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RESEARCH: A RELATIONAL TURN IN SUSTAINABILITY

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Creating alternative future trajectories for carbon farming through a relational lens: pathways towards transformative social-ecological change in the European Union

Susanna Barrineau[a,b], Thao Do[b] and Neil Powell[b]

[a]University of the Sunshine Coast, Maroochydore, DC, Australia; [b]Center for Health and Sustainability, Department of Women's and Children's Health, Uppsala University, Sweden

ABSTRACT

This paper investigates how futures thinking and relational thinking may expand practices and strategies in agriculture that aim for sustainability. Using carbon farming as a case where relational thinking is brought into conversation with futures thinking, we explore how imaginaries of sustainability transformations can be further expanded to include ways of knowing, being, and doing that imagine more radical, relational, and ethical futures. Based on the analysis of a diverse empirical material including European Union reports, focus group discussions, and workshops with carbon farming stakeholders in Sweden using the futures method Causal Layered Analysis, this paper offers a critical relational lens for approaching and evaluating strategies and practices that aim for sustainability transformations in agricultural systems.

KEY POLICY HIGHLIGHTS

- Assumptions and norms found in carbon farming as a European Union strategy are dominated by economic goals under the remit of eco-managerialism. These deny deep transformation.
- The futures tool Causal Layered Analysis (CLA) can help illustrate the worldviews and paradigms at work in current policy and practice discourse and facilitate a deep examination of the qualities of strategies and frameworks aiming to address climate and related social-ecological crises.
- Futures thinking and relational thinking are a joint resource for the current climate and agricultural policy paradigm to expand imaginaries for what is possible in agricultural futures.

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Carbon farming; relational futures; CLA; soil; transformation; imagination; possibility

1. Introduction

> *Nature is an important ally in our fight against climate change.*
> - European Green Deal – Delivering on Our Targets (2021, p. 22)

Carbon farming is a strategy presented in European Union (EU) policy documents to mitigate intersecting crises related to climate change, degrading soil health, and food security, to name a few (EU, European Commission n.d.). This paper explores current EU policy on carbon farming, as well as agriculture and nature-based solutions more broadly, and draws further on insights from carbon farming stakeholders in Sweden. Agriculture and linked food systems are simultaneously major contributors to overlapping social-ecological crises and hugely vulnerable to the effects of these crises (Paustian et al. 1997; Campbell et al. 2017; Béné 2020; van der Ploeg 2020; McGreevy et al. 2022; Clapp 2023). Deep socio-ecological transformation of these systems is necessary, where not only what land management methods and accompanying schemes are changed, but *how* these changes happen, are significant (O'Brien 2018; IPBES 2019; Wamsler et al. 2021; Bentz et al. 2022; Vogel and O'Brien 2022). Yet, the kinds of changes set into motion through different policy frameworks and processes have fallen far short of the necessary deep transformations (O'Brien 2018; Wamsler et al. 2021). Against this backdrop, we draw on theoretical insights from relational thinking and argue for futures thinking to accompany this inquiry into the emerging strategies and practices of carbon farming. Our findings indicate that assumptions and norms found in carbon farming are dominated by economic goals under the remit of eco-managerialism, which frames and constrains what is possible.

The 'relational turn' prompts an examination of relationships and the patterns of relations at work, emphasizing that a focus on human agency is

CONTACT Susanna Barrineau susanna.barrineau@research.usc.edu.au
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inadequate for the kinds of deep social-ecological transformations currently needed (West et al. 2020). Futures thinking and anticipation as well as research that reflect on time and temporality are fields of study that can help bring a critical gaze to how relationships are organized in carbon farming. They do so in two key ways which we discuss in this paper: 1) they help explore the complex interplay of human-more-than-human forces that shape futures (Granjou et al. 2017; Groves 2017), and the diverse temporalities that make up presents (Adam 1998; Poli 2011; Facer 2019) and, 2) they draw attention to the ethical imperatives of being in relationships of interdependence (Rose 2012; Puig de la Bellacasa 2017; Whyte 2021). These elements speak to the distribution of capacities to influence futures and form a critical relational lens for reflection into the relational qualities of carbon farming strategies and possibilities for alternative futures.

With these perspectives which we refer to as relational thinking and futures thinking, we take a closer look at carbon farming to make sense of the logics that are at work in trying to promote these land management practices at European, Member State, and more local levels. Carbon farming incentivizes the management of plants and soils to sequester greenhouse gases (GHGs) (Dumbrell et al. 2016; Baumber et al. 2019; Mattila et al. 2022) and is considered a viable practice for rebuilding soil health and mitigating and adapting to climate change (Bradford et al. 2019; Paustian et al. 2019).[1] The sustainable management of soils that carbon farming promotes is considered a key part of the EU's roadmap to climate neutrality (Verschuuren 2018; Montanarella and Panagos 2021) and is moreover promoted as a 'green business model' (McDonald et al. 2021, p. 49), with pilot projects happening at different scales in different parts of the EU.[2] Inspired by Krzywoszynska and colleagues' (Krzywoszynska 2019; Krzywoszynska et al. 2020; Krzywoszynska and Marchesi 2020) work around the practical ethics of soil care and by the thematic focus of this special issue, we work with this paper's research questions in relation to EU and Swedish contexts: *What are the logics at work in the carbon farming contexts, and what possibilities do they generate and which do they proscribe? How can futures thinking surface relational thinking that expands the imaginaries at work in carbon farming contexts?* We work with the futures method causal layered analysis (CLA) (Inayatullah 1998; Milojević and Inayatullah 2015) to unpack current policy and practice discourse. CLA illustrates the worldviews and paradigms at work and facilitates a deep examination of the qualities of carbon farming strategies and frameworks. While largely conceptual in nature, this paper contributes to reflexive practice by highlighting the tensions and ethical questions to which the relational and futures perspectives call our attention. We argue that connecting futures and relational thinking can not only provide important critical nuance to agricultural climate strategies, but also support a cultivation of possibility thinking (Facer 2023) that enriches imagination of agricultural futures.

We begin by outlining the capacity of futures thinking to make visible relational thinking, emphasizing their joint potential to depart from 'business as usual' sustainability pathways and to open up new ways of thinking and doing, and exemplify this with the theoretical and practical provocation to 'think with soils' (Salazar et al. 2020). Using CLA, we then present findings from the analysis of EU documents as well as workshops and focus groups with carbon farming stakeholders in Sweden. Next, we discuss key tensions from these findings including the kinds of knowledges seen as legitimate and who and what are absent in current discourses. We conclude with discerning a possibility space and opportunity for reimagination where we identify seeds of possible alternative futures (Poli 2011; Bennett et al. 2016). This paper thus aims to offer a critical relational lens to how we can approach and evaluate strategies and practices working towards transformative social-ecological change in the agricultural context.

