

RESEARCH ARTICLE

Plurality in transformative change: Three co-created pathways toward nature-positive Europe(s)

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Abstract

1. The accelerating decline of biodiversity necessitates transformative change to protect nature and society, which requires innovative actions and governance strategies. This paper advances the conceptual understanding of transformative change by identifying patterns of change in three co-created transformative pathways for a nature-positive Europe, furthers participatory futuring methodologies and identifies patterns of change that can inform anticipatory governance.
2. Three distinct pathways for a nature-positive Europe from 2024 to 2050 were co-created with 23 participants during a 2.5-day workshop, through backcasting and by using the Nature Futures Framework. Post-workshop interviews with nine participants helped map their understanding of transformative change and its connection to the pathways. The pathways were then validated in a webinar and subsequently analysed with the interviews to identify underlying patterns of change in the pathways.
3. The analysis identifies distinct patterns of transformative change, each shaped by views of the participants on how change might unfold over time, as reflected in actions and milestones of the pathways. The first pathway, called *Dòigh Nàdair*, centres on the institutionalisation of biocultural principles, community stewardship and redistribution towards rural economies, with an early emphasis on phasing-out unsustainable practices, shifting societal norms through education, and later embedding polycentric and watershed-based governance. The second, *NaturAll*, focuses on sufficiency and ecological limits, combining restrictive regulation with participatory programmes, progressive caps and land reallocation, and staged policy development from pilots to broader implementation. The third,

For affiliations refer to page 17.

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Return to Nature, emphasises strengthened government mandates, expert consultation, and mainstreaming of climate and biodiversity goals through innovation and coordinated governance, with crises reinforcing support for reform.

4. Identifying these diverse patterns of transformative change in the pathways enables a more systematic interpretation of co-created pathways and links pathway actions to broader transformation dynamics. The findings further show that methodological choices shape both the content of the pathways and the diversity of futures produced, highlighting the importance of plural and reflexive pathway development methodologies.

KEYWORDS

anticipatory governance, co-production, nature-positive economy, participatory foresight, sustainability transitions, transformation pathways, transformative governance, value perspectives

1 | INTRODUCTION

The accelerating decline of biodiversity threatens nature, ecosystem functioning and biocultural diversity (Diaz et al., 2019). There is growing recognition that biodiversity loss is not an isolated issue, but the result of anthropogenic drivers embedded in societal systems (IPBES, 2019, 2024a). Recognising that a 'business-as-usual' trajectory is untenable if we are to ensure the well-being of both nature and society, many have called for transformative change through more integrated approaches (Feola, 2015; IPBES, 2019, 2024b; Palomo et al., 2025; Vogel & O'Brien, 2022). Transformative change is defined as 'fundamental, system-wide shifts in views, structures, and practices' (IPBES, 2024a, p. 12) and as a concept has become widely adopted among scientists and other societal actors (Scoones et al., 2020).

Transformative change requires the exploration of alternative and desirable futures that break with the unjust and unsustainable characteristics of the present while considering the interdependencies between human and natural systems to find leverage points for change. Futuring approaches seek to explore what probable, plausible and desired futures might be and how these futures might inform transformative pathways for taking action in the present (Muiderman et al., 2020; Pascual et al., 2022). Futuring is helpful in exploring alternative and desirable futures for the nexus between biodiversity and other sectors, such as food, water and energy.

Futures studies and methods have become prominent in transformative change-oriented research and practice to address the complexities, uncertainties and ambiguities of transformative change (Vervoort & Gupta, 2018). Engaging with the future in structured and consistent ways can foster anticipatory and deliberate strategies and 'broaden the boundaries of imagination' (Muiderman et al., 2020, p. 2). The envisioning of desired futures is seen as emphasised as essential to foster imagination, orient and motivate commitment for transformative change, and to offer directionality through visions and pathways (IPBES, 2024a; Juri et al., 2025;

Moore & Milkoreit, 2020; Pereira et al., 2019). Futuring counters business-as-usual approaches to progress and approaches that explore biodiversity futures through risk-oriented scenarios (Bennett et al., 2016).

In this paper, we focus on transformative pathways as an approach to desired futures. Pathways outline potential routes of intervention and action from the present to desired futures, informing governance strategies in the here and now (Alexandra et al., 2023; Muiderman et al., 2022). They may range from business-as-usual to incremental or transformative change (Haasnoot et al., 2024), with transformative pathways specifically aiming at fundamentally different futures. Embracing plurality in its development is crucial, as it acknowledges diverse lived realities and legitimises multiple ways of knowing (Mangnus et al., 2021; Raymond et al., 2023), thereby supporting the articulation of plural and contested futures (Colloff et al., 2021; Rutting, Vervoort, Mees, & Driessen, 2022). Because transformative change is inherently normative and contested, co-creation is essential to integrate diverse perspectives and enhance the legitimacy and robustness of pathway development (Bentz et al., 2022; Wibeck et al., 2022). Co-creation is a collaborative and participatory methodology in which multiple and diverse stakeholders jointly define problems, generate ideas, develop solutions and evaluate outcomes equally (Voorberg et al., 2015).

This paper advances the conceptual understanding of transformative change by identifying patterns of change in three co-created transformative pathways. These pathways and their patterns can inform research and decision-making for a nature-positive Europe. We define patterns of change as the underlying drivers that connect the actions and milestones of a pathway across time, including shifts in views, governance structures, practices, dynamics of build-up and phase-out, and speed and depth of change. Identifying these patterns enables a more comprehensive and communicable interpretation of co-created pathways, aligning them with broader conceptualisations of transformative change while preserving the distinct contributions of participants.

In doing so, the paper also offers methodological reflections on how co-creation processes shape both the content and plurality of transformative pathways.

To develop this contribution, we begin by conceptualising transformative pathways. We then describe the methods used to co-create three transformative pathways for a nature-positive Europe. Next, we analyse the actions, milestones, and participant perspectives within these pathways, leading to the identification of patterns of change for each of the pathways. We end with a critical reflection on the methodological choices we made and their implications.

This study was initiated and designed by researchers specialising in social-ecological systems and transformative change from across Europe, but, in accordance with co-creation principles, it was substantially shaped and informed by the diverse participants involved. To acknowledge their intellectual contributions, all participants were invited to contribute to the analysis and writing of this paper. As a result, the paper is co-authored by researchers and some participants in the co-creation process.

2 | CONCEPTUALISING PLURAL AND TRANSFORMATIVE PATHWAYS AND PATTERNS OF CHANGE

2.1 | Conceptualising transformative pathways

Pathways outline 'the particular directions in which interacting social, technological and environmental systems co-evolve over time' (Leach et al., 2010, p. 15). Desired pathways represent potential routes from the present to desired futures including short-, medium-, and long-term goals with actionable steps, presented in a sequential narrative. Pathways are used in anticipatory efforts to explore how particular futures might be realised, what choices can be made and when and how these choices can be sequenced (Muiderman et al., 2020).

For transformative pathways, these desired futures are fundamentally different futures. Transformative pathways therefore explore potential routes characterised by fundamental changes in views, structures, and practices involving the build-up of alternatives and break-down of the status quo whether through more incremental changes within current structures or a complete overhaul of societal structures (Geels & Turnheim, 2022; Hebinck et al., 2018, 2022; IPBES, 2024a). These transformative pathways are not meant as a roadmap to a future state. Rather, they provide an alternative to dominant perspectives of the future, providing insight into potential patterns of transformative change. They highlight opportunities for action and engage people in future consciousness through compelling narratives that mobilise a sense of agency and hope (Sharpe et al., 2016). Therefore, engaging with the future should then be seen as a political intervention that is inherently normative, requiring engagement with the power structures it might challenge or reinforce (Jasanoff & Kim, 2015;

Turnheim et al., 2015; Wise et al., 2014). This necessitates integrating diverse perspectives, encouraging co-creation, remaining adaptable to uncertainty and complexity, and maintaining reflexivity throughout (Moallemi et al., 2023).

