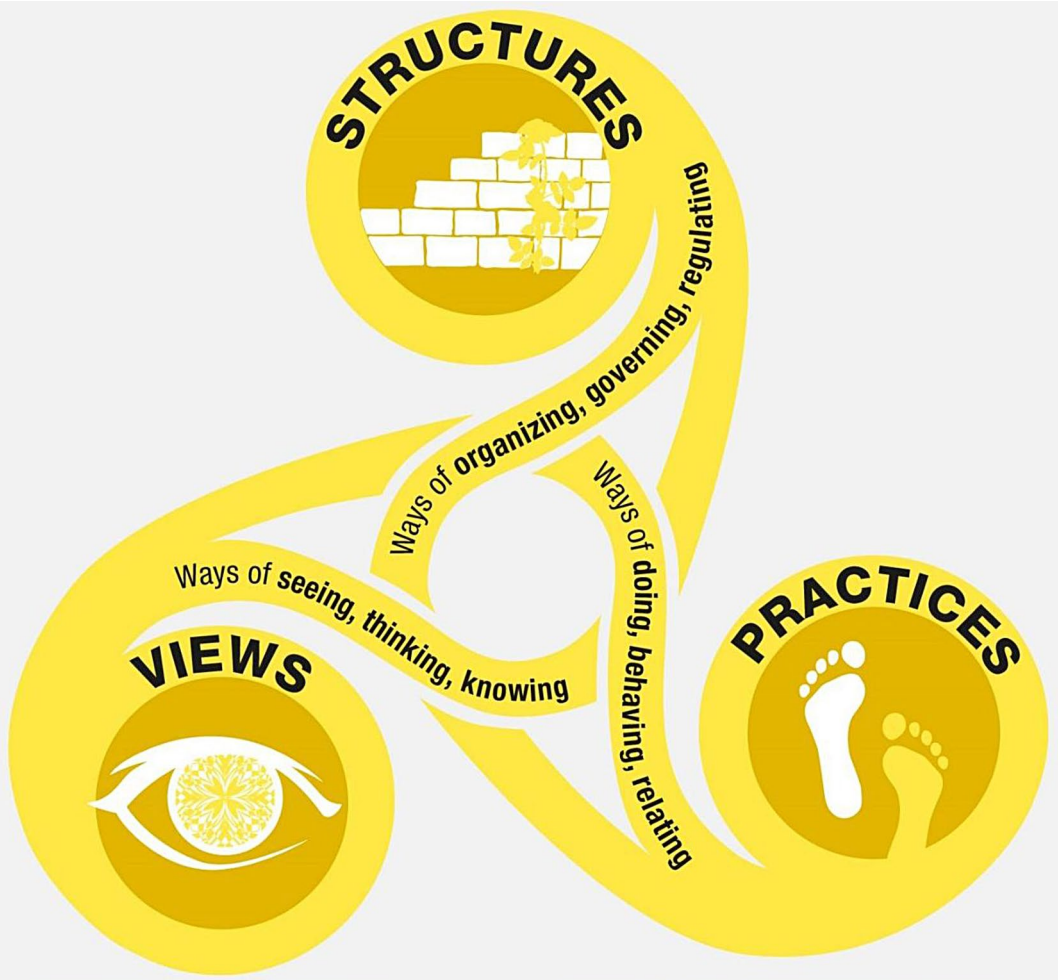

Fig. 1 Views, structures and practices: the three interwoven dimensions of transformative change. Source: IPBES (2024)

et al. 2019; Shrivastava et al. 2020). Based on this idea, Westerink et al. (2025) developed an evaluative framework to assess the transformative potential of networks. In this framework, the literature on transformative change (*what is the network changing?*) and governance (*is the network working in a transformative way?*) is brought together in a set of questions that can help map the implicit Theory of Change of a network and assess its transformative potential. A few concepts were influential in the design of the framework. Firstly, pluralising perspectives, values and knowledge was deemed essential for transformative potential (Chambers et al. 2022; Martin et al. 2024). For example, values of nature as perceived by people can be instrumental, relational and/or intrinsic (Pascual et al. 2023), and scientific as well as practice knowledge can be relevant. Secondly, the need for pluralising was an important reason to focus on transboundary networks such as Living Labs, engaging people from different worlds (Lazurko et al. 2025; Risien and Goldstein 2021). Therefore (thirdly) boundary work e.g. through coproduction of knowledge was seen as an important role of transformative networks (Chambers et al. 2022). And fourthly, the framework considers three pathways in the theory of change, or three modes of engagement, based on three different positions that networks can take in external processes: collaborate, challenge and disrupt (Westerink et al. 2026). Transformative networks *collaborate* with actors with a similar transformative ambition and empower biodiversity-positive initiatives; they *challenge* potential change agents to take responsibility and to change their practices; and they (peacefully) *disrupt* status quo actors and structures that prevent, resist or procrastinate the necessary changes. All three pathways are needed: they complement each other (Fig. 2). The transformative potential of a network then depends on navigating these pathways in response to specific situations and interactions, and leveraging the capacities of others in a network of networks (Westerink et al. 2026).

In the next section, we will explain how we used this framework in studying three different Living Labs in the Netherlands. We will investigate how the motivation and

Fig. 2 Collaborate, challenge and disrupt as three modes of engagement for transformative networks to combine and navigate. Source: Westerink et al. (2025)

Table 1 Overview of the theoretical framework

Transformative process		Transformative outcome
Steps in a Theory of Change for a network/Living Lab	**Three pathways for the Theory of Change/modes of engagement**	**Dimensions of transformative change**
Motivation and Mission Composition and Structure Internal Processes Activities External Processes Outputs	Collaborate Challenge Disrupt	Views Structures Practices

mission, composition and structure, internal processes, activities, external processes and outputs of the Living Labs, and the pathways that they combined and navigated, contributed to shifts in views, structures and practices (Table 1).