2. Deepening the relational through futures and time

To provide a critical *and* imagination-spurring account of carbon farming, we work with two connected strands of thinking emerging from futures thinking, anticipation, and research that reflect on time and temporality (hereon referred to collectively as 'futures thinking') that help deepen our relational inquiry into carbon farming. We engage with relational thinking as an approach that has an explicit analytical and conceptual focus on 'patterns of relations, produced within dynamic intersecting processes' (DeLanda 2006 in West et al. 2020, p. 310). With such an analytical lens, it becomes possible to engage with a broader spectrum of epistemologies and ontologies that decenter the human and 'allows us to investigate conditions of possibility' (Powell 2013 in Darnhofer 2020, p. 515), to explore how relations enable or hinder change and how these relations are stabilized or undone (Darnhofer 2020, p. 519). We argue for the importance of futures thinking that helps us think relationally and are particularly interested in emphasizing and exploring the attention to *possibility* that futures and relational perspectives jointly offer. This leads us to the two strands: The first strand engages with the anticipation of futures and how anticipation shapes and is shaped by human and more than human relationships.

The second strand proposes that the relational nature of time is important for how futures can be imagined. Together, we propose that these strands form a critical relational lens by working as a foundation for reflection into both the relational qualities of carbon farming strategies and possibility thinking for alternative futures. We conclude this section by 'thinking with soils' to exemplify this critical relational lens in the context of agricultural futures.

2.1. Socio-materiality of anticipation

The first strand supports inquiry into the socio-material aspects of anticipating futures. Simply put, how we think, feel, and live toward futures is co-constituted by the material living earth system (Granjou et al. 2017). The nonhuman, including environments, are therefore not static backgrounds for human activity, but agents in crafting shared futures (Granjou and Salazar 2016). Representations and imaginaries of futures, including their diverse knowledge practices, social actions, and normative frameworks, are already stitched into material environments (Groves 2017; also see; Ingold 1993). Anticipation is thus both biophysical and cultural (Bussey 2014b, 2019), shaped by not just cognitive data, but a wide range of bodily 'senses' that tunes in to the emergent and novel quality of a context (Bussey 2019, p. 66). These perspectives on anticipation can help make sense of 'how certain futures become explicit objects of common concern, and how capabilities to influence these processes, and with them, the present as well as the future, are differentially distributed' (Groves 2017, p. 31). In other words, exploring the socio-materiality of anticipation reveals the inequalities in influencing individual and collective futures by deciding which aspects of the social and natural worlds become relevant.

We find Groves's (2017) demonstration of 'lived' futures and 'empty' futures illustrative of how different 'modes of anticipation' organize relationships in an issue space. Outlining a case around building new energy infrastructure, Groves exemplifies a dominant mode of anticipation that is organized around predicting and optimizing responses for energy-secure futures. These are 'empty' futures, where anticipation is based on knowledge practices and socio-technical infrastructures that legitimize quantifiable forecasting and focus on a restricted set of variables, plotting the future on a 'single predictable trajectory' (Groves 2017, p. 34). In this way, empty futures as an anticipatory mode attempt to tame particular kinds of uncertainties about futures. This contrasts with 'lived futures' visible in a community-owned renewable energy project. In this context, 'rhythms of living conducted in places and within communities form [anticipation's] material and affective basis' where 'connection and attachment make it possible to deal with uncertainty' (Groves 2017, p. 35). Empty and lived futures demonstrate how the material organization of capacities to influence futures prioritize different knowledge practices (e.g. quantitative or experiential and embodied) and, therefore, distribution of expertise (e.g. distant and standardized or embedded in place and affective). Modes of anticipation have political implications for who participates in creating futures as can be seen in empty futures where hegemonic forms of anticipation converge (Adams et al. 2009, p. 248). In the case of anticipating futures in the carbon farming context, we are therefore able to pose a set of questions about 1) what gets erased (e.g. the kinds of problems seen as problems), 2) what is made visible in the modes of anticipation (e.g. how carbon rather than other GHGs came to be central), and 3) the kinds of relationships to the future these modes create (e.g. how capabilities to influence presents and futures are distributed). These questions can help probe into the relational qualities of carbon farming.

We now turn our focus to the second strand within futures thinking to add nuance to the temporal politics of making futures by drawing attention to the relational.

2.2. Time as relational

Building on the first strand, here we approach futures thinking as a field that makes explicit the relational nature of time (Adam 1998; Adam and Groves 2007; Inayatullah 2008; Milojević 2008; Loewen Walker 2014; Bussey 2017). In such an approach, we see presents as complex, made up of diverse temporal experiences that are visible, unseen, and latent (Adam 1998; Poli 2011; Facer 2019) where how we approach time matters for futures imaginaries. For example, linear clock time is an approach to time accompanying industrialism, capitalism, and colonialism. Linear clock time forms a powerful conceptual unit that 'constitutes the deep structure of the taken-for-granted knowledge associated with the industrial way of life, creating the by now accustomed semblance of certainty and control' (Adam 1998 in Milojević 2008, p. 333). This 'hegemonic time' normalizes time as a commodity, and in so doing, devalues the environment and futures (Adam 1998; Milojević 2008, p. 333 –334; see also see also Puig de la Bellacasa 2015).

Yet, non-linear times and the relationships formed within and by those times create the 'stems of multiple futures' (Terry et al. 2024, p. 5). This means that looking beyond hegemonic time opens up for witnessing and participating in temporal diversity and alternative futures outside the regime of commodified time. 'Time as kinship', where kinship is 'an ethic of

shared responsibility' in opposition to linear time, is an example of how Indigenous persons have articulated climate change through changes in kinship relationships (Whyte 2021, p. 39–40). In her ethnographic work, Rose (2012, p. 131) illustrates the temporal patterns at play in the coevolution of flying foxes and myrtaceous flora that 'intersect to form dense knots of embodied time'. She argues that these knots of embodied time are sites of mutuality, interconnectedness and become visible if we are open to the experiences of nonhuman groups and the histories and futures told by the knots formed by their lives. These examples of alternative temporalities foreground questions of how we want to live in 'the world of multispecies differences and connectivities' (Rose 2012, p. 135). Mutual interdependence forms the basis for an ethical approach to relationships which demand responsibility and attentiveness (Rose 2012; Whyte 2021). In these examples, we can start to scratch the surface of the heterogeneity of temporalities, which includes ecological time, kinship patterns, rhythms, clocks, and which all co-exist. Within this temporal diversity, we begin to glimpse the complexity of a 'thick present' where multiple layers of reality provide the ingredients for creating futures (Poli 2011). This includes aspects which are visible but also latent – 'seeds' of different futures (Poli 2011, p. 74) which are powerful sources of possibility thinking.