In this process, we engaged with plural transformative pathways. Pluralism is the recognition and legitimisation of diverse ways of being, knowing, perceiving and relating to the world, as held by both human and other-than-human actors (de Pater, 2025). Pluralism in transformative pathways refers to two aspects. First, it acknowledges the legitimacy of diverse realities and perspectives and incorporates them into a pathway (co-)creation process: different actors bring unique experiences, knowledge and values, shaping distinct perspectives on what transformation means and how it can be achieved. Recognising and including these differences helps avoid one-size-fits-all solutions and ensures that multiple voices contribute to shaping the future (Mangnus et al., 2021). Second, pluralism involves generating multiple desired futures rather than seeking a single pathway to a single endpoint. A plural approach embraces the plural nature of change and allows for the exploration of a range of potential futures (Lazurko et al., 2023), rather than an orientation towards a single 'good future' at the expense of all other 'bad futures'. This broadens the scope of possibilities, helps embrace uncertainty and moves beyond business-as-usual approaches, fostering novelty and radical change (Durán et al., 2023; Rutting, Vervoort, Mees, Pereira, et al., 2022).

In this study, we operationalise pluralism by striving for diverse participation in a process designed to facilitate diverse perspectives on transformative change and by co-creating three distinct pathways guided by the Nature Futures Framework.

2.1.1 | The Nature Futures Framework

The Nature Futures Framework (NFF) provided the conceptual foundations for the iterative co-creation process. Developed by the IPBES Task Force on Scenarios and Models through a participatory process (IPBES, 2023; Kim et al., 2023; Pereira, Davies, et al., 2020), the NFF is designed to support the development of scenarios that centre nature while bridging diverse value perspectives. The framework distinguishes three archetypal value perspectives on human-nature relations: intrinsic values of nature (Nature for Nature), instrumental values (Nature for Society), and relational values (Nature as Culture/One with Nature). Each perspective reflects different underlying values and normative orientations, and the framework encourages explicit recognition of these value perspectives as starting points for models and scenarios (Durán et al., 2023). By foregrounding plurality in values, the NFF aims to enhance the diversity, legitimacy and policy relevance of sustainability scenarios and pathways. In this study, the NFF served as a normative and analytical lens, structuring the conceptualisation of desirable futures for a nature-positive Europe and ensuring that distinct value perspectives were maintained rather than merged to preserve plural imaginaries.

2.1.2 | Perspectives on transformative change

Another way to operationalise plurality was through plural perspectives on transformative change that emerged through the co-creation of pathways. The term transformative change is applied and interpreted differently between disciplines and individuals (Feola, 2015). This is expected, as transformative change is context-dependent and unfolds in unpredictable ways influenced by specific conditions and dynamics (Linnér & Wibeck, 2021). Furthermore, its ever-evolving and all-encompassing nature makes it difficult to define with a single and clear description (Hebinck et al., 2023). To explore the multiplicity of perspectives on transformative change, the understanding of the concept was intentionally engaged but left open for diverse interpretations in the co-creation process.

2.2 | Patterns of change in transformative pathways

To aggregate the pathways to a level that is comprehensive and communicable, we decided to identify patterns of change in the analysis of the pathway. Identifying patterns helps us align pathways with key conceptualisations of transformative change, while honouring the unique character of the co-created pathways and participant input into those pathways. We considered three underlying factors that underpin patterns of transformative change: (1) a distinction between changes in views, structures and practices required for transformative change; (2) dynamics of build-up and break-down; and (3) speed and depth of change through reformist, reconfigurational, and revolutionary approaches. These three components are analytically relevant because they reflect core dimensions of transformative change, emphasised across social-ecological systems and sustainability transitions scholarship.

The analysis of views, structures, and practices highlights that transformative change toward sustainability must operate across various domains. We understand those concepts as follows: 'Views include ways of thinking, knowing, and seeing. Structures refer to ways of organizing, regulating and governing. Practices represent ways of doing, behaving and relating'. (IPBES, 2024a, p. 12). These are important to identify because they are widely understood as co-constitutive of any societal regime: they shape how problems are perceived, how institutions are organised, and how routines are enacted. Together, they define the outlines of an emerging transformative regime. Assessing them helps reveal how the co-created pathways articulate alternative system configurations.

The focus on build-up and break-down captures widely recognised transition dynamics in which emerging alternatives interact with the destabilisation of incumbent regimes. Dynamics of build-up refer to transformative innovations that provide alternative views, structures or practices that over time diffuse, mainstream or institutionalise and thereby challenge, alter or replace the dominant system (Hebinck et al., 2022). In contrast, dynamics of break-down refer to destabilisation and phase-out of dominant views, structures,

and practices as a result of pressure and loss of stability of systems and institutions (Hebinck et al., 2022; Turnheim & Geels, 2012). These dynamics are important to identify because they describe the temporal and relational processes through which regimes evolve: the strengthening of alternative configurations and the weakening and phasing-out of existing, unsustainable ones. The combination of build-up and break-down dynamics helps identify how the co-created pathways imagine systemic changes.

To understand how speed and depth of transformative change are characterised we use reformist, reconfigurational and revolutionary approaches as a guiding framework. Reformist approaches are characterised as a deliberate and gradual process of restructuring through incremental changes that maintain societal structures (Goetz et al., 2020; Sutterlütti & Meretz, 2023). Reconfiguration approaches are characterised as systemic changes through incremental improvements and replacements of system elements (Geels et al., 2015; Geels & Turnheim, 2022). Finally, revolutionary approaches are characterised as rapid and disruptive processes of systemic changes, including an overhaul of societal structures (Geels et al., 2015; Goetz et al., 2020). These distinctions are important to identify because they capture the varying orientations, tempos, and depth through which transformative regimes may emerge. Recognising these different approaches helps clarify how the co-created pathways envision the ambition and directionality of change, as well as how they position the transformative regime relative to existing societal regimes.

Together, these three analytical components provide the conceptual basis for examining how the co-created pathways articulate system change. In the next section, we outline the co-creative process that produced the three pathways.

3 | METHODS

3.1 | Pathways embedded in an iterative co-creation process

This paper presents results from the second phase of a three-year iterative co-creation process under the BIONEXT project. The first phase focused on co-creating visions and scenarios, the outcomes of which are described in (Lazurko, de Pater, et al., 2025; Lazurko, Kim, et al., 2025). These visions represent aspirations for a nature-positive Europe. Each vision is grounded in one of the three value perspectives of the Nature Futures Framework. Extensive narratives and analyses of these visions are presented by Lazurko, de Pater, et al. (2025). The visions can be summarised as follows: Nature as Culture (*Dòigh Nàdair*): a rural-centred society characterised by strong human-nature relationships and biocultural practices; Nature for Nature (*NaturAll*): a society that mimics and embeds natural ecological processes in its organisation; and Nature for Society (*Return to Nature*): an ecologically restored and technologically advanced society. The scenarios were based on European Shared Socioeconomic Pathways (SSPs)—five possible global socio-economic trajectories

described under the IPCC community scenario framework (O'Neill et al., 2017)—which, during the first phase of the project, were enriched with considerations of nature and biodiversity (Lazurko, Kim, et al., 2025). Both the visions and scenarios served as input to the second phase that focused on transformative pathways. The outcomes of the second phase, in turn, feed into a third phase focused on strengthening and detailing transformative pathways.

In the second phase, three transformative pathways for nature-positive futures in Europe were co-created through a structured co-creation process. Drawing on the NFF and diverse perspectives on transformative change, our approach embraced uncertainty and plurality and acknowledged the speculative nature of futuring. This enabled us to balance radical imaginaries of positive futures for nature with grounded and actionable strategies. This second phase consisted of a 2.5-day pathway co-creation workshop, a follow-up validation webinar and post-workshop reflexive interviews, and a subsequent collaborative analysis and write-up between researchers and some participants. These steps are illustrated in Figure 2.

3.2 | Participant selection and co-creation

Participation and co-creation were embedded across the whole BIONEXT iterative process, of which the pathway co-creation reported here formed one phase. In total, 23 participants contributed to this phase, representing diverse sectoral domains (e.g. health, water, biodiversity) and knowledge backgrounds (e.g. policy, business, civil society). Although participants had been selected on their primary domain or knowledge background, they often worked

across sectors and backgrounds, enabling diverse views. Seventeen participants had also been involved in the previous phase, ensuring continuity in the process. Six additional participants were invited to broaden the diversity of perspectives—including Indigenous Saami perspectives—or to replace those unable to continue. Participants were identified using a snowballing approach, starting from the networks of researchers involved in the BIONEXT project. An overview of the background of the participant is provided in Figure 1.