Methods

Context of the living labs

Ongoing agricultural intensification and specialization in the Netherlands have contributed to habitat fragmentation and environmental degradation. As a result, biodiversity has come under increasing pressure in agricultural landscapes. Since 1990, birds, mammals, and butterflies characteristic of agricultural areas have, on average, declined. Of the 47 key species associated with these areas, 29 have shown a decline over this period (CLO 2025). This context, which was further underscored by a 2017 study documenting a severe insect decline (Hallmann et al. 2017), led to the launch of a national initiative in 2018 aimed at achieving a systemic transformation to restore biodiversity in the Netherlands, known as the Delta Plan for Biodiversity Recovery (Deltaplan Biodiversiteitsherstel).

The Delta Plan represents a collaborative effort in which a broad coalition of actors has articulated a shared ambition to reverse biodiversity loss. The initiative involves not only nature organizations and governmental bodies but also farmer organizations and businesses, including some major supply chain actors, that have historically supported agricultural intensification and specialization. The Living Labs examined in this paper were established to support the objectives of the Delta Plan. They were funded through a research program of the Dutch Research Council, which ran from 2021 to 2026. Because it was funded by the Dutch Research Council, the primary initiating actors were knowledge institutes, although societal stakeholders were explicitly involved from the outset. Each Living Lab focussed on a specific region in the Netherlands.

Cases

LL Ablasserwaard is located in the lowland western part of the Netherlands (see Fig. 3) in an area that is characterized by peat meadows, and where dairy farming is the dominant agricultural land use. The Living Lab is closely linked to an existing partnership called *'Groene Cirkel Kaas en Bodemdaling'*(Green Circle Cheese and Soil Subsidence, hereafter Green Circle), in which a number of public and private actors and knowledge institutes have engaged in a collaborative search to address the challenges of biodiversity loss and climate change in relation to dairy farming (Bouwma et al. 2022). The Living Lab aims to monitor measures for biodiversity restoration on farms and to explore effective biodiversity measures, as well as business models for biodiversity- friendly farms, and forms of collective action to achieve biodiversity restoration and delivery of ecosystem services, with the aim of developing an integrated landscape approach.

LL B7 is located in the western part of the Netherlands (see Fig. 3). It is active in the so-called Dutch Dune and Flower Bulb Region (de Koning and de Koning 2024). This region is located on the coast and includes natural areas (dunes), several small towns and agricultural areas, which are predominantly used to grow flower bulbs such as tulips and hyacinths. There are also some grasslands and dairy farms located in the area. Conventional flower bulb production involves the use of high amounts of pesticides, and due to the sandy soils, phosphate leakage is another environmental issue in this landscape. The Living Lab is one of the first initiatives that aims, together with bulb farmers, to enhance biodiversity in the landscape. Therefore, it collaborates with organisations dedicated to biodiversity and sustainable bulb farming in the region to develop experiments for sustainable bulb farming and to raise awareness of the possibilities of biodiversity conservation in fields and field margins.

LL Ooijpolder-Groesbeek is located in the eastern part of the Netherlands (see Fig. 3) and covers the fluvial plains between the river Rhine and the moraines. The agricultural land use is characterized by a combination of dairy farming and arable farming. This Living Lab builds on an existing collaboration in the area, which has resulted in the large-scale restoration of a network of landscape elements, mainly on the edges of agricultural fields containing hedgerows, flower strips, small pools and dry-wet gradients. The Living Lab aims to identify the conditions that supported the restoration of this network of landscape features and what can be learned for other areas. A second aim was to explore with farmers what on-farm measures (such as flower-rich meadows, soil quality improvement) could be taken to promote biodiversity, with a particular focus on how ecosystem services can be used to sustain agricultural production.

Assessment framework

To assess the transformative potential of the three Living Labs, we used an assessment framework developed in the context of the BioAgora project (Westerink et al. 2025). This framework was developed to support Living Labs and other social networks in undertaking an interactive self-assessment of their transformative potential and to foster reflexive learning. The framework consists of probing, qualitative questions about the network's capabilities, practices, performances and conditions, organised according to eight steps in a Theory of Change. These steps are: 1) the motivation and mission of the network, 2) its composition and structure, 3) its internal processes, 4) its activities, 5) its external processes, 6) its outputs, 7) outcomes, and 8) ultimate impact in terms of transformative changes and biodiversity restoration.

Outcomes and impacts are beyond the scope of control of the network, but the motivation and mission of transformative networks is likely to refer to outcomes and impacts. For each step, facilitators can select questions that they deem most relevant for the network to discuss. The discussion of each step can be concluded by the participants attributing a score on a 4 points Likert scale to express their opinion on the transformative potential of their network for that particular step (e.g., activities). This is not meant as a judgement, but as an opportunity for reflection and improvement, and perhaps monitoring if the framework is repeatedly used. The framework can be used both in online and in offline settings. For the research reported in this article, we had an offline setting.

Fig. 3 The location of the three Living Labs for biodiversity recovery

Data collection

The collective self-assessment was organized through interactive workshop sessions during a meet-up of the researchers involved in the three Living Labs. Therefore, although other stakeholders in the Living Labs (except for one person) were not present that day, the assessment was undertaken 'from the inside'. Data were collected in November 2024. At the time of the assessment, the Living Labs had been operating for four years, enabling participants to critically

reflect on and evaluate the transformative potential of the Living Lab. Each Living Lab had its own workshop, facilitated by one or two members from a different Living Lab to reduce potential bias and enhance the reliability of the data collection process. In preparation for the workshops, the workshop facilitators had selected between one and four questions from the assessment framework for each of the eight steps, to guide the discussion (see Appendix I for the selected questions). However, care was taken to also be attentive to the other questions when participants introduced relevant insights or reflections during the discussions.