2.3. Opening agricultural futures

As we will describe further in our methods, futures thinking can assist in examining the multiple layers of presents, helping us to deepen futures and shed light on deep unconscious stories that shape future trajectories (Inayatullah 1998; Camrass 2020). What we see as crucial at this stage is that, through bringing into focus how different approaches to time affect our anticipatory capacities, thinking with futures and the relational is mutually enriching. In connecting these two strands, we summarize two key elements that support a critical examination of carbon farming as a futures-making practice. First, how we anticipate futures forms relationships with uncertainty, creates actions in the present, and plays a role in how we move through time (Adams et al. 2009). Modes of anticipation shape what and whose temporalities – whether it is knots of embodied time, lived futures or linear clock time – become seen, how problems are shaped as collective concerns, and therefore who gets to participate in shaping futures. A socio-material perspective on anticipating futures can thus help us to consider what is at work in shaping, stabilizing, and undoing human and more-than-human relations created by different visions of and actions toward futures. Second, we recognize the ethical imperative that emerges from our mutual interdependence within human and more-than-human relationships which problematizes dominant temporalities and expands notions of who counts as agents in making futures. It is this thick present of lived futures which we see as invitation to explore the possibilities that emerge when we view agency to create futures as a collective endeavor and which we argue offers a rich foundation from which to explore carbon farming. We thus move to the context of agricultural futures to add nuance to these futures and relational perspectives by delving into the invitation to 'think with soils' (Salazar et al. 2020).

We see generative openings for agricultural futures and carbon farming with the provocation to 'think with' soils which prompts reflection on the collective endeavor of knowledge production (Staffa et al. 2022) surrounding the capacity of soils to sequester carbon. From this perspective, soils are seen as 'dynamic ecologies in the becoming of which human beings are implicated, with whom they are shaped, and on which they depend' (Krzywoszynska and Marchesi 2020, p. 194). Thinking with soils, therefore, requires putting relations into focus, as soils and what constitutes them can no longer be conceived of as predetermined, if indeed they ever were seen as such (see Krzywoszynska et al. 2020). Seeing soils simply as a resource to be managed and without any of its own agency, or as a site of practical engagement with the physical imbalance of greenhouse gases, is insufficient to support deeper transformations towards sustainability. This line of thinking aligns with the theoretical and political work of Darnhofer (2020) in the context of agriculture and farms, which has begun to conceptualize how relational thinking opens possibilities for reimagining farms. From this perspective, farms are not static sites of human management but are webs of interactions where also the agency of nonhumans contributes to 'unpredictable dynamics of becoming' (2020, p. 507).

This move to decenter the human is generative in the context of agricultural futures because it allows us to move away from 'human separation and domination' (Davies 2021, p. 16) towards alternative ways of relating to each other in these contexts. Ethical action with soils acknowledges our dependency on soil ecosystems and our mutual shaping of each other which is an emergent process, where how we affect and are affected by soils is unpredictable and nonlinear and has the potential to shift into unknown directions. Ethical action must therefore be speculative. Speculative engagement is an invitation to imagine beyond the status quo and, crucially, it is an ethical engagement with human-soil relations that 'may open a route toward a practical and life-restoring onto-politics across scales' (Krzywoszynska and Marchesi 2020, p. 194). Carbon farming may

therefore be conceptualized as a site of diverse human and more-than-human agents who are in reciprocal and sometimes collaborative relationships rather than managerial and controlling ones. The present context of carbon farming becomes a site of possibility, rather than predetermined futures. With a relational lens on carbon farming, we can also begin to make sense of the 'soil realities' that are acted upon, and which ones are marginalized (Krzywoszynska and Marchesi 2020, p. 194).

However, as discussed earlier, hegemonic approaches to time and modes of anticipation come together to create the dominant operating logics for creating futures. To begin to make sense of this in the context of carbon farming, it is thus important to understand drivers for futures in carbon farming and what constitutes the deeper layers of this agricultural context. We have, so far, introduced relational and futures perspectives as theoretical resources for our study. We now work with the futures method CLA to identify drivers for futures and, further, to problematize current ways of talking about and acting for sustainable futures. In this way, we deepen our approach to futures to help us see the thick present and begin to explore the seeds of alternatives to business-as-usual.

3. Methods

Futures thinking supports reflection on presents in a deep, layered manner (Camrass 2020). Causal layered analysis (CLA) is an analytical method that has multiple uses, including mapping worldviews and core narratives and articulating transformed futures (Inayatullah 2022). It supports the deconstruction of issue areas and the imagination of alternative futures and policy actions through a layered analysis of discourses that identifies the drivers or underpinnings of the issue area (Inayatullah 1998). It is by working also with these deeper layers and the complex underpinnings of issue areas that working with CLA aligns with the work of deep transformation called for in sustainability science and beyond (Wamsler et al. 2021; Bentz et al. 2022). In the case of carbon farming, CLA can thus help illustrate the deeper worldviews and paradigms at work, including the underpinning ideas that organize relationships. As a heuristic device, CLA frames our examination of the qualities of carbon farming as a strategy to help the EU work towards the climate and sustainability goals outlined in the European Green Deal.

CLA is based on the idea that 'the present is characterized by phenomena working at different levels of depth, duration and visibility' (Poli 2011; see, p. 70; Inayatullah et al. 2022; Inayatullah and Milojević 2015). As a method, CLA has two main orientations. The first is a taxonomical deconstruction or description of issues or problems. The second is a more creative process of issue/problem reconstruction or reimagination. Inayatullah (1998) describes CLA as a way to undefine the future – it makes problematic the units of analysis, unlinking thinking from current assumptions and challenging the existing logics at work in an issue context. It is a way to draw out different ways of knowing (Inayatullah 1998), being, and doing by focusing on layers and the 'various streams of causality operating in unison upon an issue' (Ramos 2003, p. 36). Inayatullah (2008) argues that solutions can be deeper when we bring the perspectives of each of these levels to bear on our interventions. CLA thus helps to draw out the relationships between knowledge and action at work in the carbon farming context.

There are four layers in CLA: **the litany layer**, which focuses on descriptions and shallow accounts of issues without critique; **the system layer** which considers the social, technological, economic, environmental, and political causations for the issue or problem; **the worldview layer** which provides an opportunity to examine the ideologies, discourses, paradigms, and values that underpin or challenge these systems of social organization; and **the layer of metaphor and myth**, which engages with the deeper stories and foundational narratives that give meaning to life. This CLA is based on relevant European Union policy documents and reports, focus group meetings, and workshops with carbon farming stakeholders in Sweden. We formulate questions for each of the four CLA layers that guide our reading of the material and illustrate how carbon farming is co-created in this context. These questions are: *1) Litany: What concepts are used to understand why the transition to carbon farming is needed? 2) System: What are the trends and drivers of carbon farming? Who is responsible for implementing these practices? 3) Worldview: What are the ideologies and discourses that underpin carbon farming? 4) Myth/metaphor: What are the metaphors that make sense of the worldviews?*

Our reading of the material through the CLA offers, first, a taxonomical reading (Bussey 2014a). Here, we work with the first research question of exploring the logics at work in this carbon farming context and the possibilities that emerge or are excluded. Our goal is not to outline a single truth, but to illustrate the complexity of the policy arena and experiences and perceptions in relation to the field of carbon farming, containing tensions, contradictions, and hope. This rich description of the context is particularly important because it thickens the present, helping us to do some of the work that relational thinking demands by making explicit, and therefore allowing us to interrogate, concepts, language, and cultural myths in this

context which are performative in that they make the world (West et al. 2020). As Inayatullah (2004, p. 71) argues:

> The project here is to show that the real has come about for various reasons and that the coming about of a specific 'present' means the non-realisation of other 'presents'. Thus, in any given moment, *what-is* is an imposition, a silencing of various ways of thinking, of doing, and a realisation of other ways of thinking.