Principles of co-creation informed both participant selection and process design in all phases. In line with a plural and transformative pathways approach, we adopted methodologies that facilitate co-creation and incorporate diverse perspectives (Wibeck et al., 2022), recognising that reality and knowledge are perceived and valued in different ways (Pascual et al., 2017). Including multiple types of expertise—from academic to experiential to grassroots (Raymond et al., 2023)—was intended not only to broaden representation but also to enhance the quality and rigour of the results through meaningful engagement (Durose et al., 2022).

Therefore, the aim was not only to gather diverse expertise, but also to enable knowledge integration and collective sensemaking over time. To this end, the process combined analytical dialogue with creative and embodied methods that encouraged participants to contribute cognitive, experiential and relational forms of knowledge (Bentz et al., 2022; Nabavi, 2022). For example, during the workshop, participants created protest signs to express their perspectives on drivers of biodiversity loss and used image theatre to articulate the dynamics and tensions within their pathways.

Co-creation extended beyond facilitated workshop sessions. It also involved iterative reflection on interim output, collective

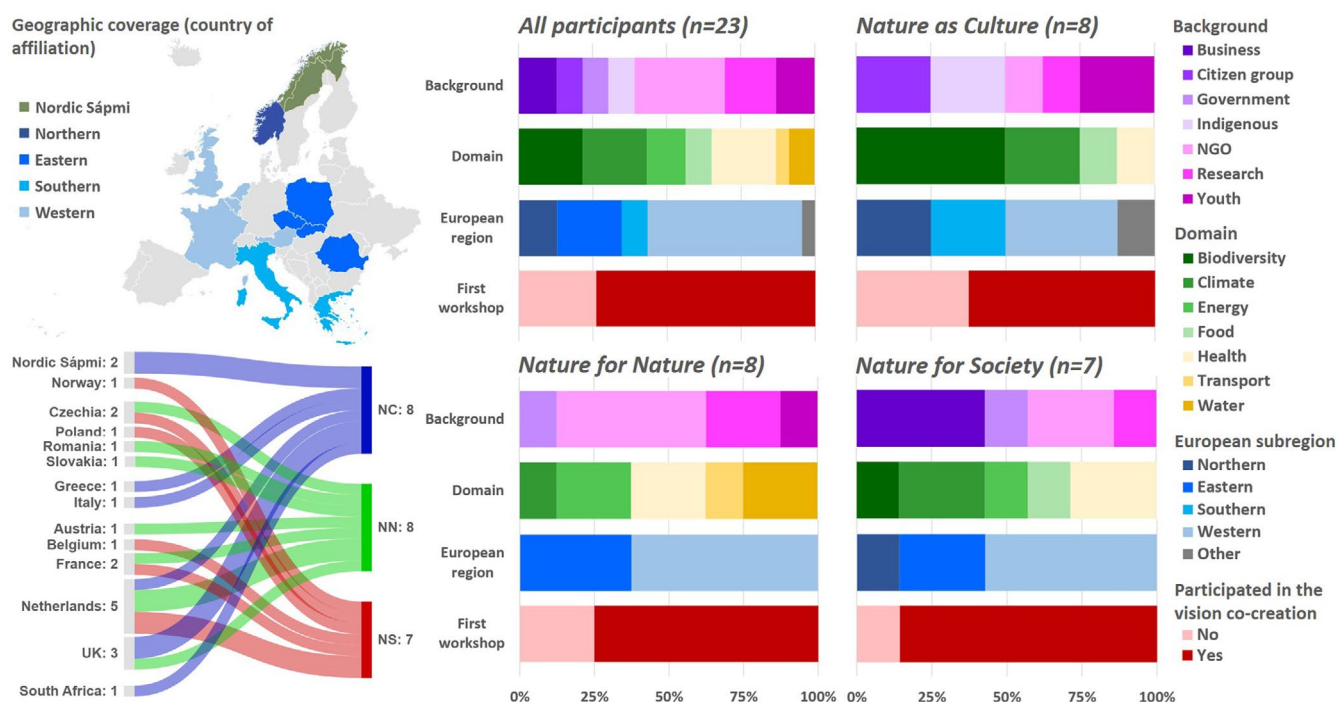


FIGURE 1 Overview of participants, participant background and grouping during the workshop.

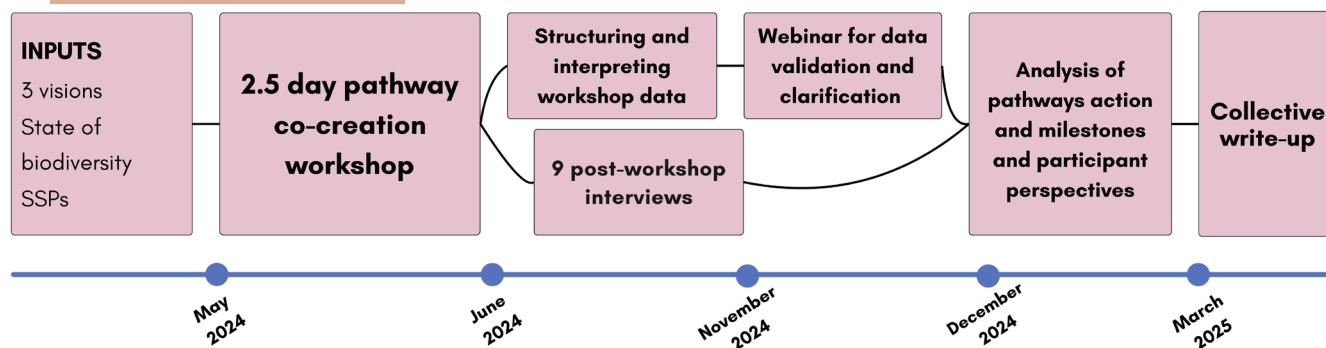


FIGURE 2 Overview of the pathway co-creation, interview and analysis process in project phase 2.

sensemaking between participants and researchers, and collaborative learning throughout the process. Participants were invited to contribute to the analysis and to co-author this paper. In this way, co-creation shaped both the development of the pathways and the knowledge production presented here.

3.3 | Methods of pathway co-creation and analysis

This section describes the 2.5-day pathway co-creation workshop, a follow-up validation webinar and post-workshop reflexive interviews, and a subsequent collaborative (between researchers and some participants) analysis and write-up. Figure 2 provides an overview of these methodological steps and their timing.

3.3.1 | Pathway co-creation workshop

The core of the co-creation process was a 2.5-day workshop aimed at co-creating transformative pathways. The workshop took place between 13 and 15 May 2024 in a carefully selected venue in the dunes of Schoorl, the Netherlands, a characteristic Dutch landscape. Constant views over the sea and dunes while brainstorming, exercises outside on the beach (e.g. a walk while listening to a podcast about visions and moving through an NFF-triangle drawn on the beach), and an excursion by a local park ranger stimulated creative thinking and a situated human–nature interaction (Angheloiu et al., 2020; Gianelli et al., 2024). During the workshop facilitators guided the participants through sessions that specifically focused on pathway creation and strengthening. The following frameworks and input provided the foundation for the workshop activities. A complete workshop program can be found in the [Supporting Information](#).

Operationalised Nature Futures Framework and associated visions

In our co-creation process, the NFF structured both the pathway co-creation process and visions co-created in the previous project phase. The visions functioned as guiding reference points (end goals) for pathway development, which connect the present to these aspirational endpoints through action. Participants were (re-)introduced

to the three visions at the start of the workshop and chose a vision they preferred to make three pathway groups. This grouping ensured that each pathway remained anchored in a distinct value perspective, thereby safeguarding plurality in the pathway outcomes. Figure 1 provides an overview of the background of the participants and their division over the groups. By structuring participation and pathway development around these differentiated value perspectives, the NFF shaped both the process design and the substantive content of the resulting pathways.