In the workshops, LL B7 and LL Ooijpolder-Groesbeek had six participants, and LL Alblasserwaard had five. Each discussion lasted approximately one and a half hours. The questions were discussed separately for each step of the assessment framework (e.g., Motivation & mission, Composition & structure), with the facilitator(s) capturing the main points and insights on a flip chart. After completing the discussion of each step, participants were asked to 'score' their Living Lab's performance in terms of transformative potential using a four-point Likert scale. These scores are not reported in this article because they were for internal use: for future monitoring and learning, and not for comparing or benchmarking. The discussions were audio-recorded and transcribed verbatim. Informed consent was obtained from all participants.

Data analysis and synthesis

The transcripts and data from the flip-charts were analysed by the facilitators. Deductive coding, based on the eight steps of the assessment framework (Westerink et al. 2025), was combined with inductive coding to identify key categories and the relationships between them for each of the eight steps of the assessment framework in each Living Lab (see Appendix I for the coding categories). The data were further analysed and synthesized in two subsequent in-depth discussions among the facilitators to review the codes, interpret emerging patterns, and develop a cross-case comparison. To strengthen the reliability of the analysis and synthesis process, the facilitators critically examined and challenged both their own and one other's interpretations during these discussions. The results of the cross-case comparison were then presented and discussed with the three Living Lab teams during a feedback session. A total of 23 participants took part in this session, most of whom had also participated in the workshops. The session served to validate and complement the findings and to deepen the Discussion section of this article.

Results

In this section, we discuss the results for the eight criteria of the assessment framework separately, combining findings from the Living Labs. In Table 2 we provide an overview of the results per Living Lab, as well as a summary of the main pathways followed in terms of the primary mode of engagement and the dimensions of transformative change that were addressed.

Motivation and mission

LL Alblasserwaard was dedicated to an already existing partnership and its 'dream' guiding the collaborative search for a good future for the area. The dream does not specify goals in terms of specific species, habitats, places or timelines. However, it is aiming at restoring farmland biodiversity and conservation of the cultural landscape (Bodemdaling and Groene Cirkels 2026). Stewardship as an important motivator for many farmers is explicitly mentioned in the dream, but this relational value is hardly used in the activities of the lab. Pathways are explored that do not severely impact the farming system: the focus is on measures that can be combined with current (farming) practices. While the dream enables and gives direction to collaboration of very different actors, such as farmers and policymakers, it lacks a truly transformative aspiration.

The reason of LL B7 to exist is contributing to change, although underlying causes are not explicitly addressed. The Living Lab focuses on catalysing the existing potential for change, by aligning with the motivation and sense of urgency of the stakeholders and 'creating commotion'. There was no clear goal at the outset, because the bulb farmers initially showed little interest in biodiversity. The network of the Living Lab had to be built from scratch, and the researchers were uncertain about to what extent farming practices could change. The Living Lab therefore focused on a process vision, i.e. how they would contribute to change, rather than a content vision, i.e. what kind of change they were working on. In their own words, they were "opportunistic" in terms of goals.

The core mission of the Living Lab Ooijpolder-Groesbeek is contributing to biodiversity restoration with an explicit dual focus on in-field measures (e.g., grassland management) and off-field measures (e.g., field margins and hedgerows). The main strategy is to connect with existing initiatives that can apply and benefit from the knowledge generated through the research, thereby creating practical impact. This focus on research is related to the founding of the Living Lab, which was set up in response to a local nature organization asking for research to scientifically demonstrate the value of the existing approach to landscape

Table 2 Summary of the assessment of the transformative potential of three biodiversity Living Labs

	Motivation & Mission	Composition & Structure	Internal processes	Activities	External processes	Outputs	Outcomes	Impacts	Pathway
LL Alblasserwaard	Restoring biodiversity while maintaining dairy farming.	Overlap with actors in Green Circle: researchers, policy makers, value chain.	Good collaboration driven by shared goals and facilitation.	Co-creative workshops and biodiversity monitoring.	Primarily collaboration with other actors in the wider Green Circle network, incl. farmers.	Outputs mainly targeted at policy and scientific audiences.	Contributed to the biodiversity debate in the area and development of policy (e.g. landscape features).	Recovery of biodiversity is not yet visible.	The primary mode of engagement is collaboration, with stakeholders rarely challenging one another. Transformative change is pursued by discussing new forms of governance, such as the Landscape Fund (structures), and occasionally by exploring values of nature (views).
LL B7	Driving change within bulb farming, without an explicit agenda.	Engagement a selective network of bulb farmers and farmers collective.	Researchers started with listening before initiating activities.	Communication, monitoring and joint experimentation on a demonstration field.	Collaboration for social capital building. Benefitting from disruption by others.	Communicative outputs for farmers, demonstration field and scientific studies.	Increased interest in biodiversity among bulb farmers. Regional bulb certificate.	The duration is too short for biodiversity recovery.	The primary mode of engagement is collaboration. Once social capital is established, challenging may become possible. Transformative change is pursued by shifting bulb-farmers' practices, with regional certification as an example of new structures.
LL Ooijpolder-Groesbeek	Restoring farmland biodiversity, specific focus.	Engagement with established networks.	Transdisciplinary collaboration was prioritised.	Field visits, experiments and monitoring.	Trying to remain independent as researchers.	Meetings wit farmers, field experiments and scientific publications.	Interactions and learning among farmers.	No noticeable impact on biodiversity yet.	The primary mode of engagement is collaboration, partly because researchers sought to maintain an independent role. Transformative change is pursued by attempting to change farmers' practices, while simultaneously encouraging a shift in their views (starting with the instrumental values).

restoration. The researchers regard their own original mission as not so transformative, but very fitting to the social network they work in.