We continue to work with the CLAs in addressing this paper's second research question where we consider how a futures lens surfaces the relational which may expand the imaginaries in this context. In this second step, we engage speculatively with broadening future visions where we identify a possibility space and opportunity for reimagination with the concept of relational futures. CLA thus allows us to move from deconstruction to reconstruction, where seeds of alternative futures help us explore alternative 'hows' of transformation.

Rather than top-down steered change processes, we stand behind the importance of communities themselves being the main drivers of transformation and the creation of alternative futures. The processual approach to CLA works from such a standpoint, where participatory processes aim to surface many alternative futures (Bussey 2014a). Our use of CLA at this stage in our research did not engage with the participatory approach, and is simply descriptive. However, we are motivated by academic discussions around the importance of scholarly 'thinking and writing as productive ontological interventions' (Gibson-Graham 2008, p. 614). For us as academics, this means that we see our role as thinkers and writers that can foreground 'social and economic experiments [...] and helping proliferate them through research by analyzing, highlighting, and conceptualizing economic relations outside of the capitalist mainstream' so that they become 'more real and more credible as objects of policy and activism and thus open an imaginative space for alternatives' (Gibson-Graham 2008, p. 616). Our aim with using CLA to analyze and illustrate this carbon farming context is, therefore, not just to demonstrate a discouraging lack of deep transformation through familiar capitalist initiatives, but also to discern a possibility space and opportunity for reimagination where we identify seeds of possible alternative futures (Poli 2011; Bennett et al. 2016). We do this by exemplifying some of the openings for what we call 'relational futures' through an alternative, third CLA (see Table 6).

3.1. Data production

The data was produced from 74 EU publications, two focus group meetings, and three workshops held in Sweden. The events were conducted with the aim to co-design a serious game around carbon farming that could be played with different stakeholder groups, e.g. policy makers or mixed stakeholder groups, and frame processes for mutual learning. Game co-design as an iterative and systemic practice has the potential to support communities in working through complex relationalities that converge and emerge in climate futures, by engaging stakeholders in systematic ways (Flood et al. 2018; Powell et al. 2021). Serious games have been shown to provide an intervention platform that facilitates cross-boundary interactions, strengthens relationships between diverse stakeholders (for example, increased mutual trust and empathy), as well as supports an improved understanding among the participants of the complex issues at stake (Jean et al. 2018). These reasons motivated us to work with game co-design as a research approach and we detail the focus of the meetings below.

The EU documents were searched for on the webpage of Publications Office of the European Union.[3] Documents published by the EU about climate, agriculture, and related topics are important sources for understanding the types of discourses and ideologies that have formed and legitimized carbon farming as a strategy (Omar and Thorsøe 2023). The interest was to find documents relating to soil carbon sequestration and carbon farming – these two being different since carbon farming relates to more than just sequestering carbon in soils, but to a host of co-benefits beyond that that are relevant for the future outcomes or impacts of carbon farming. To narrow down the results two main combinations of search terms were used, which are listed in Table 1.

Using titles and abstracts, these results were further narrowed down by excluding results that did not match any of the subject or key word criteria. This left 29 documents in the first search and 59 documents in the second. 14 of the documents were duplicates leaving 74 documents to be included in our analysis (see Appendix B).

The 18 documents highlighted in green explicitly focus on 'carbon farming' and/or 'soil carbon sequestration'; 32 documents highlighted orange consider agriculture, future soil sustainability, and often implicitly refer to soil carbon sequestration; and 22 documents highlighted in yellow refer to nature's or soils' capacity to store carbon and are considered relevant albeit peripheral to the main focus of this research article, as they provide important policy context, e.g. the document on the European Green Deal speaks to: 'Restoring nature and enabling biodiversity to thrive again offers a quick and cheap solution to absorb and store carbon' (European Commission, D.-G. for C 2021, p. 22). These categorizations are to make transparent the documents that do not explicitly mention soil carbon sequestration or carbon farming but that set the context for

Table 1. Document Search Categories.

Search category	Search 1	Search 2
Collection	EU publications & Summaries of EU legislation	EU publications & Summaries of EU legislation
Document Format	PRINT & PDF	PRINT & PDF
Corporate Author(s)	European Commission & European Parliament	European Commission & European Parliament
Languages	English	English
Document Year	2020 & 2021 & 2022 & 2023 & 2024	2020 & 2021 & 2022 & 2023 & 2024
Subject	Climate change policy	Soil improvement, Sweden, reform of the CAP, agricultural policy, farmer, common agricultural policy, soil protection, farming sector, land use, soil analysis, and sustainable agriculture
Key Words	'carbon farming' & 'sequest'	'carbon farming' & 'sequest'
Number of Results	233	348

the introduction of these types of nature-based solutions in land use. During the document search, the inextricably connected yet semantically disconnected framing of carbon farming from the topics of soil management and its intended effects on climate, soil biodiversity, soil organic matter, soil structure, carbon sequestration, farmer livelihoods, and agricultural politics became apparent. We interpret these documents as a reflection of the interwoven complexity of human-soil relations and thus, distinct categorizations of them based purely on specific keywords would be somewhat naïve and certainly represent a reductionist interpretation of them.

The other source of data for this paper comes from two focus groups and one workshop held in 2021, and two workshops held in 2022 in Sweden. The two focus groups gathered carbon farming stakeholders convened by the authors' research group in online discussions over Zoom in June and September 2021. These stakeholders were identified through our pre-existing networks, online desk research, and the snowballing method (Colvin et al. 2016). They represented academia, public, private and civil society sectors engaged in various issues connected to carbon farming and regenerative agriculture, including soil carbon research, NGOs supporting carbon farming pilot projects, climate compensation, and environmental policy advisors. Each meeting lasted one and a half hours and involved 10–11 participants. The first meeting focused on surfacing multiple perspectives on carbon farming and the opportunities and challenges associated with the development and implementation of frameworks for monitoring, reporting and verification of soil carbon sequestration. The second meeting focused on alternative approaches to certify carbon farming to support wider uptake of carbon farming practices in Sweden. In this session, we were not only interested in the technicality of certification but also the values and the motivation underpinning the certification. These two meetings were recorded on Zoom after the consent of the participating stakeholders, who were informed about the aims of the research, the use of the data collected and agreed to participate voluntarily before the meetings.