Biodiversity nexus structured backcasting

The sequences of actions and milestones in the pathways were primarily developed through backcasting using the biodiversity nexus as an organising framework. We understand the biodiversity nexus as a holistic framework that examines interdependencies between biodiversity across other domains (IPBES, 2024b), in our case the domains were climate, water, food, health, energy, and transport. A nexus approach can help foster integrated, adaptive, and transformative change across interconnected human and natural systems (Kim et al., 2024; Lazurko, de Pater, et al., 2025). Backcasting entails reasoning backward from a desired future—in this case the three previously made visions that were set in 2050—to the present, identifying the steps that contribute to realising that future. This approach combines normative elements with the consideration of deep uncertainties, sparking the development of ideas and raising sensitivity to the possible pathways that provide directions for action to achieve the desired future (Robinson, 2003).

The combined approach meant that for each nexus element, we provided end-state goals, based on the visions, and backcasting was done for each nexus element before integrating them. The Nature as Culture and Nature for Nature groups backcasted pathways, co-creating timelines by brainstorming actions on post-its and collecting these on a timeline from 2050 to 2024. However, the Nature for Society group struggled with the backcasting method and opted for a forecasting approach instead. Forecasting is a futures-oriented approach that, in contrast to backcasting, starts from current conditions and trends by extrapolating existing dynamics into the future (Dortmans, 2005).

Future wheels

To avoid fragmentation of outputs and ensure deeper engagement with the conditions and consequences of the actions and milestones, we used an adaptation of the future wheels method on three key outputs selected by the participants. Future wheels is a method to explore complexity and interrelated consequences in futuring by identifying direct and indirect consequences, deepened through several rounds (Glenn, 2009). In this case, participants used it to identify consequences as well as enabling conditions for a selection of three key actions or milestones formulated in the backcasting exercise.

Shared socioeconomic pathways (SSPs)

During the workshop, we introduced four (non-desirable) scenarios based on the SSPs—developed in a previous phase—to help strengthen the resilience of the co-created pathways. We presented these as a roleplay to make their rich and complex information more tangible. Workshop facilitators played a character living in each of the four selected SSPs, told their fictional life story situated in one of the SSPs, and they could be interviewed by the participants. This helped the participants strengthen the resilience of the pathways against the potential unfolding of dynamics described in the four SSPs.

Reflexivity

Reflexivity is widely recognised as a key capacity to navigate complex co-creative research processes where diverse perspectives are brought in (Fazey et al., 2018; Horcea-Milcu et al., 2024; Popa et al., 2015). It enables participants to engage in collective self-scrutiny and mutual learning in support

of transformative change (Lazurko, Moore, et al., 2025). In this study, reflexivity was approached both individually and collectively; we emphasised reflexivity that invites participants to situate their perspectives, positions, and frames in relation to power. Such reflexive engagement can help decentre dominant modes of thinking and acting, broaden the boundaries of discussion to invite novelty and plurality, and support the weaving together of diverse perspectives into a collective yet still plural frame (Chambers et al., 2022; Lazurko, Moore, et al., 2025; Turnhout et al., 2020).

Therefore, embedding reflexivity was considered a deliberate strategy to enhance the transformative quality of the pathway co-creation process. It was explicitly included during the workshop through six dedicated reflexivity moments of 10–20 min. During these moments, participants used a reflexivity booklet to first reflect individually, followed by discussion in small groups or plenary. Reflexive prompts in the booklet invited participants to: articulate their own perspectives and positionalities within the workshop process; observe how different perspectives interacted during the exercises and how these dynamics were reflected in emerging pathway outcomes; identify surprising situations or insights that challenged their assumptions; and reflect on how their own understanding of transformative change related to those of other participants. By structuring time and space for these reflexive engagements, the workshop sought to make the underlying assumptions, power dynamics and value differences more explicit, thereby strengthening both the process and the substantive outcomes of pathway development. A template of the reflexivity booklet is added to the [Supporting Information](#) (Figure 3).



FIGURE 3 Pictures of the methods during the co-creation workshop. 1. Position in the NFF. 2. Backcasting on a timeline. 3. Conditions and consequences using Future Wheels. 4. Image theatre. Pictures by: Maija Airos.

3.3.2 | Structuring, interpreting, clarifying and validating pathway actions and milestones

We structured and interpreted the workshop data by organising the actions and milestones across the biodiversity nexus and the emerged themes governance, economies, and norms and values. This data included actions and milestones on sticky notes, a large timeline and three future wheels, as well as notes on the discussions among participants. Interpretation was needed to link discussions to sticky notes to formulate coherent actions and milestones and correctly place them on a timeline. During a 2-h online webinar on November 20, 2024, we validated our structuring and interpretations with 11 participants and asked them to clarify data where our interpretations fell short. Two additional participants addressed the validation and clarifying questions through an online survey to ensure coverage for all pathways. We integrated the answers and discussion notes with the workshop results to refine the understanding of each pathway.

3.3.3 | Post-workshop reflexive interviews

After the workshop, between June and October 2024 semi-structured interviews were held with nine workshop participants of different pathway groups. The interviews were conducted online via MS Teams and took approximately 1 h each. Four participants from the *Dòigh Nàdair* group, two participants from the *NaturAll* group, and three participants from the *Return to Nature* group were individually interviewed. The interviews aimed to further elaborate themes from the reflexivity moments related to perspectives on transformative change, their learnings about

transformative change, and observed differences in perspectives on transformative change among participants. In the interviews, the participants could refer to their reflexivity booklets to share their reflections from during the workshop. We considered it essential to incorporate individual perspectives and experiences of the participants into the analysis, as their contributions were central to shaping the pathways. Engaging with their reflections allowed us to better understand how the pathways emerged and to interpret their content in light of the methods used and the dynamics of participant involvement. The interview guide is included in the [Supporting Information](#).

3.3.4 | Analysis of pathway action and milestones and participant perspectives

After the interviews and the webinar, we conducted a comparative analysis between pathways to identify patterns of change. The data were deductively structured around the key conceptualisations of transformative change as presented in section 2.2.4 and operationalised in [Table 1](#). Participant co-authors were involved in both the identification of key patterns and the writing. To avoid biases, the writing and finalisation of the article took place openly, with the project's researchers and workshop participants supplementing and commenting on each other's texts, and the article was completed through interactive and transparent collaboration.

3.3.5 | Communicating the pathways

The co-created pathways are large timelines and tables that include more than a hundred actions and milestones per pathway.

TABLE 1 Key conceptualisations of transformative change that structure the analysis to identify patterns of change.

Key conceptualisation	Description	Signifiers in the analysis
System-wide shifts	Views: Changing ways of thinking, knowing and seeing	Norms, values, knowledge, culture, cultural institutions, narratives, discourse, framing
	Structures: Changing ways of organising, regulating and governing	Policies, institutions, infrastructures, economies, (formal) processes, organisations, laws
	Practices: Changing ways of doing, behaving and relating	Behaviour, routines, relations, lifestyles, practices
Dynamics of change	Build-up: Transformative innovations that, diffuse, mainstream and challenge, alter or replace the dominant system	Niches, experimentation, pilots, alternatives, scaling, acceleration, emergence, mainstreaming, institutionalising, stabilising
	Break-down: Destabilisation and phase-out of dominant and unsustainable system properties due to pressure and disruption.	Destabilisation, regulating, capping, decreasing, banning, chaos, break-down, phase-out
Speed and depth of change	Reformist: deliberate, gradual restructuring through incremental changes that preserve societal structures	Tech fixes, market-based solutions, individual behaviour, no political-economic change
	Reconfigurational: systemic change through incremental improvements and element replacement	Systemic innovations, multi-level interactions, structural changes in existing structures, gradual shifts
	Revolutionary: rapid, disruptive systemic change and an overhaul of societal structures	Political-economic changes, radical and rapid shifts, critique existing institutions

In addition to distilling key patterns of change through analysis, we aimed to make the pathways more tangible and communicable by creating storylines and illustrations. The storylines were created by the research team by synthesising outputs and building on narrative elements from the discussions and creative exercises during the workshop. A condensed version of the storylines is included in Figures 4–6. The full storylines are given in the Supporting Information. Artist Maria Fraaije illustrated the three pathways following a sensemaking process in collaboration with

the first author. Beyond serving as an attractive representation, both the storylines and illustrations offer an alternative lens to interpret the pathways and encourage further imagination (Galafassi et al., 2018). By depicting the pathways using a different medium, the artwork highlights diverse aspects, raises new questions, and fosters deeper engagement for a broad audience (Moore & Milkoreit, 2020; Vervoort et al., 2024). Therefore, we deemed it important to develop and include these and align with our aim of engaging people in imagining alternative and desired futures.