The overarching motivation and mission for all three Living Labs is to encourage biodiversity restoration. LL Ooijpolder-Groesbeek and LL B7 focus specifically on shifting (farming) practices, where the first has set concrete objectives about how these practices contribute to biodiversity restoration, and the latter takes a more opportunistic approach. Shifting views is more implicit in the approach of the Living Labs, except for LL Ooijpolder-Groesbeek. LL Alblasserwaard, and to a lesser extent LL B7, also pay attention to shifting ways of governing (structures).

Composition and structure

The boundaries of the network involved in LL Alblasserwaard are fuzzy as the Living Lab is closely connected to the Green Circle. The composition of the Green Circle, with value chain partners, regional governments and research institutes was based on the assumption that all these were needed for a transition of agriculture. In addition to the seven core partners, a broader group of actors is involved in the network, including the farmer collective. The same stakeholder network is engaged in the activities of the Living Lab. In practice, there is a strong network in the area, but it is often the same spokespersons meeting each other on different occasions.

LL B7 strategically started in a smaller network, with a focus on the bulb farmers. One of the researchers was appointed as contact point for building relationships with the farmers. With a logo and a website the Living Lab has become an actor in the area (B7 2026). It functions as a network of networks with subgroups (and chatgroups) of work packages and field experiments. This network mainly consists of the researchers, the farmers and the farmer collective. The LL found it difficult to establish a collaboration with municipalities and value chain actors. Nature organizations and financial actors are not involved in the Living Lab either.

LL Ooijpolder-Groesbeek is seen as a geographical area in which researchers work on biodiversity restoration with partners. The partners of the Living Lab are mainly the change agents of the past, as it builds on an existing network. The Living Lab did not deliberately seek to include 'transformative actors' such as regenerative farmers, aiming instead to preserve existing relationships. Nonetheless, researchers varied in their approaches, with some engaging mainly conventional actors and others bringing in new or different ones. Participants questioned whether key actors, such as banks and retailers are missing in the network, and whether they should have collaborated more closely with other nature organizations.

The overarching conclusion is that the boundaries in terms of composition and structure of the Living Labs are somewhat blurred. The Living Labs can be conceived as 'networks of networks', in which researchers collaborate with each other and with various stakeholders in different levels of intensity. LL Alblasserwaard has the most complex structure with different layers of collaboration involving a wide range of stakeholders. LL B7 and LL Ooijpolder-Groesbeek have a more focused structure, with researchers at the core, who collaborate with farmers and relevant organizations, such as farmers' collectives.

Internal processes

Collaboration within LL Alblasserwaard varies: some parts work well together, while others do not, depending on joint ambitions and facilitation. For example, farmers are more interested in restoration of biodiversity, while the companies seem less interested; and there is little interaction between the ecological and the social-economic part of the work. Within the partnership and the research project, a shared language has developed as well as sufficient social capital to be able to disagree. However, stakeholders rarely challenge one another.

LL B7 had to find a way to communicate and collaborate with the bulb farmers as it is not as easy to explicitly express ambitions in terms of biodiversity restoration or to communicate more radical messages, e.g. related to the use of pesticides. The Living Lab chose to begin with listening and learning and to invest time into building relationships. It tries to pluralize, to give room to other values, and to adapt the message to the audience. Next to this, the collaboration between the researchers required attention, where the social scientists experienced little acknowledgement from their ecologist colleagues.

The researchers involved in LL Ooijpolder-Groesbeek established collaboration with farmers through co-developing a knowledge agenda, jointly designing practical experiments, and engaging in constructive dialogue around monitoring. Ecologists and social scientists needed to develop a shared language, which made collaboration challenging, especially in the beginning. The necessity to invest much time in communication and building relationships makes the participants question the feasibility of a short-term Living Lab, just as the inclusion of Ph.D. candidates whose main task is completing their thesis.

The commonality across all three Living Labs is that they face challenges in their internal processes. The projects bring together researchers from a variety of disciplines, but effective interdisciplinary collaboration has proven difficult

as efforts have largely focused on stakeholder engagement, i.e., transdisciplinary collaboration. All Living Labs emphasize the importance of adapting communication to the target audience and developing a shared language. In hindsight, these challenges made it hard to combine working in a Living Lab with Ph.D. projects. For that reason, LL Alblasserwaard chose to work with postdoctoral researchers.

Activities

As part of the Green Circle, the LL Alblasserwaard participated in dedicated sessions to revisit the dream and to evaluate and reflect on its implementation. In addition, the Living Lab organised workshops to bring together various stakeholders and co-produce solutions (e.g. Spekkink et al. 2026, Korf et al. 2025), which led, among other things, to an initiative for a new regional governance arrangement in the form of a 'landscape fund', intended to pay farmers for the ecosystem services they provide. Species monitoring was done in relation to measures proposed by farmers (e.g. insects in extensive grassland management (Siemer 2026)). Values of nature were addressed in a questionnaire among farmers (Westerink 2022), and in a workshop on landscape services and values (Yanore et al. 2024a). However, values of nature could have been given a more central role in the activities.

Activities in LL B7 focused primarily on bulb growing practices. After some time, there was enough leeway to invite the bulb farmers to visit an *organic*bulb grower in another area. This visit resulted in a demonstration field with hedges, flower strips (functional agrobiodiversity) and organic bulb production. Species monitoring focused on farmland birds in relation to insects emerging from ditches. In addition, the Living Lab contributes to the development of a regional certificate for bulb farmers, in particular to the biodiversity indicators (Greenport Duin- en Bollenstreek 2024). The enthusiasm of one young researcher during his biodiversity presentations implicitly conveyed the intrinsic value of nature.