The third occasion in 2021 was a two-day futures visioning workshop convened by a non-profit Swedish carbon farming initiative in December where farmers piloting carbon farming methods on their farms, agronomists, researchers, and representatives from the food production industry participated to discuss future visions of the Swedish food system that are based on carbon sequestration. The lead author participated in this workshop as participant-observer and note-taker. This workshop was part of another university's project, and the lead author described our research project to the participants at large, gaining their written consent to participate, observe, and report on our findings.

Finally, two workshops held in Uppsala, Sweden, by the authors' research group in May and October 2022 convened stakeholders around an iterative game co-design process that aimed to support discussions around opportunities and challenges in building sustainable agricultural systems. Both workshops were five hours long and involved 12 and 14 participants respectively. The first workshop invited the generation of ideas for transformative pathways to which carbon farming may contribute, using rich pictures, working with picture cards, and inventing system shocks or disruptions. In the second workshop, stakeholders played the first game prototype, gave reflections on the process and input into the design and content of the game. The meetings were recorded with participant consent and transcribed. The meetings happened in both Swedish and English, and the quotes from participants speaking Swedish were translated by the authors.

3.2. Data analysis

To analyze the documents and the transcriptions with CLA, we worked with the steps for coding and analysis provided by Bishop and Dzidic (2014). Since the codes are already determined by the layers in the CLA – litany, system, worldview, and myth/metaphor – we proceeded by coding each layer in the transcripts and documents independently. This involved a single read for each

layer and also meant that the coding was an iterative process where the allocation of codes was revisited through each reading. We used the process of coding the litany in CAPS, system in *italics*, worldview as underlined, and myth/metaphor as **bold**. With the EU documents, we assigned each layer a color. Often, excerpts from the transcripts and documents were relevant for more than one layer, which we could easily notate within this coding process.

This step of coding between layers was followed by a thematic coding within layers. In this case, we looked for patterns or trends that responded to the question we assigned each layer. We constructed thematic maps by clustering excerpts that were thematically related together on large paper. We then worked to convey the thematic maps in a consolidated form through the final CLAs which we present in the section below. In this way, CLA is an exercise of interpretive engagement, where we as the authors impose order through these layers to make sense of the competing narrative forces and tensions. As such, this is *one* reading where many might emerge. Furthermore, the layers are not mutually exclusive, nor is there an implied hierarchy with, for example, litany being the least important and myth/metaphor the most important.

4. A layered reading of carbon farming

The following tables (see Figure 1 and Appendix A) present the findings of the CLA from the material that aim to address the first part of our question: *What are the logics at work in the carbon farming contexts?* The tables aim for conciseness, tying together common threads in a summative way and are elaborated upon further in this section. In documents that do not explicitly mention 'carbon farming' (CF) or 'soil carbon sequestration' (the orange and yellow categories), the litany and system layer questions were interpreted considering the role of soils in transitioning to sustainable futures. This means that we use them to capture the elements important for context, such as what sustainable soil management means, and which actors are seen as responsible for enacting change.

On the litany layer (Table 2), we conceptualize the reasons for carbon farming and related futures. In general, the focus of the documents centered on meeting climate objectives which would in turn accelerate the transformation to a climate-resilient future. Here, key phrases such as 'bringing nature back to agriculture' (European Commission Directorate-General for Research and Innovation et al. 2020, p. 34) and 'nature is an important ally in our fight against climate change' (European Commission, D.-G. for C 2021, p. 22) are connected to futures that are climate neutral and sustainable. Drawing on the key concepts from the Swedish context, carbon farming is needed to mitigate the effects of and the vulnerability of farmers within industrial agriculture, monopolies, and a linear food system focused on profits. Action is crucial to stay within planetary boundaries, acknowledging that we live in an interdependent and interconnected system. Future environmental sustainability is tied to creating an economic system that rewards action towards revitalizing ecosystems.

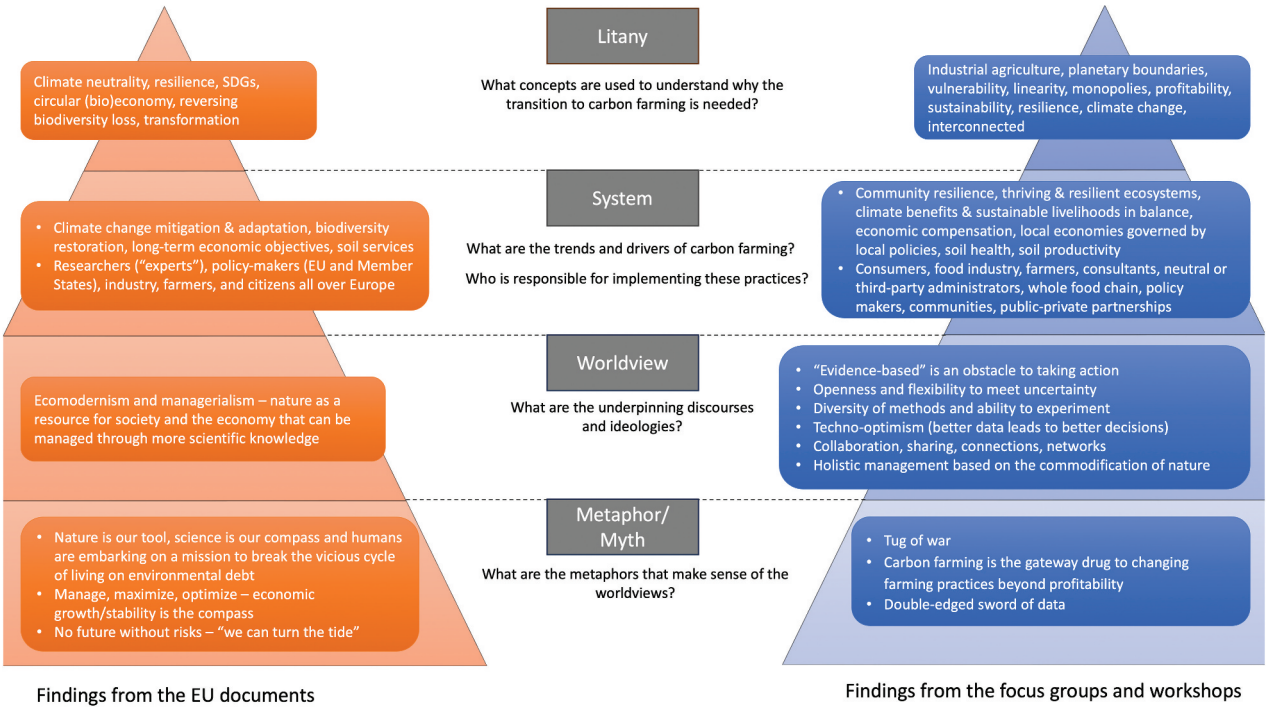

Figure 1. Combined CLAs.