Dòigh Nàdair: The way of nature

Summarized storyline

Once a restless traveller, I returned to rural ancestral land which connected me to agroecology and community stewardship. Reruralization, rights for nature, local and Indigenous knowledge, and community governance drove a transformation to reciprocal biocultural societies with a localized economy.

Nature as Culture
Relational values



Dòigh Nàdair pathway interpreted and illustrated by Maria Fraaije - Fraaijeboel

Exemplary actions and milestones

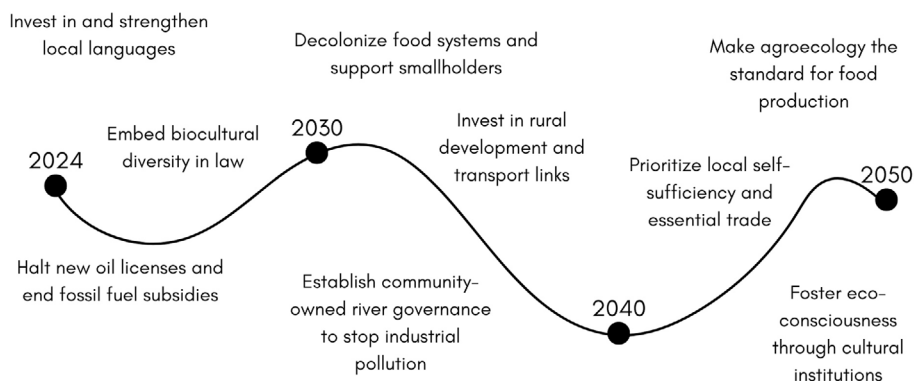


FIGURE 4 Overview of pathway 1: Dòigh Nàdair.

NaturAll

Summarized storyline

Today, May 14th, 2050, we celebrate how far we have come in building a sufficiency society. Looking back, everything has changed: vacating my house to give space to the river; my work rhythm (seasonal) and connection to work (care instead of profit-driven); my – now regulated – consumption patterns all to give equal rights to humans and nature.

Nature for Nature
Intrinsic values



NaturAll pathway interpreted and illustrated by Maria Fraaije - Fraaijeboel

Exemplary actions and milestones

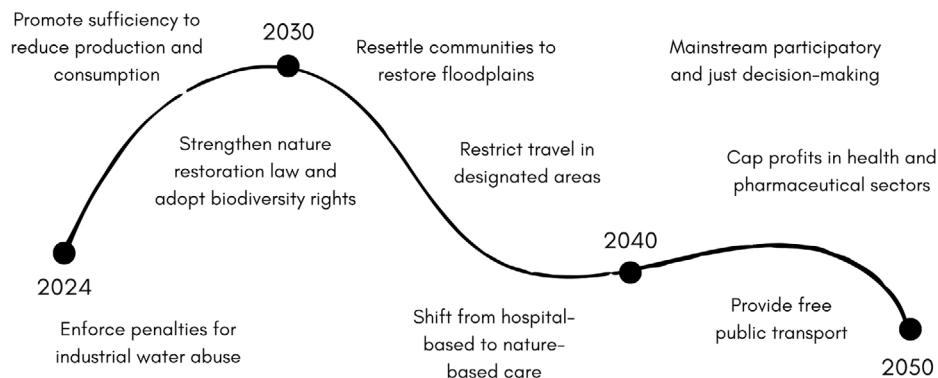


FIGURE 5 Overview of pathway 2: NaturAll.

3.3.6 | Details of ethical approval and informed consent

This study was granted ethical approval by the DPAS Research Ethics Review Committee of Erasmus University Rotterdam under reference number ETH2223-0623. All participants gave written informed consent for the use and publication of the data gathered in the workshop, webinar, and interviews.

4 | RESULTS

The three co-created transformative pathways each include distinct actions and milestones and patterns of transformative change. The following section presents the comparative analysis of the pathways through a lens of transformative change. Building on the analysis of actions, milestones, workshop discussions, and reflexive interviews, we identify changes in views, structures, and practices, as well as

Return to Nature

Summarized storyline

It is twenty years after the catastrophic flood. It took crises to move from populism to having circularity, biodiversity, and participation at the heart of governance. In my work on energy governance, I saw how hope and a new narrative of change led to collaboration across experts and stakeholders to return to nature.

Nature for Society
Instrumental values



Return to Nature pathway interpreted and illustrated by Maria Fraaije - Fraaijeboel

Exemplary actions and milestones

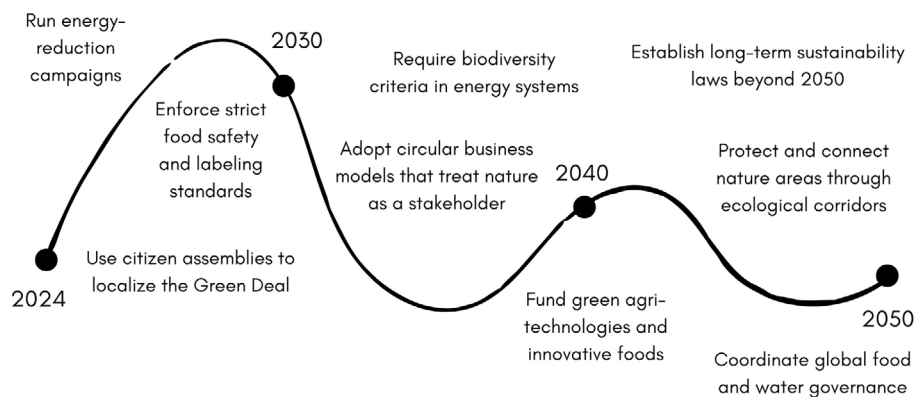


FIGURE 6 Overview of pathway 3: Return to Nature.

dynamics of build-up and break-down within the pathways. We also examine the speed and depth of change for each pathway. Together, these elements reveal patterns driving change across the pathways, which are presented at the end of the results section. Before presenting the analysis (Figures 4–6) give a characterisation of each pathway through a summarised storyline, its visualisation, and an overview with exemplary actions and milestones.

4.1 | Comparative analysis of actions and milestones in the three pathways

4.1.1 | Changing views

Here we consider views as 'ways of thinking, knowing and seeing' (IPBES, 2024a, p. 12). In terms of views, both the *Dòigh Nàdair*

pathway and the *NaturAll* pathway emphasise changing values and principles. *Dòigh Nàdair* centres the acknowledgment of local and traditional knowledge of Indigenous peoples and biocultural values—interdependence, stewardship, solidarity, care, reciprocity, resilience, continuity, sense of place, and justice—which guide structural and practical changes. This focus highlights a holistic view of human–nature relationships, prioritising ecological and societal well-being, as well as cultural and ecological diversity and continuation. *NaturAll* focuses on the normative principle of ‘sufficiency’, which is seen as both a minimum to meet basic needs and a maximum based on local ecological capacity. Beyond consumption, sufficiency drives changes in lifestyle, production, and the economy, such as reallocating land for nature instead of prioritising human desires. In the *Return to Nature* pathway, changes in views are linked to a narrative for the need for transformative change that became widely accepted after environmental and political crises. The narrative underpins policies, investments, and lifestyle changes. Education plays a role in changing views across all pathways, with *Dòigh Nàdair* also highlighting Indigenous livelihoods, languages, traditions and cultural expressions, art, and cultural institutions. *NaturAll* and *Dòigh Nàdair* focus on active stewardship and citizenship, while *NaturAll* and *Return to Nature* use awareness campaigns as strategies.

4.1.2 | Changing structures

The structural changes—which ‘refer to ways of organizing, regulating and governing’ (IPBES, 2024a, p. 12)—envisioned in the pathways relate to governance and economic systems that crosscut the biodiversity nexus. *Dòigh Nàdair* strengthens local governance through alliances, unions and cultural institutions, with policies aimed at promoting rural economies and equitable distribution of resource and land. Both *Dòigh Nàdair* and *NaturAll* institutionalise rights for nature. Additionally, *NaturAll* focuses on growing the support and mandate of existing institutions to implement long-term policies and regulations that reduce consumption, production, and vacate land for nature. Similarly, *Return to Nature* strengthens international organisations (e.g. UNEP, FAO) and establishes regional governance entities specialising in sectors like food and energy. While *Return to Nature*’s institutions focus on compliance and (technological) innovation through support and investments, their regulatory enforcement is present but less pronounced compared to *NaturAll*.