LL Ooijpolder-Groesbeek focused on activities with farmers, including information sessions and field visits, supplemented with several field trips (see e.g., Via Natura and LL Ooijpolder-Groesbeek 2022). These efforts led to two large-scale field experiments initiated by the Living Lab in which multiple farmers piloted new practices related to multi-species grassland and flower strips (Janssen et al. 2024). Learning together – farmer to farmer and farmer to researcher – was central throughout all activities (Ploegmakers et al. 2025). Species monitoring was done in relation to soil biodiversity and landscape features. Although the Living Lab focussed on the instrumental value of nature, researchers noticed that farmers also valued biodiversity from a relational and intrinsic point of view.

Comparing the Living Lab shows that they share a common focus on stakeholder interaction and knowledge development related to biodiversity restoration on farmland. LL Alblasserwaard organized co-creation workshops with a broad network of stakeholders, aiming to develop new forms of governance. LL B7 and LL Ooijpolder-Groesbeek put greater emphasis on influencing farmers' daily practices through activities in which mutual learning is central. The Living Labs differ in how they engage with values of nature: LL Alblasserwaard aspires to stewardship but has not yet embedded it in activities, LL OoijpolderGroesbeek emphasizes instrumental values such as ecosystem services, and LL B7 did not adopt an explicit value framework.

External processes

The researchers involved in LL Alblasserwaard primarily engaged in collaborative interactions with farmers, farmer organisations, value-chain actors and financiers in the Green Circle network. During the reflections in the workshops, it was argued that the researchers could have adopted a more challenging or disruptive attitude towards financiers and supply-chain companies within the larger network. In contrast, adopting such an attitude toward farmers was viewed as counterproductive, as many are willing to act for biodiversity, and a disruptive approach could undermine their sense of ownership.

The researchers in LL B7 felt they first needed to learn from the bulb farmers, build trust, and strengthen social capital before they could challenge them with confrontational messages or urging them to take additional actions. There were several reasons for this: they did not feel that they had sufficient skills, they depended on the farmers for part of the success, and they felt it was not compatible with their focus on learning and with their role in building connections. In addition, they find it easier to challenge their own worlds: science and the 'biodiversity sector' need to change as well. The Living Lab did, however, benefit from disruption by others: national conflicts over pesticide use in bulb production sparked interest among local farmers (de Koning and de Koning 2024).

LL Ooijpolder-Groesbeek focused on an existing network of farmers, but as the project proceeded, more and different stakeholders were involved. The Living Lab focused on collaboration, and tried to stay out of political debates, such as the one on the Dutch nitrogen crisis. However, because several members had the relevant experience and expertise, they would also challenge farmers when needed. The participants questioned whether it is possible to challenge and disrupt when the Living Lab is part of an existing network.

They acknowledged that becoming part of an existing status quo network creates a danger of getting encapsulated and used as a form of greenwashing.

The three projects adopt a predominantly collaborative approach in their external interactions because this is fundamental to the Living Lab model. Participants feel that it is difficult to challenge stakeholders due to the reliance on their active participation. Challenging them may be feasible once strong relationships have been established, expertise has been clearly demonstrated, and mutual respect has been achieved. All Living Labs have avoided disruptive strategies and intentionally avoid taking part in polarising debates about more radical solutions. Establishing radical goals is not seen as feasible for Living Labs, although it was suggested that they could perhaps raise the ambition with a different stakeholder composition.

Outputs

Outputs refer to the products that have been delivered by the Living Labs, such as reports and online platforms. The main output of LL Alblasserwaard were the results of co-creative workshops, which were shared with the various participating stakeholders. For example, several co-creative steps were taken in the development of the 'landscape fund' designed to pay farmers for the ecosystem services they provide. Several reports and papers were produced aimed at policy and scientific audiences (see e.g. Yanore et al. 2024b). However, few outputs are useful for farmers.

LL B7 produced many practical outputs to facilitate communication with the bulb farmers, such as presentations, a video about biodiversity and a poster on nature-inclusive bulb production (B7 2024). The Living Lab also produced various scientific outputs (de Koning and de Koning 2024; de Koning et al. 2023). However, activities such as the demonstration field are considered more important than outputs, or serve simultaneously as activities and outputs.

In LL Ooijpolder-Groesbeek, the activities with farmers were seen as an important output in and of themselves. Reports as well as blogs were prepared after each meeting (see e.g., Via Natura and LL Ooijpolder-Groesbeek 2025). A second output concerns the field experiments with multi-species grassland (Janssen et al., 2024) and native flower strips. Finally, various ecological and social scientific studies have been published (see e.g. Baumgarten et al. 2025; Boone et al. 2025; Lexmond et al., in preparation; Ploegmakers et al. 2025; Witvliet et al. 2024).

The outputs of the Living Labs differ in nature and focus. LL B7 and LL Ooijpolder-Groesbeek have prioritised tangible outputs, such as demonstration projects and field trips to showcase how agricultural practices can become more environmentally friendly. LL B7 paid specific attention to communicative outputs (videos, posters) for the farmers.

Outcomes and impact

In this section we discuss outcomes and impact jointly because they are closely interlinked. Outcomes relate to effects beyond their 'span of control' either in terms of a shift in views towards valuing nature (paradigm shift), in changing (daily) farmers practices, or in integrating biodiversity into policies, rules or governance arrangements. Impact refers to the progress made in regard to 'bending the curve' of biodiversity loss, where significant reversal in declining trends in species abundance and richness can be observed.