Table 2. CLA findings, Litany layer.

Layer	Guiding Question	Applying CLA to EU documents
Litany	*What concepts are used to understand why the transition to carbon farming is needed?*	Climate neutrality and resilience, Sustainable Development Goals (SDGs), circular (bio)economy, reversing biodiversity loss, and transformation
		Applying CLA to focus groups and workshops in Sweden
		Industrial agriculture, planetary boundaries, vulnerability, linearity, monopolies, profitability, sustainability, resilience, climate change, and interconnected

The system layer perspectives (Table 3) characterize the type of action carbon farming entails and considers the impacts of carbon farming as well as who is responsible for taking action. In the EU documents, a quick and cheap solution to absorb and store carbon is offered by measures that restore nature and enable biodiversity to thrive again. Soil health can improve through the monitoring of soil carbon, widespread adoption of best management practices, and sustainable soil management. However, the system layer perspectives from the Swedish context demonstrate a different language around carbon farming. Here, we see important drivers as community resilience and thriving, resilient ecosystems. These are part of a prioritization of actions that enhance social, economic, and environmental co-benefits over farming methods that merely focuses on high yield quantity. This means that climate benefits and sustainable livelihoods need to be in balance. Responsibility is spread widely, though actors such as researchers, policy makers, and industry are seen to hold the largest responsibility on the EU-level. The whole food chain – consumers, industry, farmers, consultants, communities, policy-makers – play important roles in making the transition to carbon farming happen from the perspectives brought in the Swedish context. Furthermore, knowledge spreading, collaboration, and experimentation were named as key parts of any systemic transformation.

At the worldview layer (Table 4), we draw out some of the discourses and paradigms that underpin the litany and system layers perspectives. Control and mitigating risk are central aspects of the EU documents. Risk is characterized as irreversible changes to the biosphere where human societies and economies need to be aligned with Earth's ecological systems. Human actions have led to the 'unleashing unstoppable planetary forces with huge socio-economic consequences' which is an existential threat to the world (European Commission Directorate-General for Research and Innovation et al. 2020, p. 3). Time is short to mitigate these risks, though some documents even expressed hope that 'we can still turn the tide' (European Commission Directorate-General for Environment 2022, p. 6). Control manifests as so-called sustainable and circular management, underpinned by research to obtain robust estimates of the effects of different practices on soil carbon sequestration. These actions can reduce uncertainty and derive clear policy recommendations. To succeed in these types of management efforts involve increasing knowledge and subsequent knowledge transfer to maximize the potential of carbon sequestration, which is usually communicated through scientific

Table 3. CLA findings, System layer.

Layer	Guiding Question	Applying CLA to EU documents
System	- *What are the trends and drivers of carbon farming? – Who is responsible for implementing these practices?*	- Climate change mitigation & adaptation, biodiversity restoration, long-term economic objectives, and soil services - Researchers ('experts'), policy-makers (EU and Member States), industry, and citizens all over Europe
		Applying CLA to focus groups and workshops in Sweden
		- Community resilience, thriving, resilient ecosystems, climate benefits & sustainable livelihoods in balance, economic compensation, local economies governed by local policies, soil health, and soil productivity - Consumers, food industry, farmers, consultants, neutral or third-party administrators, whole food chain, policy makers, communities, and public-private partnerships

Table 4. CLA findings, Worldview layer.

Layer	Guiding Question	Applying CLA to EU documents
Worldview	*What are the ideologies and discourses that underpin these documents?*	Ecomodernism and managerialism – nature as a resource for society and the economy that can be managed through more scientific knowledge.
		Applying CLA to focus groups and workshops in Sweden
	What are the ideologies and discourses that underpin these focus group and workshop discussions?	- 'Evidence-based' is an obstacle to taking action - Openness and flexibility with uncertainty - Diversity of methods and ability to experiment - Techno-optimism (better data leads to better decisions) - Collaboration, sharing, connections, networks - Holistic management based on the commodification of nature

and economic models. Finally, in framing nature as an important technology, ecosystem services may be harnessed to move the EU beyond business-as-usual, leading the EU instead to operate in a circular bioeconomy that increases its competitiveness and sustainability. Agriculture is a business opportunity, and central to cultures and traditions of Europeans. Real mitigation needs to make economic sense – there needs to be incentives for land managers to adopt these practices. Some documents (e.g. European Commission Joint Research Centre et al. 2021) explicitly connected this move beyond business-as-usual as moving beyond neoliberal economic logic.

While risk mitigation and control are present in the focus group and workshop contexts, they are expressed with difference nuances. On the one hand, the phrase 'right direction' alludes to practices that mitigate climate change and lead to a host of social, economic, and environmental co-benefits. However, uncertainty of the relative success of methods regarding carbon sequestration is an obstacle to moving in this direction, and technology has great promise in helping to measure progress. Thus, with better data harnessed by technological and scientific improvements, actors can make better decisions. As one focus group participant put it: '*we have to somehow also trust in the development of this technology; we have to count on the technology that will exist in the future not only look at what we already have*' (Participant, September 2021 Focus Group). The high-risk context is characterized by uncertainty with regard to climate and economic instabilities, but also the risk of trying new farming methods with uncertain results. This uncertainty and associated risk creates the need to decrease complexity, opting for smaller, simpler, and concrete practices; something inspiring, positive, and easy to communicate so that everyone understands. Care for soil health is thus underpinned by the need to produce yields and by the economic value of soil carbon. On the other hand, 'evidence-based' practices are expressed as an obstacle to doing good things where science cannot provide a clear pathway for transformation since, '*You are never going to have that high of resolution in the science and in climate accounting that is needed to kind of detect the differences between a good method and a bad method*' (Participant, May 2022 Workshop). Under both discourses of the role of science, openness and flexibility to a diversity of farming methods and the ability to experiment are generally regarded as crucial characteristics to any food system transformation due to the complexity of biological life.