All pathways promote participation in governance. *Dòigh Nàdair* fosters local stewardship and self-governance, supported by central governments and characterised by inclusivity and consensus decision-making. Contestation and social movements also play a role in *Dòigh Nàdair* governance. Both *NaturAll* and *Return to Nature* emphasise institutionalised participatory processes, such as citizen assemblies. *NaturAll* has a top-down support strategy for local action through grassroots initiatives, citizenship programmes and community-driven policies. *Return to Nature* emphasises collaboration among stakeholders, experts and businesses to

improve governance outcomes while reducing the influence of the private sector.

Each pathway envisions different economic systems with some similarities. All pathways support economic localisation to varying degrees, with *Dòigh Nàdair* having the strongest focus and aiming to promote rural economic opportunities. All pathways encourage a shift to local production and consumption and seek resource reductions—*Dòigh Nàdair* through equitable distribution and a well-being economy, *NaturAll* through sufficiency and a degrowth economy, and *Return to Nature* through efficiency and a circular economy. Financial instruments, including taxation and subsidies, are used across the pathways, but their emphasis differs. *NaturAll* prioritises discouraging financial instruments, while *Dòigh Nàdair* and *Return to Nature* focus more on encouraging alternatives. Similarly, the role of the financial sector varies for *Dòigh Nàdair* and *Return to Nature*; actions related to finance shift funding toward desired practices and adapt monitoring, while *NaturAll* seeks to end profit-oriented logics in the financial sector.

4.1.3 | Changing practices

The last category to determine what changes the pathways propose are practices which represent ‘ways of doing, behaving and relating’ (IPBES, 2024a, p. 12). In *Dòigh Nàdair* practices change to biocultural practices and the ways people act in closer relation to nature (humans as part of nature), which centres reciprocity, care, and stewardship into practices. The pathway proposes dietary changes to culturally appropriate localised food production and consumption, shifting away from industrial to pastoral. It includes shifts in travel and mobility toward active, local and virtual travel. Production practices change to be more local, including agroecological and pastoralist practices in food production. For *NaturAll* the main focus is the shift in production and consumption practices. For example, a reduction in water and energy use and a change in diets to seasonal, native and non-processed foods. Production processes undergo similar changes as production shifts to local and seasonal and includes the reintroduction of native plants and no-monocultures. Other changed practices in *NaturAll* include enhanced citizenship activities, active mobility and shifts to annual daylight rhythm. For *Return to Nature* changes in behaviour often follow from regulating actions such as nature and efficiency centred spatial planning and development of public transport, which determines people’s mobility. Practices in businesses change to be more sustainable and enhanced civic engagement leads to new practices.

4.1.4 | Dynamics of transformative change in the three pathways

In the following two sections, we present the dynamics of transformative change using a distinction between build-up dynamics and break-down dynamics to better understand the differences

and commonalities between the pathways in dynamics of change leveraged.

Dynamics of build-up: Emergence and uptake of alternatives

Both dynamics of build-up of alternatives and break-down—destabilisation and phase-out of dominant views, structures, and practices—can be observed in the pathways but differ in intent and implementation. In *Dòigh Nàdair*, the emergence of alternatives is culturally diverse, with local initiatives taking the lead. Institutional support and funding drive the uptake of these alternatives, with changes happening primarily through bottom-up mechanisms. This fosters a landscape of diverse alternatives throughout Europe, where local practices expand into broader societal changes. In *NaturAll*, the emergence and uptake of alternatives is driven by a combination of top-down planned and implemented piloting and planned expansion of initiatives and programmes, alongside bottom-up emergence through enhanced citizenship. As they mature, these alternatives are expected to transition into mainstream practices across Europe with some local variety. In *Return to Nature*, top-down efforts, including expertise and R&D, drive the development of alternatives, with funding being a key instrument for their emergence and upscaling. As these alternatives mature, they are expected to transition into mainstream practices, aligning governance efforts at multiple levels to ensure broad uptake resulting in a more homogenous uptake of alternatives across Europe.

Dynamics of break-down: Phase-out of unsustainabilities

Break-down patterns are also visible in all three pathways. For *Dòigh Nàdair* and *NaturAll* this is done through designed system break-down. Whereas in *Return to Nature* unintentional system break-down has a role in the pathway. In the *Dòigh Nàdair*, this is more deliberate. It involves dismantling the enabling conditions for unsustainable practices, such as abolishing subsidies for extracting industries, forbidding land grabbing and extractivism, phasing-out pollution through taxation, actively phasing-out fossil fuels, and breaking with colonial mindsets and enduring structures. *Dòigh Nàdair* included contestation and the formation of alliances that provide pressure to existing systems. In *NaturAll*, phase-out dynamics through policies are central to the pathway, through Europe-wide bans, taxes, and caps on goods and activities production and consumption is reduced. The pathway emphasises breaking away from the profit-and-growth logic which might lead to a destabilisation of the economic system. Moreover, shrinking human activity on land and increasing the allocation of land for nature are key to *NaturAll*. In *Return to Nature*, the inclusion of the rise and fall of populism signals chaos and loss of stability of institutions. Subsequently, the focus lies on reduction of energy consumption and improved efficiency in resource use driven by technological advancements and includes restricting industry lobby influence, addressing green-washing and shifting subsidies, such as taxing private jets.

In summary, the analysis showed that while the pathways share similarities in their alignment with existing concepts, sectoral changes

in the biodiversity nexus, and shifts in governance, economies and values, they diverge significantly in what they prioritise as drivers of transformative change. *Dòigh Nàdair* emphasises bottom-up transformation rooted in biocultural principles, community stewardship and local empowerment, with change driven by contestation and shifts in structural conditions. In contrast, *NaturAll* combines top-down and participatory approaches centred on sufficiency, where transformation is steered through policy instruments and regulatory restrictions. *Return to Nature* relies more heavily on centralised governance, expert-led consultation, and the mainstreaming of sustainability in institutions and businesses, with public support mobilised in response to crises.

4.2 | Plural perspectives on speed and depth of transformative change

Participants articulated distinct understandings of how fast and how deeply transformative change should or would unfold. These interpretations shaped the sequencing, type, and intent of actions and milestones in each pathway. Differences between the pathways therefore also reflect contrasting beliefs about manageability, feasibility, and structural disruption. We analysed perceptions of the speed and depth of transformative change in each pathway, focusing on whether change was envisioned as reformist, reconfigurational, or revolutionary. While certain orientations were more prominent within particular pathways, all pathways incorporated elements of more than one approach. Thus, how participants envisioned the pathways' speed, depth, and feasibility resulted in different combinations of the three orientations.

4.2.1 | *Dòigh Nàdair*: Rapid rupture and deep cultural transformation

Participants consistently associated *Dòigh Nàdair* with revolutionary and rapid change. Transformative change was understood as fundamentally culturally driven. As one participant stated, 'If you look at every great social or political or ideological transformation historically, there have always been artists, poets, film makers, musicians, writers at the forefront of those movements' (D1¹). This framing positioned transformative change as beginning with rapid cultural reorientation rather than gradual policy reform.

The group also explicitly embraced radical imagination: 'Having a more radical vision [...] widens our thinking of what society could look like' (D3). This orientation translated into strong confidence in agency and manageability. Change was seen as something that

¹Interviewees are referred to with a D, N or R, referring to the first letter of the name of the pathway they worked on and a number to allow for traceability.

could be intentionally accelerated through bottom-up coalitions and contestation.

This interpretation is reflected in the actions and milestones of the pathway. Most phase-out measures, like the phase-out of fossil fuel subsidies and unsustainable practices, occur before 2030, followed by continued phase-out until 2045. Education and awareness efforts aimed at shifting societal norms are included before 2030, with embedding in EU policies and sectoral frameworks between 2030 and 2035. After 2040, efforts focus on institutionalising watershed-based and polycentric governance. Few new strategies emerge after 2045, indicating an assumption that rupture occurs early and consolidation follows. While this reflects a predominantly revolutionary orientation, the later emphasis on embedding new governance arrangements also reveals reconfigurational elements focused on institutional consolidation. Depth is therefore systemic and cultural; speed is urgent, rapid and assertive.