In terms of **outcomes**, Living Lab Alblasserwaard has contributed to sparking conversations on collective action for biodiversity in the region. For example, the proposal of farmers to upscale 'biodiverse ditches', which was elaborated in Living Lab workshops (Spekkink et al. 2026, Korf et al. 2025), has been incorporated into a provincial programme for green-blue infrastructure (Mouthaan 2025). This programme could lead to up to 10% of the area to become biodiverse landscape features, which would make a considerable contribution to biodiversity restoration. To date, however, the **impact**of the Living Lab in terms of large-scale biodiversity recovery is limited, even though the Living Lab is embedded in a partnership that started in 2018.

By starting small and investing in social capital, more was achieved in Living Lab B7 than initially expected in relation to **outcomes**. A paradigm shift has been observed among the bulb farmers: interest in biodiversity and biodiversity friendly practices has grown. The integration of biodiversity into a regional certificate can also be considered as an outcome (Greenport Duin- en Bollenstreek 2024). However, the Living Lab has had limited influence on policy-making and public debate. In terms of **impact**, according to the participants, the duration of the Living Lab is too short for 'bending the curve' or achieving concrete, measurable biodiversity recovery. It may, however, have helped to take the first steps toward bending the curve.

The main **outcome**of Living Lab Ooijpolder-Groesbeek is initiating and sustaining a conversation about the relationship between biodiversity and agricultural practice. In addition, interactions among farmers seem to have increased (they regard the Living Lab as their 'study group' on biodiversity). As a result, farmers are showing a more positive attitude toward biodiversity, and the Living Lab has helped to build a bridge between science and practice. In terms of **impact**, while the approximately 20 hectares of multi-species grassland have yielded some biodiversity

gains, achieving significant and lasting effects would require a much larger area to be established (Ploegmakers et al. 2025). The observed shift in views on nature and farming may eventually result in increased biodiversity, but this is not yet evident.

In terms of **outcomes**, all three Living Labs have raised attention to biodiversity in farming practices. LL Alblasserwaard played a pivotal role in initiating dialogue with a wide range of regional stakeholders and supported the upscaling of measures. LL B7 has sparked significant interest among bulb farmers in more environmentally friendly practices (a paradigm shift) and has supported the integration of biodiversity into a regional certification program. LL Ooijpolder-Groesbeek has facilitated interaction among different types of farmers, creating valuable opportunities for mutual learning and exchange. Despite these efforts, the Living Labs have so far had limited **impact**due to their relatively short duration and limited scope.

Discussion

Discussion of results

Our results yield a number of relevant insights into the transformative potential of the Living Labs. Here, we discuss transformative potential in relation to scope and ambition, strategies for leverage, composition and structure and external positioning. In addition, we discuss how conditions set for these Living Labs by the funding scheme enabled and constrained their transformative potential. We provide recommendations in relation to our observations.

With a limited scope in terms of duration, budget, network and area, the Living Labs can at best have a modest contribution to transformative change for biodiversity. Nevertheless, all three Living Labs are aimed at restoring biodiversity and at contributing to change. What this would mean for the area, is not made very specific. Targets for biodiversity restoration are not set: the ambitions focus on promoting biodiversity-friendly farming practices such as species-rich grassland. Addressing underlying causes was not an explicit ambition of the Living Labs, but at the same time they aspire to shift practices, structures and views, although fragmented and to a limited extent. By experimenting, the Living Labs contribute to changing practices. By facilitating learning in transboundary multi-actor networks, and – in the case of B7 - futuring, the Living Labs contribute to changing views. By offering an alternative structure for collaboration, Living Labs can include experimenting with alternative forms of organisation, as is done in Living Labs Alblasserwaard (e.g, landscape fund) and B7 (e.g., regional certificate). However, this leverage by Living Labs is at a local scale and does not challenge system-wide structures. This is in line with the study by Sievers et al. (2026), who found that Living Labs contribute to shifting views, practices and informal governance structures, but influencing formal governance structures and broader institutions is more difficult. While it is relevant to produce 'contextualized, actionable' knowledge to enable concrete changes within the landscapes (Gamache et al. 2020), challenging system-wide structures is important to enable truly *transformative*changes.

We argue that the transformative potential of the Living Labs could be enhanced by being more explicit about transformative ambitions, the change envisioned, and biodiversity restoration aimed for. This can be supported by biodiversity monitoring, both to substantiate the need for transformative change and to show its impact on biodiversity. However, the ambition to contribute to change influences the composition of the Living Labs and vice versa. Being too ambitious will probably hinder collaboration with actors that are either part of the status quo, or not in a position to change. For one Living Lab (Alblasserwaard), this meant that a partnership was built with a diversity of actors who were seen as indispensable for achieving change, while for another (B7) this meant dedication to a specific group, to be able to build social capital and to move faster. Apparently, the trade-off between quick, wide and deep transformation (cf. Termeer et al. 2024), in addition to the specific farming sector and existing network within and outside the landscape (Timpanaro et al. 2024), evokes different approaches. We propose that at the onset of a Living Lab, the composition of the partnership must be considered strategically in combination and in interaction with its mission and ambition. Relevant stakeholder groups can include status quo actors, change makers, young people and representatives of non-human actors.