At the fourth layer of analysis, the myth/metaphor layer (Table 5), the discursive tensions on the previous layers manifest in different forms of agency given to nature and humans. The EU documents paint a picture of humans embarking on a mission that will 'keep us safely on Earth with healthy soils!' (Veerman et al. 2020, p. 4), drawing inspiration from humans' mission to the moon. Here, 'no future without risks' and 'we can still turn the tide' are mantras. In these depictions, nature is our tool to break the vicious cycle of living on environmental debt, where 'soil is a vast reservoir of carbon' (European Commission Directorate-General for Agriculture and Rural Development 2021, p. 4). Science is one compass, but profit through managing, maximizing, and optimizing is the other compass. In the voices from the Swedish context, we hear that the work to sequester carbon in soils is a '*tug of war*' (Participant, May 2022 Workshop) between those whose want to do good on the ground and create good food systems and those who primarily see the financial potential and want to clean up or climate compensate their own businesses. In this struggle, some expressed the idea that carbon farming could be considered a kind of gateway drug[4] to understanding the benefits of changing farming practices beyond profitability: '*maybe people go into it for the money but then they try it and after a few years they realize I am making more money without the, you know, I actually don't need the economic incentive anymore to do it, because I see that these are actual benefits I get from doing this anyway*' (Participant, May 2022 Workshop). Regarding the role of science in determining action, the perspective was voiced that, '*The problem with data of course is that it is a double-edged sword. It can be enabling but also crippling*' (Participant, May 2022 Workshop). To add to this metaphor, '*Going down the measurement road*' was regarded as problematic by some participants, seeing it as '*a bit of a lottery for*

Table 5. CLA findings, Myth/Metaphor layer.

Layer	Guiding Question	Applying CLA to EU documents
Myth/Metaphor	*What are the metaphors that make sense of the worldviews?*	- Nature is our tool, science is our compass and humans are embarking on a mission to break the vicious cycle of living on environmental debt - Manage, maximize, optimize – economic growth/stability is the compass - 'No future without risks' – 'we can still turn the tide'
		Applying CLA to focus groups and workshops in Sweden
		- Tug of war - Carbon farming is the gateway drug to changing farming practices beyond profitability - Double-edged sword of data

the farmer whether his field comes out as a sink or a source' (Participant, June 2021 Focus Group).

5. Futures in tension

Thus far, we have used CLA to deconstruct and present a snapshot of the carbon farming context based on EU documents and grassroots events in Sweden. These readings serve as a point of departure to work with our questions: *What are the logics at work in the carbon farming contexts, and what possibilities do they generate and which do they proscribe? How can futures thinking surface relational thinking that expands the imaginaries at work in carbon farming contexts?* We turn now to this task by putting the CLA layers of both data sets in dialogue with each other.

Our results show that the 'win-win' of carbon farming denies the emergence of a relational paradigm, and is oriented to linear, progressivist timelines (Adam 1998; Puig de la Bellacasa 2015). At the litany layer of EU-level Table 2, climate change, resilience, and sustainability objectives are examples of key organizing concepts for action on the system layer – improving soil services, economic objectives, and finding good management strategies that respond to the litany concepts. The impacts of carbon farming are described as wide reaching and are reached by actions with quantifiably communicable results underpinned by an ecomodernist, managerialist worldview. The metaphor of a mission akin to humans' moon mission establishes a foundational narrative rooted in the myth of (hu)man as scientific pioneer. This signals an attitude of 'we can still turn the tide'. The stories of science as savior terraform the planet while viewing 'nature' as 'out there', strengthening the story of the separate human and 'other'. The discourse of managing nature for sustainability oriented around economic goals on the litany and system layers finds resonance in the non-transformative worldview and myth layers. We see a myth layer that stabilizes hegemonic time, which aims to predict and optimize an empty future (Groves 2017).

The CLA from the grassroots conversations suggests the emergence of other systems, discourses, and myths, bringing our attention to overlapping tensions, which we attempt to cluster below. First, the disempowering myth of 'science as savior' sits uncomfortably with the metaphors of 'tug of war' and 'the double-edged sword of data' in Table 5. The latter two metaphors illustrate the experiences of emerging alternative stories coming into conflict with the dominant technoscientific stories of progress. One of these dominant stories is present throughout the EU documents, depicting successful carbon farming using quantitative measurements around a restricted set of variables allowing results to be commensurable in the form of credits or points to ensure that soil carbon sequestration targets are met, and the economy is buoyed. Expressions of the importance of scientific certainty through ecomodernism and techno-optimism in the EU and grassroots results at the worldview layer uphold this story. Here, soil carbon measurements represent desired futures telling us stuff about 'what soils are, who soil experts are, and what knowing and governing soils means' (Kon Kam King and Granjou 2020, p. 39). Retrieving accurate measurements is necessitated by politically and economically motivated climate goals, where soil is a resource, a sink, and an ally. What gets measured shapes relationships to soils by determining the kinds of evidence and knowledge seen as legitimate, necessarily affecting what is seen and what remains unseen. The dynamism of soil ecologies and their diverse temporalities, as well as the influence of those without access to scientific measurement methods, are erased in the science as savior myth.

However, the third metaphor of Swedish-grassroots level in Table 5 of carbon farming as a gateway drug to practicing sustainable farming for reasons that go beyond economic benefits reflects the vision of waning economic values and the surfacing of other non-economic values instead. That data is a double-edged sword further is inviting a disruption of the binary between uncertainty and knowledge, where the capacities of openness and flexibility are regarded just as important as acting with certainty. The tensions expressed on the myth/metaphor layer from the grassroots perspective manifest also on the worldview layer. On the one hand, empirical data is valorized (be it in service of proving measurements to get rewards in a carbon market or for the own farmer's sense of security about how a field is 'doing'), but on the other hand, the limitations of the mainstream evidence-based culture of decision-making are acknowledged, turning the conversation to acting without all the so-called evidence in place. This tension highlights an alternative link between knowledge and action than the one dominated by evidence-based action, where the urgency to care for soils might instead be guided by diverse partial knowledges as we learn from our attempts to respond to and care for soils with all means possible (Krzywoszynska et al. 2020). We thus see the different modes of anticipation present in the grassroots conversations, where the seeds of lived futures come up against emptied futures. The lived futures expressed in these conversations concern, for example, diversity in how we perform technology, how we eat, and how we see ourselves in relation to ecosystems, hinting at

Table 6. CLA – Seeds of possible relational futures in carbon farming.

Layer	Guiding Question	Possibilities seeded
Litany	*What concepts are used to understand why the transition to carbon farming is needed?*	Healing, responding to a lively planet, interdependence and transformation.
System	*What are the trends and drivers of carbon farming?*	Responsive and flexible economic and political systems, organized around a variety of ecological temporalities through ecological dialogues.
	Who is responsible for implementing these practices?	Practices determined by local actors in intersubjective processes.
Worldview	*What are the ideologies and discourses that underpin these concepts and systems?*	Response-able relationships with more-than-human beings and environments, working to become attuned to diverse temporalities
Myth/Metaphor	*What are the metaphors that make sense of the worldviews?*	- Seeding a new economy and society - Soil as source

the emergence of new ways to imagine agriculture and responding to a lively planet (see also Johansson et al. 2022).