4.2.2 | *NaturAll*: Radical goals with staged implementation

NaturAll combined strong normative ambition with more cautious expectations about speed. Participants debated the balance between idealism and feasibility. As one reflected, 'I thought, well, we probably should have more of that reality check, when imagining those positive futures' (N1). This illustrated an internal tension about how quickly sufficiency could be institutionalised.

The pathway reflects this ambivalence. Regulatory measures such as taxes and caps progressively tighten until 2045, rather than being implemented as immediate rupture. Participatory processes, pilots and education dominate until 2030/2035, after which centralised policies with local implementation expand. Land reallocation for nature begins with pilot areas before 2035 and scales up thereafter. The introduction of a rights-of-nature act before 2030 signals normative depth, but enforcement mechanisms expand gradually toward 2050.

Transformation in *NaturAll* is deep in orientation, for example, with sufficiency as a societal principle and extensive rights for nature but sequenced in pace. This combination aligns most closely with a reconfigurational orientation, in which transformative ambitions are pursued through gradual restructuring and scaling. At the same time, proposals such as rights of nature and sufficiency principles reflect revolutionary aspirations, while the emphasis on phased implementation reflects reformist concerns with feasibility. Speed is managed through staged regulatory escalation rather than an abrupt systemic overhaul.

4.2.3 | *Return to Nature*: Incremental reform with crisis-enabled acceleration

Participants who described *Return to Nature* emphasised feasibility, coordination, and institutional alignment. One participant noted

that, 'we had quite a homogenous group with a joint view of how the world could look like' (R3), reflecting a shared understanding of change as pragmatic and institutionally grounded.

Compared to *Dòigh Nàdair*, highly radical proposals were often perceived as unrealistic within European governance systems. Participants expressed a more constrained view of manageability, highlighting political realities and path dependencies. Change was seen as possible but largely incremental. This interpretation is visible in the timing of the pathway. Crises intensify until 2030, creating momentum for a new narrative between 2030 and 2035 and broader support before 2040. Early niche connections between citizens and policy enable multi-level governance, with regional bodies emerging around 2035/2040 and commons-based management expanding after 2040. Technological innovation receives support throughout, with stronger investment before 2030, and niche business practices that scale into new business models from 2030 onward.

Here, speed is conditional: it is accelerated by crises but embedded in institutional continuity. The depth remains largely within existing governance and economic structures, focusing on mainstreaming and coordination rather than rupture. This reflects a predominantly reformist orientation, although the development of new governance arrangements and the scaling of niche innovations also point to reconfigurational forms of change.

4.3 | Patterns of change identified in the pathways

Integrating these insights reveals patterns of change—main drivers of transformative change in the pathways that underpin the individual actions and milestones—that align with both the key conceptualisations of transformative change and the unique nature of the co-created pathways and participant input into those pathways. Looking across the different key conceptualisations of transformative change and the participant perspectives on transformative change, we can identify the following key patterns of change in each pathway.

4.3.1 | Main patterns of change in *Dòigh Nàdair*

- *Institutionalisation of biocultural principles*: Biocultural values such as interdependence, stewardship, justice and reciprocity are embedded in governance and education, following an early cultural rupture driven by shifts in norms and awareness before 2030. Traditional knowledge of Indigenous peoples and rights-based approaches gain recognition, as colonial and extractivist worldviews lose legitimacy through contestation and changing framework conditions.
- *Community stewardship and bottom-up diversification*: Inclusive decision-making enables a landscape of diverse alternatives. Agroecological production and place-based livelihoods expand through decentralised initiatives, gradually reducing reliance

on centralised industrial systems, reflecting a strong belief that transformation can be intentionally accelerated through grass-roots mobilisation and collaboration.

- *Deliberate phase-out of unsustainable and colonial structures:* Extractive subsidies are abolished, land grabbing is banned, and fossil fuels are phased out, with most disruptive measures occurring early in the pathway. Unsustainable economic structures are actively dismantled, while regenerative and community-led systems are strengthened.
- *Strengthening local economies and (re-)ruralisation:* Wealth and decision-making power are redistributed to rural and remote communities, with institutional consolidation occurring after 2040. Local production and consumption systems are reinforced, reducing dependence on globalised supply chains and revitalising rural livelihoods. Health services—following a One Health approach—are brought to rural and remote areas.

4.3.2 | Main patterns of change in *NaturAll*

- *Institutionalisation of sufficiency and ecological limits:* Sufficiency becomes a guiding principle for production, consumption and land use, introduced early but progressively tightened over time. Europe-wide caps and ceilings define ecological boundaries; land is prioritised for nature restoration over intensive human use, and the rights of nature are recognised. Growth-oriented logics are replaced by stabilisation at lower levels of resource use.
- *Restrictive regulation and planned phase-out:* Unsustainable practices are reduced through bans, taxes and regulatory limits. High-impact sectors contract as policy frameworks deliberately shrink environmental pressures. With measures escalating gradually between 2024 until 2045, rather than occurring as immediate rupture.
- *Top-down piloting and enhanced citizenship:* Policy programmes begin with participatory processes and pilots before 2035, evolving into more centralised frameworks with local implementation. Delegated implementation, citizen assemblies and stewardship initiatives support behavioural change within clearly defined ecological boundaries.

4.3.3 | Main patterns of change in *Return to Nature*

- *Crisis-driven consolidation of a sustainability narrative:* Environmental and political crises intensify before 2030, creating momentum for reactive narrative shifts between 2030 and 2035, which increase public acceptance of transformative change. Sustainability becomes a widely shared policy objective, and previous governance arrangements lose legitimacy.
- *Strengthened and expert-led governance institutions:* Governmental institutions gain mandate and technical expertise, with reforms unfolding incrementally through coordination and institutional

layering rather than systemic overhaul. Policymaking integrates citizen and expert consultation, and coordination improves across sectors and levels of governance.

- *Mainstreaming of climate and biodiversity in policy and business:* Climate and biodiversity objectives are embedded in public policy and corporate strategies. Gradually implemented compliance mechanisms and reduced lobby influence support consistent implementation.
- *Enabling innovation and technological advancement through incentives:* Positive incentives, research funding, and circular economy policies create conditions to stimulate innovation across Europe, with early investment enabling gradual scaling up and mainstreaming of new business models that are efficient and less polluting

5 | DISCUSSION

The co-creation methods that were employed facilitated coherence within pathways, effectively aligning them with existing debates and ensuring that each pathway was relatively broad (cross-sectoral). However, this coherence came at the expense of exploring the diverse perspectives between groups, which could have further enriched the pathways. Although there was strong plurality between different pathways, the methods fell short in fostering constructive conflict, contestation and divergence—elements that could have sparked novel ideas and deeper exploration of alternative perspectives that could lead to more radical pathways.

5.1 | Coherence versus plurality

While reflexive interviews revealed diverse perspectives on transformative change. These differences were not prominently reflected within the pathways. Having three pre-assigned visions and value orientations helped ensure plurality between pathways. However, participants self-selected into groups, resulting in homogeneity in worldviews and assumptions. *Return to Nature* was seen to be more technocratic and male-dominated, while *Dòigh Nàdair* lacked business representation and was the only group with Indigenous representation. More generally, the participants of the workshop were diverse in terms of knowledge and geographic background, but the majority tended to be highly educated, urban, and progressive. This restricted plurality within pathways also limited the broadening of perspectives (Delina & Sovacool, 2018; Tengö et al., 2014).

This homogeneity within in turn enabled coherence and consensus in the directionality of the pathways, but gave limited opportunities in utilising the benefits of diversity: the possibility of including diverse directions may benefit responding to emerging issues (Bulah et al., 2024). The overall workshop structure—with predetermined visions, backcasting, linear timelines, templates, and a tight agenda—also favoured singular and neat trajectories over complex, messy

transformations, and limited space for plurality to emerge (Stirling et al., 2023). It reinforced a consensus-building dynamic, focusing on alignment rather than surfacing fundamental differences and engaging in 'constructive conflict' (Cuppen, 2012). Some participants observed that emerging narratives, often led by dominant voices, sidelined divergent ideas: 'we sort of discarded them quite quickly' (R3). Whereas another expressed a desire for more space to identify disagreements: 'It would be really great to have the space for identifying more disagreements in the group' (R1). Avoiding this requires workshop designs, facilitation and participation around divergence and constructive conflict. Diversity and constructive disagreements can foster novel approaches (Cortés-Capano et al., 2022; Cuppen, 2012; Miller & Wyborn, 2020), suggesting that their relative absence may have limited the novelty of the pathways.