Within the Living Labs, a strong focus was put on conventional farmers, based on the assumption that focusing on the majority of farmers would lead to the biggest impact. To connect to these conventional farmers, the Living Labs approached biodiversity restoration on farmland mainly from an instrumental point of view (functional agrobiodiversity, ecosystem services), rather than emphasising the relational or intrinsic value of nature. Not addressing relational and intrinsic values of nature as well may have been an opportunity missed. Relational values such as stewardship can be important to conventional farmers, such as in the case of Alblasserwaard. Another balance that needs to be found by researchers is the balance between collaboration and legitimization of current practices. 'Positive' findings by ecologists could be used to legitimize current practices. In one of the Living Labs, an ecologist was asked to '*go to the capital to tell them [politicians] that there is nothing wrong with our farms*'. Another example of walking a

thin line is whether or not to involve 'alternative farmers', such as organic or regenerative farmers, into the Living Lab. In Living Lab B7, the researchers first focused on building trust with conventional farmers before involving 'other' farmers. In this case, this seemed to work out well, as the conventional farmers became interested in alternative ways of farming after a couple of years of engagement. However, involving these other farmers from the start could perhaps also have enhanced the transformative potential of the Living Lab.

In all workshops on transformative potential, the questions on the composition and structure of the Living Lab sparked reflection on its identity and the meaning of membership. The participants found it hard to distinguish the internal from the external network and considered their Living Labs to be networks of networks. The fuzzy boundaries of the Living Labs may be a strength and a challenge (Toffolini et al. 2021). Openness (as opposed to strongly defined membership) may benefit shifting views through the exchange of different perspectives, values and knowledges. However, fuzzy boundaries may also hinder a strategic consideration of positioning in relation to external networks. For example, reaching agreement on a strategy to challenge or disrupt in interactions with external actors on behalf of the Living Lab maybe harder when it is not clear who 'we' are, or when some members have a relation of dependency with the external actor. These two sides of fuzzy boundaries of Living Labs are in line with Risien and Goldstein (2021), who conclude that transformative networks treat boundaries dynamically, moving between a stronger definition (enabling influence and authority) and fluidity (enabling growth and expansion of knowledge resources). We argue that transformative potential of Living Labs can be enhanced by managing their boundaries strategically, on the basis of what they want to achieve within the Living Lab and how they wish to influence others. Depending on the situation, they may choose to present themselves according to a narrower (e.g. scientists working with practitioners) or a broader membership (e.g. scientists and practitioners).

Of the collaborate, challenge and disrupt modes of positioning in external networks, the 'collaborate' mode was most prominent in the Living Labs. This is not surprising, collaboration – between scientists, public authorities, businesses and other stakeholders - being Living Labs' reason to exist (Cascone et al. 2024; Gava et al. 2025; Timpanaro et al. 2024). It may be for that reason that challenge and disrupt as modes of operation are found difficult. Challenging each other as scientists seems easier than challenging partners in the Living Lab with whom social capital has carefully been built in the course of time. However, now that the social capital is there, the scientists feel that they have also built the legitimacy to challenge their partners now and then. Disruption is not seen as a suitable or feasible option in the networks of these Living Labs. To be able to combine collaborate and challenge with disrupt pathways, Living Labs would need to ally with additional networks. We argue that Living Labs could enhance their transformative potential by adding a challenging mode to their default mode of collaborating, and by combining their efforts in networks of networks with others who do have the capacities to disrupt actors with vested interests in the status quo.

The Living Labs in this study were funded as research projects. By funding Living Labs explicitly, the funding organization promoted collaboration between scientists and stakeholders. However, this transdisciplinary orientation resulted in stakeholder engagement taking precedence over interdisciplinary collaboration. Stronger collaboration between social scientists and ecologists would benefit the Living Labs, because it would not only demonstrate the ecological effectiveness of certain initiatives, but also help to explain the circumstances under which they will be effective (see Witvliet et al. 2024). This requires more systematic and sustained dialogue among researchers about combining insights from ecology and the social sciences, including explicit engagement with their distinct foundations, methodological approaches and disciplinary languages. It also necessitates explicit strategies for integrating diverse types of data, both qualitative and quantitative, in ways that enhance explanatory power. Current studies on biodiversity recovery rarely pursue this level of integration, resulting in parallel, disconnected streams of evidence (see McCracken et al. (2015) and Hasler et al. (2022) for similar arguments in the context of agricultural landscapes).

The research funding resulted in researchers doing most of the paid work, and in difficulties compensating farmers for their efforts in the Living Lab, which is necessary for farmers to be able to experiment and adopt new practices and/or technologies (Timpanaro et al. 2024). These experiments are not always "publishable" (James et al. 2025), which is difficult when this is expected from the researchers, especially if their career depends on it. The scheme that funded these Living Labs mainly funded temporary Ph.D. positions. Combined with the expectations of Ph.D. research in academia – with a focus on publishing disciplinary research in peer-reviewed journals -, this constrained transdisciplinary collaboration. Another limitation resulting from the funding mechanism, is the time frame of projects. The limited time frame of a project (in this case, five years) is not sufficient for long lasting partnerships, let alone for a serious contribution to bending the curve of biodiversity loss. Building social capital, developing joint strategies and monitoring take place in iterative cycles during a longer period of time. There is a mismatch between the processes aspired by Living Labs and current mechanisms of project

funding. That funding mechanisms for Living Labs are both enabling and constraining is in line with observations of Horcea-Milcu et al. (2024), Gava et al. (2025) and Sievers et al. (2026) about funding transformative research and Living Labs.

Discussion of methods

Using the framework for interactively assessing the transformative potential of our Living Labs supported a joint reflection and learning. It also yielded relevant insights into the functioning and dynamics of the three Living Labs. Some participants also noted that the self-assessment helped them to develop a clearer understanding of what transformative change entails, including its practical implications for the design, activities, and operational approaches of initiatives aiming to contribute to such change. Moreover, the process was appreciated as a meaningful integrative activity that connected the three Living Labs, fostering a sense of coherence across the initiatives.