At this stage, we move to trouble these CLAs by taking a speculative leap into what we see as seeds of alternative futures in the grassroots perspectives. In these seeds, we detect the multiple human and more-than-human relationships in carbon farming which generate and host a diversity of anticipatory modes and capabilities. We conceptualize these as seeds of possible relational futures that thicken the present and invite exploration into what is at stake by perpetuating the hegemonic paradigms of sustainability in agricultural transitions. We create a third CLA that demonstrates these possible seeded layers (see Table 6).

The foregrounding of contextual experiences and knowledges represented by the summative community resilience and local economies governed by local policies in the grassroots data gesture towards the need for responses that disrupt dominant linear temporalities, making room for the openness and flexibility of approaches called for by grassroots stakeholders, where taking time to care for soils might invite new roles for science and technology (Puig de la Bellacasa 2017). As an example, then, of possibilities seeded, one role of for science is to support us to engage care-fully in ecological dialogues which have a fundamentally different epistemological starting point, regarding 'nature-as-process' rather than 'nature-as-universe' (Latour 2018, p. 80). Sciences in relational futures engage in what we conceptualize as ecological dialogues with a spectrum of agents – mycorrhizal networks, humus, crops, pastures, etc. – operating along a range of temporalities, engaging in '*diversity on a high level*' (Participant, December 2021 Workshop) and working more with a cyclical or rhythmic understanding of planetary forces that move in stark contrast to the confines of '*linear systems where things leave the earth and the production systems*' (Participant, December 2021 Workshop). Carbon farming in this possible future is thus organized around knowledges based in these kinds of dialogues, where participants respond to diverse temporalities of soils again and again. The shift from the desire for scientific certainty to ecological dialogues centers the relational, inviting us to conceive of a broader spectrum of 'data'. The role of scientific inquiry becomes more clearly to develop 'knowledge tools and practices that would empower and enable various soil workers, soil users, soil citizens – what we could call soil publics – to explore their soil relationalities' (Krzywoszynska and Marchesi 2020, p. 199).

In a possible carbon farming future, how we come to know soils gains a diversity that seeds new economies and societies. Relational thinking reminds us that our practical engagement, the ways we come to know about soil matter for how we care for soil, and how we care for soil informs how we know about soil (Puig de la Bellacasa 2017; Krzywoszynska et al. 2020; West et al. 2020). We argue that staying with this complexity of our practical engagement with soils can cultivate a temporal imagination that acts as a resource for possibility thinking (Facer 2023). The thriving and resilient ecosystems of the grassroots system layer are imbued with potentiality, where the alternative myth of soil as source – as a life source – rather than resource finds resonance. This imaginative opening supports an attentiveness to the thick present and invites relational thinking. This is one of the foundations of working rigorously, hopefully, and response-ably with futures (Facer 2019).

6. Conclusion – futures seeded

The ways that futures are anticipated and imagined are not inconsequential, but open and close different pathways for farmers, practitioners, policy-makers, and other stakeholders. Using CLA, we have illustrated three snapshots of carbon farming – a hegemonic, a grassroots, and a possibilities seeded set of imaginaries. In this way, CLA illustrates the worldviews and paradigms at work in current policy and practice discourse and helps facilitate a deep examination of the qualities of strategies and frameworks aiming to address climate and related social-ecological crises. We find seeds of lived futures and a transformative set of logics which are nested in non-transformative, empty futures, where grassroots actors struggle to work in creative and innovative ways to improve their local contexts. The EU

documents demonstrate a desire for transformation on the litany layer while the deeper layers reveal a non-transformative narrative. This narrative centers humans and foregrounds techno-scientific approaches to manage social-ecological challenges. The Swedish grassroots CLA also demonstrates language and worldviews that mirror the EU documents. However, these layers also illustrate tensions with the prevalent evidence-based culture of current structures, acknowledging the importance of experimentation in transformative processes and the heterogeneity of soils. Thus, by exploring the modes of anticipation and approaches to time, we observe a temporal politics that prioritizes predictive sciences and short-term economic wins, and which denies the relational. The diverse, complex, and often ambiguous temporalities embedded in human-soil relations are rendered invisible by linear timelines oriented by the demands of production and climate mitigation. The assumptions and norms present in the EU-level CLA thus deny deep transformation.

Yet this analysis also demonstrates seeds of alternative, relational futures that we build upon in the possibilities seeded carbon farming CLA. We argue that thinking with relational futures both highlights and enriches important concepts that could facilitate new imaginaries around human and more-than-human nature needed to navigate sustainability challenges in agriculture. The purpose of illustrating this possibility space with more radical and relational ontologies is to challenge and extend dominant conceptualizations of how agricultural transformations happen – to assist in 'opening up the future' (Milojević and Inayatullah 2015, p. 154). With this, we recognize that these CLAs span over a wide variety of stakeholders with different power and agency, where imagining and enacting alternatives is riskier for some than others. A relational futures lens does not resolve the desire for safety and control that is perceived to mitigate economic and ecological risks, and which is legitimated by global political climate goals. The CLAs illustrate the grassroots capacity to imagine and begin to enact different futures that depart from current hegemonic strictures.

Our aim is not to present this analysis of carbon farming as a naïve picture of the possibilities of 'simply' reimaging this context through the lens of relational and futures thinking. Instead, this paper contributes a focus on time and temporalities that enriches relational perspectives. In this way, we hope that it can highlight some of the tensions and complexities of creating transformation in agriculture and how the substantialist assumptions that dominate are inadequate for the sustainability challenges we currently face. We argue that a focus on how anticipation shapes and is shaped by human and more than human relationships as well as on the relational nature of time offers a critical relational lens that can provide important nuance crucial to current climate and agricultural policy strategies. We find that relational futures can help draw attention to 'previously underacknowledged or undervalued aspects of the world visible and valued' (West et al. 2020, p. 319), helping to take the complexity of agricultural transformations seriously. The concept of relational futures offers a lens through which to ask different questions about the futures we desire and how we collectively move towards those futures. By critically and speculatively broadening thinking and futures visions to include the dynamic and lively earth, relational futures offers vocabulary that invites us to engage with our challenges in alternative ways and can support us to reframe relationships with lands, soils, and ecosystems.

Notes

1. The focus in this paper is agriculture and soils, though forests and oceans, for example, are also contexts of carbon farming projects. For more detailed information on carbon farming, see for example, the European Commission's Technical Guidance Handbook (https://op.europa.eu/en/publication-detail/-/publication/b7b20495-a73e-11eb-9585-01aa75ed71a1/language-en).
2. See for example, the Interreg North Sea region carbon farming project (https://northsearegion.eu/carbon-farming/.), LIFE carbon farming (https://www.life-carbon-farming.eu/.), and Carbon Action (https://www.bsag.fi/en/carbon-action-en/).
3. https://op.europa.eu/en/home.
4. One definition of a gateway drug in this metaphorical context is 'something that makes you more likely to try other things that are similar but more unusual or difficult' https://dictionary.cambridge.org/dictionary/english/gateway-drug.

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