Similarly, the analysis we did for this paper—which focused on finding patterns of change—also sought coherent patterns in the pathways rather than outlying or unique perspectives. Thereby strengthening the dominant underlying ideas within the pathways. These also show clear distinctions between pathways and diverge from business-as-usual. They do not contribute to greater plurality within the pathways. Analysis could also centre on unique elements, which preferably combined with pathway co-creation methods could lead to results that highlight diversity within the pathways.

Future co-creation processes would benefit from greater diversity within groups and using methods that actively surface fundamental differences and assumptions (Cuppen, 2012). Additionally, the embracing of pluralism must take the needs and opportunities to participate into account. For example, by developing participation methods suitable for different groups—including those in vulnerable positions, different personality types, linguistic and cultural groups, and by upholding the principles of a safe enough space (Pereira, Frantzeskaki, et al., 2020).

Arguably, this is needed for novel ideas that can challenge hegemonic ideas and status quo assumptions that now remained unchallenged (e.g. the role of the EU, democratic nation-states, the dominance of neoliberal economic decision-making). An alternative approach to foster plurality within pathways is to work on 'branching' pathways where key differences can exist within the structure of pathways with different endpoints. This is, however, challenging to combine with a backcasting approach, which helps to uphold a desired and ambitious endpoint (Robinson et al., 2011; van der Voorn et al., 2023).

Moreover, the post-workshop reflexive interviews revealed that participants had diverse interpretations of the aims of pathway co-creation, with some focusing on practical, feasible pathways through technical expertise, while others sought radical alternatives via creative imagination. This divergence arose from facilitators presenting a broad and multi-interpretable goal for co-creating transformative pathways. The methodology combined anticipatory and speculative approaches (Munera-Roldan et al., 2025). While anticipatory methods integrated sectoral knowledge through professional expertise, speculative methods fostered radical imagination via creative methods such as image theatre and reflexivity. However, ambiguity

in goals led to varied degrees of radicality among participants and pathways, given the relative homogeneity of the three groups. To enhance the process, it is recommended to clarify the goals and assumptions of each exercise, balancing speculative pathways that inspire radical imagination with anticipatory pathways that develop concrete strategies for transformative change. Future work will also benefit from a deeper exploration and understanding of the effects of participants' ontological and epistemological perspectives through additional reflexivity dimensions—such as learning processes and changes in perspectives (Mäkinen-Rostedt et al., 2023)—as a form of practical transformation from below through enhanced futures literacy (Mangnus et al., 2021).

5.2 | Discursive variations

The design of the workshop led to integrated pathways across the biodiversity nexus: it brought together experts from across the nexus, adding depth to each pathway with established concepts and frameworks. This led to the integration of expertise-specific concepts into the pathways in novel ways, balancing concepts that were academic as well as practice-oriented.

For example, *Dòigh Nàdair* draws on biocultural principles such as stewardship, decoloniality, solidarity, and reciprocity (aligning with e.g. Caillon et al., 2017; Elands et al., 2019), as well as One Health—an integrative approach to health that considers the interdependence of humans, animals, and ecosystems (Keune et al., 2022; Nzietchueng et al., 2023). It also aligns with agroecology and food sovereignty, both of which emphasise ecological resilience, local and traditional knowledge, and democratic control over food systems (Altieri et al., 2012; Holt-Giménez & Altieri, 2013). *NaturAll* centres on the principle of sufficiency, which, following Spengler (2016), defines sustainability as meeting basic needs within ecological limits, setting both a minimum and a maximum for resource use. *Return to Nature* focuses on nature-based solutions (e.g. Kabisch et al., 2016; Seddon et al., 2020) and frequently draws on language from transition theory, such as the use of 'niches' (e.g. Smith & Raven, 2012), as well as governance concepts like policy mainstreaming (e.g. Karlsson-Vinkhuyzen et al., 2018). All three pathways include rights for nature (e.g. Ghijssels, 2023; Guayasamin et al., 2021), and all three pathways seek to align with alternative economic models: a well-being economy in *Dòigh Nàdair* (e.g. Fioramonti et al., 2022), degrowth in *NaturAll* (Kallis, 2011; Kothari et al., 2014) and circular economy in *Return to Nature* (Ghisellini et al., 2016).

Although this added depth to the pathways, it also brought about discursive variation both *within* pathways and *between* pathways. For example, the concept 'community ownership' was included in all pathways, but was diversely understood between pathways and between individual participants. Many of the mentioned concepts can be considered 'boundary objects' requiring a certain interpretive flexibility (Leigh Star, 2010), which is helpful in collaboration between disciplines or societal groups (Brand & Jax, 2007). Due to time constraints in the workshop, assumptions and understandings

of these concepts could not be explored in detail, leading to their inclusion without critical engagement. However, without critical reflection, boundary concepts risk becoming performative (Hebinck et al., 2023). The discursive variations between and within the pathways demonstrate how different interpretations of the same concept can shape actions, governance choices, and envisioned transformative pathways, thereby influencing broader social structures, relationships, and power dynamics (Jasanoff & Kim, 2015). As argued above, this can be avoided by creating space for participants to explore and challenge assumptions and engage in constructive conflict over competing interpretations of these concepts (Cuppen, 2012). Such processes help clarify what broad concepts like circular economy or community ownership mean in a given context, reducing ambiguity and enabling more concrete pathways.

6 | CONCLUSIONS

This study underscores the urgent need for a plurality of transformative pathways to inform transformative actions and governance. Through a co-creative process, three distinct pathways for a nature-positive Europe from 2024 to 2050 were co-created, each reflecting diverse perspectives and unique patterns of transformative change. *Dòigh Nàdair* emphasises bottom-up transformation through community empowerment and biocultural principles, *NaturAll* combines top-down regulation with participatory approaches centred on sufficiency, and *Return to Nature* relies on centralised governance and expert-driven strategies. The analysis reveals that while there was strong plurality between pathways, the methods used tended to converge towards dominant frames, limiting diversity within group outputs. The focus on generating coherent narratives, coupled with limited space for disagreement or constructive conflict, constrained plurality within each pathway. This emphasis on coherence contributed to *Return to Nature* being shaped as a more incremental pathway with practical intentions, whereas *Dòigh Nàdair* and *NaturAll* leaned toward more speculative, revolutionary transformations. Despite these tensions between directionality and plurality, the pathways illustrate how different patterns of change can lead to nature-positive futures, translating perceptions of transformative change into actionable strategies for researchers and practitioners. The plurality of pathways and the richness of their narratives help move beyond business-as-usual approaches, engaging people in the diverse patterns of transformative change. For future co-creation efforts, it is crucial to aim for greater diversity within groups and clarify the aims of pathway co-creation, balancing speculative and anticipatory approaches. By doing so, we can better explore a plurality of desired futures and maintain the radical ambition and urgency needed for transformative action.

AUTHOR CONTRIBUTIONS

Mara de Pater and Aniek Hebinck conceived the ideas and designed the methodology. Mara de Pater led the writing of the manuscript.

Mara de Pater, Aniek Hebinck, Symke Nieboer, Anita Lazurko, Elizabeth Díaz-General and Aron Teunissen collected and analysed the data. Robbert Biesbroek, Laura Pereira, Samia Baadj, Anna Chilton, Seweryn Krupnik, Richard Kock, Klemetti Näkkäljärvi, Mathijs Rozemuller and Eirini Sakellari were participants in the co-creation process and contributed to the analysis and write-up. All co-authors contributed insights and text to the manuscript and revised and approved the final version.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

Workshop and webinar data are shared in the publicly accessible data repository 'EUR Data Repository' under this reference <https://doi.org/10.34894/VSGHGA>. Interview data is not shared as it includes sensitive personal information and identifiable information.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Supporting Information S1. Full pathway narratives, detailed workshop methodology and programme, interview protocol and reflexivity booklet.

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