Involving more of the other stakeholders in the Living Labs in the self-assessment could have enriched the discussions and perhaps would have yielded additional insights for example in terms of external processes and outcomes – because of the unique position of the stakeholders in networks of networks. Organising a self-reflection session in each Living Lab could be a good follow-up to enable the stakeholder networks in their transformative aspirations. Moreover, introducing the transformative vocabulary in the stakeholder networks of the Living Labs could be considered as a form of '*challenging*'. However, care should be taken to tailor and translate the assessment questions to become meaningful and comprehensible to the stakeholders.

Based on our experiences, we also see some opportunities for improvement in the way we performed the assessment. Some participants noted that it would have been beneficial to have more time and material to prepare for the self-assessment. Immediately before the individual Living Lab workshops there had been a plenary introduction session to familiarize participants with the framework and the concept of transformative change. Some participants felt they lacked sufficient background information to meaningfully contribute to the assessment and would have preferred to receive the framework in advance, allowing them to prepare more thoroughly. This could also have prevented confusion about certain concepts, such as the difference between outputs, outcomes and impacts. In addition, during the feedback session the importance of the framework not being a tool to judge or to hold networks accountable, but being a tool for joint learning and reflection, became very clear. Comparison risks turning into benchmarking and competition. It was helpful to experience this sensitivity in a setting with researchers first, before implementing the approach in a setting with stakeholders.

Conclusion

For transformative change for biodiversity policy makers and academics have high expectations of bottom-up innovative initiatives such as Living Labs. In this article, we explored the transformative potential of Living Labs by interactively assessing three Living Labs for biodiversity recovery in the Netherlands with the aid of an existing reflexive assessment framework. Based on these cases, we propose that Living Labs do have transformative potential, but that this potential is also limited.

Potentially transformative aspects of Living Labs include their local grounding and their focus on change, their diverse stakeholder composition and embeddedness in larger networks, the building of bridging social capital, forms of experimentation and knowledge coproduction, their collaborative mode of operation, and actionable outputs. Through collaborating, experimenting and learning in the field as well as in forms of organisation, Living Labs can contribute to influencing practices, fostering new structures, and shifting views at the local level.

However, the nature of Living Labs will inherently limit their transformative potential. Firstly, their scope in terms of area, network, and time and resources is limited. Being place-based is favourable for local change, but many underlying causes take place at a much higher level of scale. Similarly, a limited network of participating stakeholders is favourable for collaboration but cannot include all relevant actors. If the composition of the Living Labs is limited to status quo actors, their transformative potential is contained (cf. Smith et al. 2016). In addition, the project form of many Living Labs, with bounded time spans and resources, make that Living Labs can only make a small contribution to transformative change. Secondly, their collaborative identity favours a collaborative mode of working. Challenging can be a deliberate choice at strategic moments and with sufficient bridging social capital, but disrupting could severely damage the collaboration. Both limitations are reasons for Living Labs to make better use of their network of networks: to extend their influence beyond their own scope, and to make use of the skills of others to challenge and disrupt.

The Living Labs that we studied, all in their own way, tried to contribute to changes in practices, structures, and views. However, in terms of transformative potential they have room for improvement. We recommend that they raise their transformative ambitions, more carefully consider their composition to include stakeholders that can help to

achieve change, find a balance between defining themselves and being an open network, take care of both trans- and interdisciplinarity, challenge their stakeholders more, and strive for long-lasting collaborations. Nevertheless, all three Living Labs resulted in more attention for biodiversity in their region.

In general, we recommend that Living Labs reflect on their transformative potential and enhance it where they reasonably can. An assessment framework such as the one applied in this article can support such joint learning efforts. At the same time, Living Labs cannot realize transformative change on their own. They need to be supported with funding, leeway and network. Governments and other powerful actors also need to take their responsibility in addressing underlying causes at other levels. For policy makers and funding organisations that aim to support Living Labs, we have the following recommendations: 1) Acknowledge the strengths as well as the limitations of Living Labs. Do not burden Living Labs with unrealistic expectations in terms of outcomes and impact. 2) Support the network of networks that can complement and leverage the capacities of Living Labs. 3) Match the funding conditions to the needs of Living Labs: allocate funding for salient research and addressing context-specific questions, make possible the financial compensation of farmers as participants and experts, and develop financial arrangements for longer lasting engagement to transcend project structures. And finally: 4) Put additional strategies in place, such as large-scale landscape planning ('big plans') and legislative changes ('rule changes') that enable farmers and the farming sector to change in a transformative manner (Termeer et al. 2024).

In this research, we have studied the transformative potential of Living Labs by means of a self-evaluation of three Living Labs. As this is a limited sample and a specific research approach, we suggest that more longitudinal research is needed into a larger number of Living Labs and with multiple methods. Remaining questions include which underlying causes are most suitable for Living Labs to address, what are the most effective strategies for Living Labs to do so, and what conditions (e.g. institutional) are necessary for Living Labs to obtain their full transformative potential? These conditions relate to a second suggestion for future research, which is to further explore how Living Labs can be embedded in transformative governance mixes that contain complementary instruments? The third suggestion relates to one of the most important discussion points within the self-evaluation of our Living Labs: could Living Labs become more transformative if they incorporate activist and disruptive goals and actors? For this question, Living Labs that do incorporate these goals and actors should be studied, and if absent, establishing such a Living Lab could be an interesting experiment.

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meadow areas: A portfolio of practices for improving biodiversity in the Alblasserwaard - Vijfheerenlanden and their potential for business models of Dutch dairy farmers. In farming practices to improve biodiversity in peat meadow areas: A portfolio of practices for improving biodiversity in the Alblasserwaard - Vijfheerenlanden and their potential for business models of Dutch dairy farmers. Wageningen: Wageningen University

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